The Development of the Agricultural Sector of Colombia into the 1960s

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Abstract

In the nineteen sixties in Colombia many politicians still believed that increases in agricultural production required capital intensive large production units, and Berry showed that employment and production could increase if technology and other inputs were delivered to medium and small farms.

These ideas supported policies of land reform, as long as it generated productive units of sufficient size. Berry also discussed the inevitability of solving extreme poverty in the rural area through rural urban migration, since given the large number of farms with insufficient land to guarantee a decent income, migration was called for to increase rural wages.

Keywords: Agricultural development, 1960-1969, agricultural policy, agricultural industry, Colombia.

Desarrollo del sector agrario en Colombia en la década de 1960

Resumen

En los años sesenta en Colombia muchos políticos todavía creían que los aumentos en la producción agrícola requerían grandes unidades de producción intensivas en capital y Berry mostró que el empleo y la producción podrían aumentar si la tecnología y otros insumos fueran entregados a fincas medianas y pequeñas.

Estas ideas apoyaban políticas de reforma agraria, siempre y cuando generaran unidades productivas de tamaño suficiente. Berry también discutió la inevitabilidad de resolver la pobreza extrema en el área rural a través de la migración urbana rural, dado que dado el gran número de granjas con tierras insuficientes para garantizar un ingreso decente, se solicitó la migración para aumentar los salarios rurales.

Palabras clave: Desarrollo agrícola, 1960-1969, política agrícola, industria agropecuaria, Colombia.

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Foreword

I have kept a bound copy of some of Albert Berry's mimeographed studies on *The Development of the Agricultural Sector of Colombia*, dated around 1971, as source material for my lectures on Colombia's early economic development. I was therefore very glad to hear from Hernán Jaramillo that, after many decades, the Universidad del Rosario planned to publish the draft of *The Development of the Agricultural Sector of Colombia into the 1960s*. Upon hearing this news, I agreed to write a short foreword to the volume because I had used the material throughout the years in my courses on Colombian economic history and in my economic policy recommendations. Other researchers, including Salomón Kalmanovitz, also found Albert Berry's 1960s papers useful for their studies on Colombian agriculture.

In this brief note I will mention which aspects of the work influenced Colombia's later economic history, and to some extent public policy.

In the first place, the papers are remarkable for the wealth of data presented. Albert used every kind of data available mid-century Colombia, particularly the 1960 agricultural census, as well as an array of local studies that described production and demand for agricultural products. His tables on production and income generation by different-sized agricultural production units made it possible to calculate rural income distribution. In combination with the urban income distribution calculated by myself and Elsa de Sandoval, (see Miguel Urrutia y Albert Berry, (1975) *La Distribución del Ingreso en Colombia*) this made it clear that poverty was concentrated in the rural sector and suggested that public policy be mobilized to increase the productivity of small and medium-sized farms as the best way to diminish a portion of extreme poverty.

This idea became government policy in the 1970s with the establishment of the Comprehensive Rural Development (*Desarrollo Rural Integrado*

- DRI) program, which was designed to invest in technology transfer, rural infrastructure, and credit, in areas with a concentration of small and medium-sized agricultural units capable of generating acceptable levels of farm income. DRI was not a substitute for land reform, as some critics maintained, but an attempt to improve rural incomes where land reform was difficult to implement but an increase in family income was possible within the existing land tenure.

In the 1960s, many politicians in Colombia still believed that increases in agricultural production required large, capital-intensive production units, and Berry showed that employment and production could increase if technology and other inputs were delivered to medium and small farms.

These ideas supported land reform policies, as long as they generated productive units of sufficient size. Berry also discussed the inevitability of solving extreme poverty in rural areas through rural-urban migration, since given the large number of farms with insufficient land to guarantee a decent income, migration was called for to increase rural wages.

Miguel Urrutia Montoya
Bogotá, April 2017

Presentation and Acknowledgments

The material of this book was circulated to a few friends and colleagues soon after it was written, while I was a member of the Economic Growth Center at Yale University. For various reasons it was not revised and edited for publication at that time. In view of the important events currently transpiring in and around the agricultural sector of Colombia and the possible usefulness of additional historical material, it is now being published essentially as it was left in the late 1960s. I have not reviewed the available material in detail recently, so their may be errors of fact that I am not aware of, either in the numbers presented or of other sorts. Many useful studies of Colombian agriculture have been undertaken in the interim, though they may not have covered the same material as included here.

Because of the unrevised nature of the material the mode of presentation varies from chapter to chapter. Table numbers are not continuous (i.e. there may be no Table 5 in a given chapter) but their order has been maintained, sometimes through the use of decimals (e.g. Table 10.1). An attempt has been made to assure the accuracy of references in the text to tables that are located either in the text or in the appendix.

I am very grateful to Professor Hernan Jaramillo of Rosario University for suggesting the publication of the volume in one of our discussions of agriculture during my visit to the University over the first semester of 2014, and for arranging the derails of the process. I also thank Miguel Urrutia and several former colleagues at the Economic Growth Center for providing helpful comments some decades ago.

November 2016

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INTRODUCTION

Colombia in the 1960s is midway along a development path which has brought it from a poor agricultural, war-ridden country at the turn of the century to a semi-industrialized, increasingly urbanized country at present. The measures of change are impressive: average income has probably more than doubled; the share of the active population engaged in agriculture has fallen from about 75[1] percent to about 45 percent; the share of total output coming from agriculture has fallen from about 50 or 55 percent to less than 30 percent. But for all this the Colombia of the 1960s has been a struggling economy with an unimpressive growth record, and based on a society whose characteristics make a mobilization of forces towards economic and social development very difficult. Income per capita has remained almost constant over the decade starting in 1957 with the dramatic decline of coffee prices, as an accelerating population growth--now estimated at 3.5 percent per year (and threatening to rise still higher)--has just about eaten up the increases in total income. Impressive efforts are currently being made by the Lleras administration to get the country off dead center and though these may be starting to pay off and should do so in coming years, the overall effect so far has naturally been small. And it is clear that to attain a rate of development sufficient to alleviate the most pressing economic and social ills even within 30 or 40 years, a greater and better designed attack on poverty must be mounted.

In this Colombia of the late 1960s, agriculture remains the key sector in many crucial respects; the country's growth and development depends, at

least in the short run, more heavily on change within agriculture than on what happens in any other sector of the economy, since agriculture as well as providing most of the current export earnings, is the most promising source of new potentially large scale exports. And much of the abysmal poverty which continues little abated is found in the densely populated minifundio regions of the Colombian highlands.

Agriculture may provide a possible way out of Colombia's present stagnation (there is ample evidence that exports can be expanded if appropriate policy measures are taken). But the increasingly marked dualism, as more and more modern mechanized agriculture competes with a slower changing traditional sector, signals caution. An incautious agricultural policy, aimed only at output increases, may guarantee the continued, or even deepening, misery of the small minifundias and the landless farmer, even the forgotten man in the councils of government. Such an event, to be sure, does not appear inevitable; men in positions to make or affect decisions, on agricultural policy are not unaware of the problem, and there is evidence that policy packages could be put together which would not lead to this disastrous result. But optimism for the future is tempered by a close look at past (and even present) agricultural policy, and by the worsening income distribution, which, as we shall see, has indeed characterized Colombia's agricultural population over the last three decades. A successful policy must be a policy which breaks markedly (but carefully) with the past.

This study takes an historical look at the development of the agricultural sector, with a view to learning things of current policy relevance. It attempts to explain some aspects of the process of growth and change which has been occurring more or less since the turn of the century, how this process has been affected by agricultural policy and exogenous factors, and what patterns of development are likely to occur with the application of current policy changes.

CHAPTER I

An Introduction to the Development of Colombian Agriculture and to Current Policy Issues

Why Are Colombian Farmers Poor?

By any absolute standards, Colombian agriculture taken as a whole is unproductive on a per worker basis and Colombian farmers are poor. The low productivity is not evidenced by generally high prices of agricultural produce but by the high share of the population still found in agricultural pursuits, and their low average incomes. Since our major concern in this study is the process of change in agriculture during this century, it is important at the outset to point out that we will give relatively little consideration to those factors which contribute or have contributed to the very low incomes in the agricultural sector (and since the agricultural sector has always been the most important one, to the low incomes of Colombians in general) unless they are also important in determining the rate of change of incomes, output, and the distribution of income over the period of interest. Thus we will place relatively little emphasis on the question of land tenure when discussing possible policy measures to alter the growth of output, income, and income distribution; policies having to do with changes in tenure seem unlikely keystones for agricultural policy in the next couple of decades, barring a revolution, and might in any case not be efficient policies, given the present starting point. The distribution of land and the forms of tenure are, therefore, less interesting in the analysis of change than in the historical explanation of the current levels of income. It seems probable that the original

distribution of land is the basic cause (or at least an important component of a set of interrelated causes) of most of Colombia's current economic and social ills. It is almost certainly the factor which distinguished the development of most of the South American countries from others which were settled on the basis of a relatively even distribution of land and the family farm system. In other words, Colombia would probably not be a poor country today if the original distribution of land had been fairly even.[2]

With the distribution of land Colombia has had throughout its history, it is not surprising that the engines for change and progress were rather weak ones,[3] and that Colombian agriculture was in a backward stage at the turn of the century. It remained generally underdeveloped from a technological and infrastructural point of view until about World War II. Since then a modern technical agriculture has sprung up; it accounts now for perhaps 25-30 percent of crop output (and perhaps about 20-25 percent of crop and livestock output--since the share of livestock production which one could call modern or technical is smaller than in the case of crops) though it sustains only a very small portion of the agricultural population. Before World War II one could ascribe the low output levels in agriculture to the limited opportunities of most farmers due to the lack of information and improved inputs (these affecting lack of government initiative in part) and the limited interest of some of the large ones. Now, ironically, the combination of the distribution of land and the modernization process on large farms is creating another potential danger to the welfare of many.

Large farmers are technifying, mechanizing, and increasing their output, while the small farmers who do not have such easy access to the newer modes of production are unable to do so in the same degree;[4] at the same time mechanization in the large farms is decreasing the demand for labor, and thus putting laborers out of work and forcing them either back to subsistence agriculture or out of agriculture entirely.

The spectre of worsening income distribution and continuing poverty darkens still further in view of the fact that the larger size farms still have relatively low productivity in some respects, hence have large potential for increased output. This would not, as we see later, be particularly disturbing if one could anticipate that the bulk of their increased output would go to the export market, or if one believed that price elasticity of supply on the large farms was high, so that when prices went down a little they would draw back and shift funds to other sectors. But both of these "outs" are problematic. At present, profit rates on large farms vary widely; they are very high on efficiently run farms, often reaching 20 to 40 percent of the commercial value of the land, and somewhat less on all invested capital. But independent evidence suggests that many of these farms are not run efficiently by U.S. or European standards; these rates of profit are achieved in Colombia by part-time farmers.

Public policy has in many ways contributed to the dual effects of the revolution of commercialization in the post World War II period. For example, agricultural machinery (like much other machinery) has usually been imported at subsidized prices;[5] such machinery cannot be used on the

very small farms (partly because of the economics of large scale use, and partly because many small farms are on hillsides) and therefore helps the large farmer relative to the small one. Credit goes more easily to the large farmer; so do most modern inputs; roads tend to be built in areas of large farms rather than in those of small farms, and so on. Agricultural policy, as we shall see later--has perhaps not had much of a biasing effect until recent years, since earlier there was little which deserved the name of agricultural policy. The dangers of a policy distorted in favor of the large-scale farmer increase as the institutions become more serious and more effective.

Land distribution, therefore, has at all times played a nefarious role in the rural drama of poverty. A related aspect of the scenario in most regions of the country has been the rural cast system, maintained, by a series of factors including the (sometimes quite deliberate) withholding of public education. The absence of education has probably been second only to the original land distribution in terms of its long-run contribution to the maintenance of poverty and income inequality.[6] One mildly positive feature of present developments is the gradually increasing penetration of rural education as of the last couple of decades; it should have some income equating tendency. The government cannot take full credit for the improvements, however, since many of the schools have been built by Accion Comunal groups.

While original land distribution (and the associated distribution of power, class system, etc.), may be thought of as the basic cause of past and current poverty, the proximate causes at the moment may be identified as not just small farms, but also backward technologies,

underdeveloped market systems and lack of infrastructure.

Where Agriculture Fits into the Economy

The relationship between agriculture and the overall economy in Colombia has been rather typical of that in many developing countries. The shares of population engaged in and income generated from agriculture are high but declining fairly rapidly; agriculture has been the main source of exports (primarily coffee) and few agricultural products have been imported; output and income per capita are lower in agriculture than in the rest of the economy; agriculture has been moving increasingly into the market and money economies, though the ties are still weak for some regions and some types of farmers. Table I-1 suggests that the share of all ourput coming from agriculture fell from about 40-45 percent around 1928 to about 30 percent in 1967;[7] the decline was gradual, with occasional fluctuations largely related to coffee price movements in the international market. In constant price terms the decline was considerably greater (about 55% to 29% over the same period) since relative prices of agricultural products did rise from the start of the period under consideration to about the mid 1950s. The percent of the labor force in the sector also fell substantially from almost 70% to around 45%.

The average income per capita in agriculture has been secularly rising faster than that of the economy as a whole,[7a] with the result that the originally very large differential (see Col. 9) has diminished somewhat, though it is still only a little over 50%, an eloquent testimony to the continuing prevalence of very low incomes in the sector.[8]

Table I-1

I-9

Output, Income and Employment Data of Agriculture, Compared to Non-Agriculture
Five Year Averages, 1925-1967

	(1) Value Added in Agriculture: Constant Prices of 1958 (Millions)	(2) Value Added in Agri/Tot Output (Current Prices)	(3) Value Added Agri/Total (1958 Prices) Millions	(4) Employment in Agri. (thous.)	(5) % of Total Employment	(6) Output per Capita (58 Pesos)	(7) Output per Capita Agri/ Nonagri.	(8) Income per Employed Person in Agriculture (58 Pesos)	(9) Income per Employed Person Agri/ Nonagri. (58 Pesos)
1925-29	2070.1	37.0	53.5	1756	67.6	1178	40.1	1081	27.9
1930-34	2488.5	38.8	51.8	1870	65.4	1330	44.4	1171	33.5
1935-39	2636.2	36.0	48.1	2015	63.7	1407	40.9	1390	32.1
1940-44	3072.5	33.9	46.1	2125	61.4	1444	40.9	1524	32.5
1945-49	4121.9	35.4	43.2	2193	58.5	1879	45.5	2053	39.0
1950-54	5825.0	38.1	36.2	2217	54.8	2627	47.6	2604	50.9
1955-59	5825.0	36.7	33.8	2314	52.2	2949	51.2	3032	53.1
1960-64	5825.0	31.7	31.4	2447	49.1	3245	51.1	3169	47.6
1965-67	5825.0	30.1	29.1	2559	46.2	3444	52.7	—	50.2

Source: Table A-9.

The above figures, while valid in representing the pattern of change in the importance of the agricultural sector may tend to underestimate its relative importance; in a sense activities like transport and commerce are derivative of those sectors which produce the physical good which is consumed, i.e. especially agriculture and industry. This relationship may be thought of as one of close complementarity in production; when the factors used in such complementing sectors as commerce are in excess supply (likely to have been the case in Colombia given the big labor component) increases in their output are really attributable to increases in the batput of the basic sectors on which they depend. There are of course many unmeasured complementarities both in production and in consumption, and these, along with lack of information on which secondary activities do tend to use mainly "surplus" resources make it impossible to answer with any precision the question "if agricultural output rose by 1% (in some sense exogenously), by what percent would total output rise? If one assumed (in an arbitrary fashion) that all of the output in commerce and government, and one half of that in transportation, financial services and personal services was produced with surplus resources (labor and otherwise ungenerated savings), and assumed that the ratio of these complementary activities to agricultural output was the same as for output of other "basic" sectors, then its relative importance would be as indicated in Col (2) of Table I-2; it shows agriculture as the dominant sector over the whole period, only in the 1960's finally dropping below its previous contribution of .45-50%. The assumption that some forms of output are easily expandable because of the factors they use indicates that we are talking about a sort of multiplier effect from an increase or decrease

Table I-2

Indicators of Agriculture's Importance in the Economy Over Time

	(1) Agri. Share of All Income Generated in "Goods-Producting" Sectors [1]	(2) Agri. Share of All Income Generated in "Scarce Factor" Sectors	(3) Implicit Multiplier for an Exogenous Increase in Agricultural Output
25-29	57.61	45.94	1.24
30-34	63.27	51.07	1.31
35-39	58.45	47.51	1.32
40-44	53.32	43.30	1.28
45-49	56.54	45.64	1.29
50-54	63.75	51.00	1.34
55-59	60.61	49.20	1.34
60-64	54.07	43.44	1.37
65-67	53.21	42.07	1.40

[1] i.e. agriculture (including forestry and fishing), mining, manufacturing, construction, and utilities.

in agricultural output--an effect which would be measured by the "multiplier" of Col. (3) if the non-basic activities were perfect complements in production to the basic ones and there was an excess of all the factor supplies needed in them.[9] (When its share of goods-production activity is measured (Col. 1) agriculture's role looks even higher, but this sometimes mentioned indicator has little economic meaning.) Since the relative importance of the non-scarce factor sectors tended to rise over time, the decrease in the role of agriculture was presumably overestimated in the figures of Table I-1.

Somewhat the same "measure of importance" as just discussed is involved when one measures the share of agricultural goods (or ones the majority of whose value was added in the agricultural sector) as a share of all consumption or absorption of goods and services. The most recent family budget survey carried out by CEDE suggests that the share of all consumption expenditures in urban areas going for food products was about % in 1967; then, of course, there are agricultural inputs to industrial products. The share of food in all consumption would be above that for the urban areas since it is higher for the rural than the urban populations.[10] This ratio has been falling gradually as national income per capita has risen, and, as indicated later in this chapter, the overall income elasticity of demand for food products and agricultural products in general is now rather low. (The fact that malnutrition is still rife in many regions of the country will be seen to be essentially an income distribution problem.)

Agriculture's share of exports has, as in most underdeveloped countries, been greater than its share of output (even if we measure its role broadly by comparing agricultural output to that of the basic sectors as defined in Table II-1.) As of 1925, 87% of exports of goods and 81% of those of goods and services came from agriculture (See Table A-160). Meanwhile the share of agricultural goods in all imports is very low, having ranged between 6% and 17% over the 1925-present period (Table A-165). The main export has been coffee, since around the turn of the century, and, as explained in Chap. VII, coffee was the main motive force of Colombia's economic advances of the first half of this century. Total exports as a share of G.D.P. have ranged between 10 and 15 percent, but the crucial importance of coffee is suggested jointly by the need to import capital goods and some raw materials to get the process of industrialization moving, and the fact that no other product which could have become a large export seems to have had a comparative advantage even close to that of coffee. Bananas, gold, and petroleum have had clear comparative advantages, but none had much chance of being exported in great quantity.

Over time the share of coffee -- and of agricultural products in general -- in exports has fallen, as noted above. But with the success of the economy's industrialization process still depending very much on imports of capital goods and intermediate inputs, this role remains obviously crucial.

Among the other possibly relevant and important ties between agriculture and the rest of the economy are the purchases of each sector from the other and the (related) net lending flows, as well as the transference

of savings based on income generated in one sector for use as investment in other sectors. Unfortunately these flows remain essentially unquantified to date in Colombia. While it may reasonably be assumed that the agricultural sector has contributed to the progress of industry by its demand for consumer, capital and intermediate goods, this contribution might easily be overestimated[11]; probably the only really important tie of this sort is the consumer goods purchased by the more well to do farmers (many of whom live in the cities) and the demand for selected products like textiles by almost everyone, rich and poor. Including all sources of demand, a rough guess might be that as of the mid 1960's about 20-30%[12] of the industrial goods produced were being sold to people whose income was generated in the agricultural sector.

It is even harder to guess what savings transfers may have occurred between agriculture and non-agriculture over time. Some theories suggest this is an important contribution of agriculture to the growth process. It does seem that some coffee-generated incomes have led to investment in commerce and other sectors, and presumably the same has happened for income from other crops and from livestock. And undoubtedly now, with a close tie (same entrepreneur) linking a fair share of commercial agriculture to other sectors, such flows must be frequent (though here the direction of the net flow would be open to question[13]). But all these flows and many other agricultural-non-agricultural relationships remain to be quantified.

Background: Some General Characteristics of Agriculture over Most of the Period Under Discussion

It is, of course, not possible to draw a picture of the agricultural sector which corresponds to the whole period under consideration, since significant changes, to be detailed in subsequent chapters, have occurred. But these changes have been usually restricted to a part of the sector, and have, for the most part, been fairly recent (e. g. WW II). (The growing commercial sector, whose presence has led to an increasing dualism with respect to such characteristics as the modern input-output ratio, has only some of the characteristics of the rest of the sector. These overall characteristics are, in summary, (and without presuming which are more cause and which are more the effects of other conditions), a very unequal distribution of land (both by ownership and by operator), with something between one quarter and one half of the farm families having no or almost no land (depending on the time and how one defines "almost no land") with many small plots having a symbiotic relation with nearby large ones on which the small farmer earns a considerable amount of his income; small farms frequently being on poor land and many of the large operators being absentee; relatively low capital/land ratios, especially on larger farms; backward technology, as exemplified by little use of modern inputs and frequently by poor soil management; little use of machinery till the post WW II period; substantial heterogeneity of type of agriculture and income levels among regions; a very rugged topography which, coupled with an underdeveloped road and communications system tend to make many

areas rather isolated, and a government usually without the combination of desire and ability to take much of a hand in the development of the sector.

Many of these aspects are general to the agricultural sectors of poorer countries, so that much of the list itself is rather predictable, and interest attaches not so much to the existence of the characteristics as to their explanation and the analysis of how certain types of change may affect them. In some cases it is not necessarily clear whether the effect of a notable characteristic (e.g. uneven distribution of land, lack of mechanization) is a positive or negative factor.

Reference has already been made to the inequality of land distribution; its historical roots will be considered later in this chapter and its effects in Chapters III and V. A prominent aspect of the distribution and use (though somewhat less true now than a couple of decades ago[14]) is that small crop farms have usually been located on mountain slopes or on steep or broken ground, hwhereas flat lands, often of high quality, have been used for livestock.[15] This phenomenon (whose implications for total output and for equality of income are rather obvious,) came about partly because, at each stage of expansion to new lands the wealthy chose the land they wanted; they either bought or otherwise obtained extensive tracts of flat land (i.e., the most desirable land) for stock farming so the poorer farmers had to resort to the less productive land. A second factor was that, due to more favorable health conditions, the high and middle altitude regions were settled earlier than the warmer lowlands,

where most of the country's flat lands are, but where periodic floods and the existence of permanent swamps made life difficult and hazardous. Thus the population, over the course of time, became quite dense in the former regions. Finally, it happens that much of the sloped lands are coffee lands and that one of the few areas settled from the start by small farmers was parts of the coffee zones of Caldas, Tolima, etc.

The background technology has similar roots in the past, though it is not so obvious a priori why changes have begun so recently.[16] Historically the backwardness resulted in part from the fact that the European settlers adopted and perpetuated many of the farming practices and systems of the original inhabitants, and in part from the low level technology characteristic of Spain's extensive farming when the settlers came to the New World. These factors do not explain the continued low level, of course. In the case of livestock, the animals brought from abroad by settlers became adapted, giving rise to the various indigenous breeds now present. Their hardiness has permitted the use of extensive methods of raising, but they are less productive then various foreign breeds, being generally small, slow to mature and low yielding. Experimentation with crosses, some relatively successful, has only gradually improved their productivity, since the gestation period in the development of superior breeds tends to be rather long and the research effort has been limited. The death rate, especially of calves, remains high and steers are still light at slaughter. Pasture development has been slow, and the storage of fodder and feeding of concentrates very limited.[16a] In the crop sector,

the low level of technology has manifested itself in a great variety of ways, including generally poor soil management, limited use of fertilizer, and limited use of improved seeds. With respect to the seeds, ECLA, in its study[17] in the early 1950's, suggested that at that time only in the cases cotton and sugar had the use of improved varieties resulted in generally increased yields. Since then barley can be added to this list as can tobacco. In a number of other cases there has been substantial increase in the use of improved seeds but no increase in yield[18] (rice until about 1968 when indications were that a new variety might finally be raising the average yield figures; corn where hybrid varieties are now widespread in the relatively progressive Cauca Valley, though not generally in the rest of the country and the average yield for the country does not appear to have risen much if at all).

Although use of chemical fertilizers has increased rather rapidly over the last couple of decades, it is still low by the standards of the more developed countries which also have high man/land ratios.[19] The shortage of capital and credit, the weakness of the distribution system, and high prices and quality problems contribute to the limited use. But lack of information is also important, especially for the small farmer for whom it is quite difficult to obtain the data which would enable him to make the most of funds used this way.

The soil management problems are reflected most clearly in the serious erosion in several parts of the country, which becomes dramatic (and even scenic) in some regions of Santander and Boyaca. This adds to the silting problem in the Magdalena and other rivers, and increases the dangers of

flooding. Nevertheless, the expanding rural population continues to cut down forests and to extend its cultivation on the steeper slopes and other areas.[20] In the precarious economic situation in which most small farmers find themselves, their lack of concern for the distant future is hardly surprising. The erosion is due to the lack of knowledge of soil conservation practices as well, possibly, as lack of interest. Luckily the problem is not so serious in the hilly coffee territory; shade trees are usually grown with coffee, and weeding is usually done with the machete rather than the hoe. In some irrigated land bad management of the water supply and excessive irrigation along with repeated cultivation of a single crop has led to depletion and chemical erosion. The distribution systems have often not been supplemented by such necessary complements as basic drainage works. This phenomenon is more symptomatic than quantitatively worrying, however, since irrigation is still not widely used in Colombian agriculture.

Though little light has been thrown on the extent to which the Colombian small farmer has managed his farm well from a micro point of view (i.e., given the factor prices, liquidity etc. characteristic of his situation [21]), the achievement of technological progress must have been slowed by the low level of literacy and income of the typical farmer coupled with the very low quantity and quality of extension services, that the large farmer has not usually been efficient is now well documented. But the slowness of advance is partly due also to factors beyond the control of individual farmers or the research-extension apparatus. Control of disease and pestilence is especially difficult due to the relatively stable

temperature and humidity conditions in most of Colombia's climatic regions. Disease control for cattle is rendered less effective by the extensive method of production coupled with absentee ownership. In the case of plants, difficulties are compounded by the very small size of farms.[22,23] Progressive farmers often run into difficulty because of re-infection from their neighbor's land. Since the use of chemicals for weed and insect control (especially the former) is a much more recent phenomenon in the developed countries than the use of fertilizer, for example, one could not say that Colombia has been especially backward in this respect. What distinguishes the case is the greater difficulty of effective control than under different climatic conditions.

A shortage of technical experts has impeded technological advances. It has resulted at least in part from an education system which traditionally has almost disregarded the teaching of agriculture from the elementary and secondary levels on through the university. Those people who do pass through this system have not been well paid and have often been obliged to take up other work, (Some aspects of this situations are improving rather rapidly now, as the number of agronomists being turned out has risen rapidly from to , and there is now even fear of a market glut, despite a large percentage increase in demand by semi-public agencies.)

In general the lack of education of the farmer and the lack of government interest in improvement have helped to maintain the low level status quo, as far as technology is concerned. There has been a multiplicity of public and semi-official organizations dealing with agriculture, both

in absolute terms and even more with respect to the small total effort made on behalf of the sector; the majority of these have not been directly connected with the Ministry of Agriculture, the separation being in part an inevitable result of the low government salaries which assured that the Ministry could not have more than a few competent people. In any case the dispersion has probably been an impediment through its leading to a dissipation of economic and technological resources and a lack of unified action. (In Chapter V we give a more detailed picture of the history and roles of the major of these institutions.)

Among the other striking characteristics of Colombian agriculture (although with implications which are not so clear) is the fact that land under cultivation is a relatively small portion of all land used for crops and livestock, the ratio typically having been in the neighborhood of 10 percent. While much of the remaining 90 percent is on very sloped terrain and of poor quality, there is probably still a reasonable amount which would be productive in crops. Some of this is in undeveloped areas like the eastern llanos where introducing the necessary social infrastructure to integrate is with the rest of the economy would in many cases be too expensive but much relatively underutilized land lies in already integrated parts of the economy (on large farms).[24] During the twentieth century, land under cultivation has continued to increase, according to the somewhat questionable figures we have. Although no figures are available before the 30's, it is well known that the great expansion of coffee lands included the first three decades of this century; and the northern lowlands were beginning to come under control at this time,

although mostly for cattle. Figures suggest an average annual increase in land under major crops of about 2 percent from 1938 to the present.[25]

The main sources of power have always been human and animal i.e. oxen and burros (the horse has never been important except for riding); machines are a quite reeent arrival. . And machinery, while is has increased a good deal since World War II, is the major source of power for a minority of farms, though for a considerably greater share of all cultivated land.[26] It is used primarily in the preparation of the land for crops grown on large scale farms such as rice, cotton, cane for the sugar industry and, to a lesser degree, barley and wheat.[27] Tractors are less generally used for the other farm operations such as weeding, manuring, harvesting and threshing. Mechanization of the pest and disease control essential for potatoes, tobacco, cotton and bananas for export has been efficiently spread. Spraying from planes is common for cotton, and small fumigators are widely used by small farmers to control insects.

A frequent characteristic of poor agricultural regions is single-cropping with a possible loss of soil fertility and inability, both cultural and technological, to revitalize the land.[28] Since, many crops produced are susceptible to wide price fluctuations, the one-crop farmer's income is subject to significant variations. While no precise figures are available on the extent of single crop farming in Colombia,[29] the phenomenon is obviously prevalent in the coffee regions (and is now the subject of efforts towards diversification in those areas); since coffee is perennial

and lands planted to it are not very subject to erosion, the problem is not loss of fertility, but fluctuations in income. Many Colombian farms are rather diversified, growing subsistance crops like corn, yuca, beans, etc. along with whatever commercial crop is produced. Overall, the income fluctuation problem is only of medium seriousness.

The Colombian economy as a whole is characterized by rather desperate income levels in different regions, for agriculture as well as for the other sectors, with the high levels of departments like Valle and Tolima contrasting with the very low ones in Narino, Cauca and Boyaca. The stimulus of differing income levels for farmers in different regions has led to considerable movements of the farm population. The largest flow populated the Quindio region, primarily with emigrants from Antioquia. As the twentieth century has proceeded, there have been increasing flows into the good agricultural lowlands of the country, a possibility previously precluded by health conditions.[30] The agricultural labor forces of Magdalena, Cordoba, and Bolivar and Meta all grew at over 3 percent per year between 1951 and 1964 (see Table II-10.8), while with the exception of Cauca, no other departments had a rate of growth of even 2 percent. The fairly large-scale migration implicit in these differing growth figures may, of course, have been in part a result of the violence which has characterized many of Colombia's rural areas in the last two decades and which has been most severe in Huila, Tolima, Caldas, and part of Valle. Between 1951 and 1964 the agricultural labor force fell in Valle, stayed constant in Caldas, and rose very slightly in Tolima. (In Huila it rose

considerably.) Very likely there was, therefore, a push factor from at least three of these departments, not associated with economic variables.[31] But this almost certainly does not account for the magnitude of the migrations involved here.[32]

Since our major interest in this study is the process of change in agriculture, the rest of the study will deal primarily with it and much less with characteristics which have tended to be stable over time. To lay the background for this study in the post 1920 period, we first present briefly some aspects of its development before that time and around the 1920's.

Digression: Some Aspects of Pre-1920 Agriculture in Colombia, and its Relation to the Social System

Before the 1920's, the changing scenario of Colombia agriculture involved the arrival of the Spaniards with new crops; the building up of huge haciendas (original land grants, grants after the independence wars, encroachment on Indian reservations) and the whittling down of others (division through inheritance, etc.); the colonization of new areas, (e.g., the Qunidio in the late 19th and early 20th centuries; the enslaving and freeing of the Indians and the legal breakup of their resguardos (reservations); the gradually increasing feasibility of agriculture in the tropical regions of the country; government restrictions and monopolies on production (e.g., tobacco before 1850), and the ending of same; violent wars between the political parties culminating in the 1,000 days of war 1899-1902; and so on. Each of these factors played its role in determing agricultural output and income; average incomes appear to have undergone considerable fluctuations during these early days, with, if anything,

a secular tendency to decline. Ospina Vasquez concludes that Colombia hit "bottom" in terms of the degree of poverty around 1890, after suffering a notable decline in the period 1850-90.[33] This was the concensus of some of Colombia's famous chroniclers (such as Uribe Uribe, Camacho Roldan, Miguel Samper) of the period, and was suggested, rather dramatically, for the case of agricultural workers on the Sabana de Bogota by a survey of their food habits towards the turn of the century.[34] Elements conspiring to push incomes down were the facts that in the early period of the Republic agricultural production for export was very small and in the areas of old and dense population of the Eastern band there were no significant changes in the methods. Population was growing fairly rapidly and land was being worn out and not replaced at the same speed. In the Coast, Tolima, and the Cauca Valley, extensive or semi-extensive livestock raising was developed with the use of artificial pastures, taking off some pressure but not helping the small farmer too much.

Further, considerable effort was put into obtaining export crops and the early failures, tobacco, quinine, and indigo ate up, without any lasting return, a lot of capital and effort during 40 years. Each time it was necessary to start all over again. The development of coffee also represented a sizeable effort. The limited amount of energy and capital available tended to be eaten up with the wars and politics in the late XIX century.[35]

Perhaps the chief factor explaining low rural incomes was the uneven distribution of land; both current data on the relative efficiency of farms of different sizes and cross country comparisons would suggest this. There is

some diaagreement among students as to the origins of the large haciendas in Colombia. T. Lynn Smith[36] agrees with previous writers that the Indians were quickly reduced to a state of serfdom or peonage, but does not feel,[37] as have some authors, that the large estate in Spanish America in general or in Colombia in particular grew mainly out of the encomienda. Although the kings of Spain and their representatives did distribute a lot of land by grant or sale and unscrupulous officials used their position and power to cheat the Indians on the resguardos out of their lands (the latter frequently selling their rights for a few cents without knowing what they were doing,[38]), Smith notes that of the dozens of Colombian haciendas whose detailed history has been examined there is still to be found one that was originally an encomienda. Some of the concentration of land ownership took place in the hands of the church--in particular the Jesuits--with foreclosed mortgages a major source of the buildup. These lands were then taken over by political authorities in 1767 but redistributed again in large plots. Other important elements in the buildup were the liquidation of the Indian resguardos, the adjudication of public lands to victorious generals and others in the various civil wars, and the investment in land by big commercial and industrial interests.[39] Since legal title has not always determined effective ownership of control, de facto expropriation by large farmers of land previously controlled small owners has played a role.[40] Thus the livestock operations which the Spaniards mounted in the rich valleys, with horses, cattle and swine, drove the Indians, with their plots of corn, potatoes, and beans, gradually up the slopes, pushed partly by the voracious swine. Most of the really large farms in Colombia today have been built up over time by a variety of means; in few cases have all of these been strictly legal or honest.

While there is disagreement as to the origins of the latifundia, there is near concensus on the general direction of its effects. The latifundia is considered by most observers to have been the major obstacle to development of the economy. Ramon Franco describes how it slowed the settlement of Antioquia and worked along with the "vagrancy laws"[41]— severely applied from 1840 on--to give the large landowners their labor gangs. Alejandro Lopez writing in the 20th century noted the obstacle it posed to satisfactory agricultural development. And President Alfonso Lopez (president during 1934-38 and 1942-45) was dedicated to the idea that a stable middle class farm owning group was necessary to give Colombia stability and prosperity.

The land distribution was tightly related, as both cause and effect, to the system of social stratification, which further detracted from the incentive conditions necessary to foment rapid progress. The wealthy creoles had from the early days been pushed toward institutionalized indolence. The Spaniards, in their administration of the colony, developed a policy of discriminating against those sufficiently devoted to the new world to live there and raise their families there (i.e. the creoles). While the conquerors and their descendants were supposed to be favored, men from Spain "must manage the government and the institutions of the country." The Creoles were thus left to indolence and luxurious indulgence—they had rights but no voice in the government.[42] (This situation, incidentally, helped to generate the hatred between groups which led to the chronic civil wars.) Meanwhile the middle income groups were not characterized by self-reliant or democratic attitudes. They were jealous of and wished to emulate the upper groups and were contemptuous toward those lower down.[43, 44, 45] These attitudes are obviously not well designed to

bring about the independent, innovative behavior of some middle classes, nor any feeling of responsibility towards those lower on the social ladder, such as might lead to widespread education or other equalizing public services.

Colombia's social structure has, thus, been an unfortunate one in respect to the promotion of economic growth. But it would be incorrect to allege that it has been a homogeneous one. Social class relationships have traditionally varied considerably from region to region in rural Colombia, depending on different historical paths, different racial mixtures, etc. In some parts of the country, the system used to approximate as a feudal one and may still have many carryovers from it;[46] in others it has been closer to the North American type family farm pattern. But, in general, white farmers have had higher status than mestizos or negroes,[47] and people living in the country have had lower social status than those living in the local town.

Dix notes that in some places differences in material circumstances among the campesinos seem to have some significance for local social relations. Yet at least several students of agrarianism in Colombia tend to agree that the potential of social distinctions among the campesinos based on property relationships is not in the main realized. "In the first place, the practice of dividing land among all the heirs works, at least at this level, against social distinction based on its concentration. In addition, when one member of the family owns land, a close relative frequently does not, thus making it more difficult to use it to draw social lines. The institution of ritual godparenthood (compadrazgo) meanwhile creates bonds of reciprocity among potentially different levels."[48] Dix argues, probably correctly, that in fact the minifundio owner is at a near subsistence level about equivalent to

that of most other campesinos. He frequently lives, as they do, in economic symbosis with the latifundio, often as a part-time or seasonal laborer to supplement the skimpy income from his own plot. The system of justice (or rather the lack of such a system) needless to say disadvantages the weak. "The courts have often been rigged against him, (the small farmer), with a much higher percentage of campesinos convicted of crimes than the accused of urban localities. The police and other authorities can frequently be found in collusion against him."[49]

All these aspects of discrimination and inequality, have for the most part been based on their acceptance as being right, or at least unchangeable, by those who are discriminated against. "The masses, especially the campesinos, are impermeable to ideas and improvements designed to make effective their own rights for fear of "losing credit" with their particular patron and consequently with the other patrones."[50] There has indeed been some desire for change on the part of the campesinos but it usually amounts only to a wish to add a hectare or two in his land holding. The extent of mobility has been, in any case, very restricted. The result is a static in-bred traditional rural community in which the majority leave public affairs in the hands of those who manipulate the system from superior positions on the social scale."[51]

In the rest of this study we do not analyze in any depth the relationship which may have existed between the economic and the social change during this century; it is not clear to what extent each was cause and/or effect. Sociologists generally feel that much of rural Colombia still conforms to the pattern just described, but that forces of change are beginning to enter. Fals Borda, who has been observing the community of Saucio (in the Department of Cundinamarca)

since 1950, notes that it was toward the turn of the century when new forces appeared and began to challenge the existing social system in Saucio, although the impact was limited until about 1930. Studying in the decade of 1950 he concluded that the pace of change had accelerated.

The addition of new groups appears to have complicated the social structure in the rural sector (as well as in the society as a whole). The development of commercial farming, to a considerable extent by entrepreneurial types and on rented land, is one source of such change. In describing the municipio of Cerete, Havens et al made a five-way distinction of traditional and new upper classes, traditional and new middle classes, and the lower class. The traditional upper class is constantly preoccupied with the improvement of its technical and professional level, and almost all of the present generation are professional men. (This description of the traditional upper class would be too positive a one for many municipios of Colombia, though the trend is in this direction and away from the "unconcerned latifundista.") The new upper class are largely agriculturists and immigrants of Syrian and Japanese origin; among them economic success is the defining characteristic, with education and origin unimportant. The mode of conduct of the lower class remains completely distinct from that of the middle and upper classes, in the sense, for example, that the practice of buying women still persists, and with great frequency. Such a picture suggests perhaps that the way of life of the upper groups has changed more over time than that of the lower class.

Although education is gradually reaching the rural areas, levels of superstition remain deplorably high in some areas. One not infrequent belief is that fresh air is a danger for sick people, for women on diets and for babies.

Change is indeed possible and present (Reichel notes that in several regions the building of rural hospitals has led to an evolution in the campesinos thinking about diseases)[52] but has been bery gradual. Much violence is still characteristic, and seems unlikely to decline, given the increasing employment problems to be described later. Part of this increasing violence probably represents unacceptance of the structure of rural society in the past, but it suggests that social and economic adjustments are occurring with much friction, and bodes ill for the future.

The combination of "wrong race," low income, acculturation to servility, and few opportunities for progress in any case (no easy frontier to turn to, for example) have provided insurmountable obstacles to the progress of the people on the bottom. Those in the middle were usually too concerned with emulating the consumption behavior of the rich to stress productive innovations.[53]

Besides the uneven distribution of land and wealth, with the attendant social inequalities, other factors may also have had negative effects on the development of the sector. The early emphasis on mining, for example, may have held back agriculture. Many of the Spanish were much more interested in mining than in the large encomiendas consigned to them, on which the Indians were forced to work under the imposition of high taxes in money and in kind. They did not consider themselves basically as farmers; further, Spanish agriculture was technologically backward (based on the hoe and rudimentary plow using oxen) relative to that of other European countries at the time of the conquest. It did not have, as most of the other European countries did, a turning plow equipped with a moldboard, the four-wheeled farm wagon, or the horse collar which made use of horses and mules possible for draft purposes. The Spanish settlements were thus at a real disadvantage. While the new crops and annuals--fruits, barley,

wheat, coffee, sugar, vegetables, cattle, sheep, and horses--of which cattle and horses were by far the most important along with various metal tools, (especially the hoe) and the crude oxcart were useful additions to Indian agriculture, there was no continuing innovational process and the technological level achieved was always low by contemporary world standards. Smith even argues that, despite the various innovations at the time of their arrival, the Spanish had little long run effect on the Indian system of agriculture and since they paid relatively little attention to agriculture themselves, their total effect was also small.[54] Even at present only one-third of all farms use draft pack animals, in some cases only for transportation purposes, and in a good many others primarily to run the trapiches; they are thus used relatively little for cultivation.

Further drawbacks included the taxes on the commerce of certain agricultural products and the considerable damage which was done to the agricultural and cattle industries during emancipation. A large effort was required to re-structure the economy and get it on its feet again. Meanwhile, the government did not exercise any strong efforts on agriculture's behalf. The initiative and funds during the 19th century for agricultural development came almost exclusively from the private sector, although there were certain government regulations designed to foster it.[55]

Since an export crop, coffee, ultimately became the key to the first stage of Colombia's economic development, it is of interest to ask why the earlier exports (which had their booms in the 19th century) did not generate similar growth producing effects. Successively cacao, cotton, anil, tobacco, and indigo became major exports, before coffee finally took over.[56] Part of the explanation

appears to lie in the fact that in some of these cases the world market simply did not offer as big an opportunity and/or collapsed fairly quickly after Colombia's entry. Other suggested explanations involve the fact that relatively few producers were involved in these cases so the income accrued tended to be quite concentrated in the hands of a few people, who were interested in importing foreign consumer goods. They did not create a broad enough base of demand for any products to create an incentive for domestic production.

The Agricultural Sector at the Turn of the Century

Whatever may have been the positive factors at work during the nineteenth century, they were insufficient to set the economy as a whole on a pattern of self-sustaining growth. The seeds of such growth were indeed germinating and the forces spreading with the advent, in the latter part of the century, of coffee as an important export, with a large market relative to Colombia's output. But the colonization of the Quindio, with its rapid addition of new lands to the area under production, its capital formation and its relatively high social mobility, were exceptions to the general pattern still prevailing at the turn of the century and into the present one. This pattern included:

a) a fairly freely accessible land frontier which was basically limited to the new coffee zones; other potentially colonizable lands were either owned in large blocks or too remote and/or unhealthy to be attractive;

b) little capital formation, as investment was difficult for the small low income farmer and often not too attractive to the large farmer who had limited income goals and whose domestic

market for many products was limited by the small urban population, poor transportation and underdeveloped marketing systems;

c) very few technological innovations. There were, of course, a few,[57] but the pace appeared glacial. Ospina Vasquez considers the introduction of first Guinea grass and later para as the most significant economic event between Independence in 1820's and the establishment of coffee production as an important sector of the economy in the late 1800's. The coming and going of tobacco, quinine, anil, were relatively unimportant by comparison, and few if any other introductions of new varieties or changes in practices stand out. P. L. Bell, the U.S. Trade Commissioner described the situation, even as of 1921, as follows:[58]

> With the exception of the wheat lands of the table-land of Bogota, the two large sugar estates mentioned, a few individual efforts in modern agriculture, there is, in general, little cultivation of the soil in Colombia...
>
> Throughout the coast regions and in the Magdalena Valley and other valleys of the interior, there is little attempt at cultivation or the use of modern agricultural implements or machinery. The principle field crops of corn and cotton are handled in the following manner: the land, if new, is first cleared of underbrush with the machete and then the larger trees cut down at waist height with the ax. This work is done during the dry season, and the dry brush and other growth are burned off just before the rains begin--leaving the land encumbered with an assortment of stumps, partly charred trunks of hardwood trees, etc., and incapable of being plowed in any case. The burning over kills

> the seeds of all weeds, as a general thing, and the corn or cotton seed is planted in holes dug with a sharp stick or iron bar at the beginning of the rains. During the growth of the plants nothing further is done, with the exception of periodically chopping out the larger weeds with the machete.

While the shifting cultivation described in this quote has naturally diminished in importance since 1920, it has not yet disappeared from the Colombian scene. The digging stick was probably the chief hand implement at the turn of the century and was still fairly widely used in the forties. The hoe with metal blade has been present in the highlands for a long time, ever since Jimenez de Quesada, (the founder of Bogota), but was very expensive in early years and even now has not fully replaced the wooden hoe or digging stick. In the intermediate altitudes where coffee is grown the metal hoe is the chief tool.

As late as 1926 plows were being used only in the Cauca valley, the savanna of Bogota and some cottom plantations in the north.[59] The introduction of the modern plow has often been unsuccessful because oxen cannot pull it effectively, and because of other informational gaps about its use. (It is, like other implements, more finely tuned to the complex circumstances of the agriculture for which it is developed than is sometimes realized.) The first harrow was imported in 1871 by Juan de Dios Carrasquilla, who brought fertilizers and improved pastures at the same time. In 1911 the Sociedad de Agricultores de Colombia introduced the first disk plow. But the first significant steps in the technification process date from the period since 1920.

Isolation, both regaional and individual, characterized agriculture at the turn of the century. Regionally, it was a natural result of the

rugged mountainous terrain and the underdeveloped road system. Narino, for example, had little commerce or even communication with the rest of Colombia (though it had more with Ecuador) unitl around 1940. Dispersed agricultural settlement characterized most of the country, especially the highland areas.[60] Its impact has been thought to be negative by many, from the colonial days on, and indeed the greater difficulty in achieving communication, education, and so on with such a settlement pattern may have been important.[61]

A Review of the Performance of Agriculture Since the 1920's

When about half of the active population is engaged in agriculture, as in Colombia, the most relevant measure of the success of the sector is its ability to provide adequate income levels to the people working in it. A country's agricultural performance may also be judged by whether it produces enough food and raw materials so that their prices do not become too high.[62] In the long run, and in a not-too-open economy, the performance with respect to these two goals is likely to be closely linked since a tendency for relative prices and incomes to change will tend to lead to the movement of factors from the sector with relatively falling incomes to others. In the short or intermediate run, however, (during which these forces do not have a chance to come into play), relative prices of agricultural products are more a function of the relative rates of growth of agricultural and non-agricultural output; if one tends to outrun the other (making allowance for the relatively lower income elasticity of demand for agricultural products) then its relative price will fall. One way in

which any sector can contribute to the easier development of the rest of the economy is through rapid output growth leading to falling prices; conversely a slow growth leading to rising prices will exert a negative effect on the development of the rest of the system.

Considering the prices of agricultural products in Colombia as one index of the performance of the sector, it could be argued that it has been something of a bottleneck in the development of the economy during a considerable part of this century but not during the last decade; from 1925 (the first year for which we have tried to construct price series) through the mid-50's there was a gradual increase in relative prices of agricultural products, but these prices have become more or less constant in the last 10 years.

In the period 1925-56, production of domestically used agricultural goods rose at an average of about 3 percent; although population growth was slower in this period (perhaps around 2.4 for the period as a whole) income per capita in the economy was rising substantially so the growth in output (even when augmented by a slightly faster growth of agricultural imports) was insufficient to prevent a rising price. Output of domestically used products has tended to rise at only about the same level as that of population for a decade now, but the demand is rising slowly so that this has been sufficient to maintain rough stability in the relative prices of agricultural and non-agricultural products.[63]

This slowly growing demand has resulted from a slow (about 3.5 percent annually) growth of national income, only a little above the rate of growth of population expressed in terms of consumer equivalents,[64] coupled

with the low income elasticity (which during the last decade may have been due partly to a worsening in the income distribution such that people with low incomes, and therefore relatively high income elasticities of demand for food have not been achieving income increases, while the higher income people who have been attaining such increases have low income elasticity of demand for food.[65]) Overall, it appears that food consumption per capita has not risen since 1951, though it has occasionally fluctuated to a level above that of 1951; Table I-4 presents estimates of total food consumption in 1958 pesos and consumption per capita.[66] In any case, price developments are only one indicator of a sector's performance; a sector's optimal growth rate is not, in general, the one which holds relative prices constant; if there are many high yielding investment possibilities relative to those in other sectors, the optimal rate would imply a fall in relative prices.[67]

In terms of changes in the average income level of the farmers, there is little to complain about in the performance of this sector over the last 40 years. As we see later on, it has probably risen by 2-3 percent per year--an improvement substantially greater than has occurred in the rest of the economy.[68] But this apparent success hides a tremendous failure in terms of providing reasonable and growing incomes for the majority of people within the agricultural sector. Landless farmers appear now to be in about the same real income situation as they were 30 years ago, and there is reason to believe that small farm owners have had a similar income trajectory. The average figures are, therefore, most misleading. In sum, the unsatisfactory performance of the agricultural sector (which as we shall see on analysing the government policy towards it is hardly

surprising) shows itself not in terms of average agricultural incomes and not too much in terms of increasing prices of agricultural products, but in a worsening distribution of income within the sector and the failure to improve the conditions of the majority of farmers for at least as long a period as the past 30 or 40 years.

For the future as for the past and present it seems certain that the income distribution problem will remain a more serious one than that of total production. There is much evidence that the potential productivity of the sector is very high; there are many fairly obvious means by which increases in output could be achieved; whether such means will be implemented remains to be seen. Our understanding of the sector and our prediction about the future government policy are still too deficient to permit full assurance that production will not expand too slowly relative to demand; if it did so this could imply both continued low levels of income within the agricultural sector, and a shift of the terms of trade against the product of the urban sector which could slow down capital formation within that sector, and in general slow down the rate of growth. The problem of lagging output in the future is thus a possibility; but that of poverty due to very uneven distribution of income within the agricultural sector is already severe and could easily become worse. While we do not have a clear picture of the way income distribution has changed over the last 30 or 40 years, what we know about current trends is indeed depressing and there are good reasons to believe that these trends are likely to continue into the future, unless a strong government policy is developed to counteract them.

Table I-4

Food Consumption per Capita 1950-1966

Year	Total Annual Food Consumption (Millions of 1958 pesos)	Annual Food Consumption Per Capita (1958 pesos)
1950		
1951	4612.4	382
1952	4758.0	384
1953	4757.7	374
1954	5008.9	384
1955	5107,8	370
1956	5292.5	372
1957	5361.5	367
1958	5647.2	375
1959	5689.9	366
1960	6023.3	376
1961	6414.2	388
1963	6372.4	373
1964	6774	384
1965	6827	375
1966	7089,5	376
1967	7139,7	366 (?)

Some Current Structural Characteristics of Agriculture

More detailed descriptions of various characteristics and subsectors of agriculture in Colombia and of the process of change which has converted the situation described at the turn of the century into the present one will be presented in later chapters. At this point, we mention only the major features which will bear on the optimal form of agricultural policy during the coming years. The dominant one is the extreme inequality of distribution of land and of income, a feature which has been present throughout Colombia's history, though as we mentioned above, it appears to have worsened in recent years. According to calculations presented in Chapter 5, probably about 75-85% of the land (by value) is held by 10% of the people engaged in agriculture. Using figures on yield by farm size and agricultural wage rates, we have calculated (for the year 1960) the (personal) distribution of income generated within the agricultural sector, shown in Table I-5. These tables, taken together with an appraisal of the methodology, indicate that the top 15 percent had around 60 percent of the income (say 55-65) and the bottom 85 percent therefore had 35-45 percent; the great majority of the agricultural labor force had an income below 5000 pesos (about 700 U. S. dollars) and the bottom half had less than 3000 pesos (400 U. S. dollars).

The (Gini) coefficient of concentration is 0.59.

It hardly needs commenting that this distribution is abysmal. Note that it is in some sense worse at the top (where the concentration in the hands of the top very small percent of farmers is phenomenal) than at the bottom (where the small share is obviously bad, but no worse than observed in many other distributions).*

Table I-5a

Personal Distribution of Income in Colombian Agriculture, 1960, By Income Categories

Income in Thousands of 1960 Pesos	Percent of People in Category	Percent of Income Accruing in Category	Cumulated Percent of People	Cumulated Percent of Income
0 - 1	8.79	1.94	8.79	1.93
1 - 1.5	32.72	10.83	41.5	12.76
1.5-2.0	22.35	10.02	63.86	22.78
2.0-3.0	11.90	7.54	75.76	30.32
3.0-5.0	10.12	10.25	85.89	40.57
5.0-10.0	8.92	16.09	94.81	56.66
10.0-20.0	3.36	11.82	98.16	68.48
20.0-100.0	1.55	15.22	99.71	84.30
100.0-200.0	0.22	8.60	99.93	92.90
200.0	0.07	7.10	100.00	100.00

Source: Albert Berry, "The Distribution of Agriculturally Based Income in Colombia, 1960", mimeo, p. 10.

The estimate presented here is a best guess, and figures designed to present upper and lower limits are also presented in the cited study, as are the details of the original sources and the methodology used. As the table heading indicates, this was a personal distribution of income. The income concept used was the national accounts one. "This concept excludes increases in wealth which result from appreciation (in real terms) of various assets, physical or financial. Since such income is as real and usable as that generated in the process of a year's production it clearly should be included when one analyses the distribution of income with a view to questions of equity, predicted changes in the distribution of wealth, etc. Most of the income not captured in national accounts is related to the ownership of capital and hence its exclusion tends to bias downward the concentration of income in upper income groups." (op. cit., pp. 3-4) Subsequent calculations indicated that the inclusion of capital gains would not alter the distribution significantly.

Table I-5b

Personal Distribution of Income in Colombian Agriculture, 1960, By Deciles

Decile	Percent of Income (1)	Cumulative Percent of Income (2)
1	2.24	2.24
2	2.97	5.21
3	3.28	8.49
4	3.71	12.20
5	4.06	16.26
6	4.60	20.86
7	4.63	25.49
8	8.51	34.00
9	12.08	46.08
10	53.92	100.01

Source: Berry, op. cit.

TABLE I-5c

Income Distribution by Decile, Agriculture (1960) and Urban-Non-Agriculture (1964)
(figures in 1964 pesos)

	Agriculture			Urban Non-Agriculture					
				Unemployed Included			Unemployed Excluded		
Decile	Percent of Income	Cumulative Percent of Income	Average Income	Percent of Income	Cumulative Percent of Income	Average Income	Percent of Income	Cumulative Percent of Income	Average Income
1	2.24	2.24	1362	0.57	0.57	580	0.9	0.9	1140
2	2.87	5.11	1745	1.54	2.11	1566	3.3	4.2	4200
3	3.34	8.45	2031	2.63	4.74	2674	4.3	8.5	5470
4	3.73	12.18	2269	3.92	8.66	3985	5.0	12.5	6360
5	4.21	16.39	2560	5.14	13.80	5226	5.5	19.0	7000
6	4.68	21.07	2845	7.92	21.72	7180	7.0	26.0	8910
7	5.78	26.85	3515	8.54	30.26	8995	8.0	34.0	10,180
8	7.90	34.75	4818	10.65	40.91	11,803	11.0	45.0	14,000
9	12.77	4752	7779	15.69	56.60	16,479	14.5	59.5	18,450
10	52.48	100.00	31,917	43.40	100.00	46,681	40.5	100.00	51,530

SOURCES AND METHODOLOGY: The agricultural figures come from Berry, "Land Distribution...", op. cit., Tables 2 and 5. Figures for urban non-agriculture are based on Miguel Urrutia and Clara Elsa de Sandoval, "La Distribucion del Ingreso Entre los Perceptores de Ingreso en Colombia-1964" Revista del Banco de la Republica, Julio 1970, p. 1; Cols. 4, 5, and 6 are based on Table A-3 of that study, and Cols. 7, 8, and 9 come directly from page 13. There appears to be one inconsistency between Table A-3 and another summary table in the study, Table 8. Urrutia-Sandoval had concluded that only for the first (lowest) decile was urban income below that in the rural sector; since they concluded that average non-agricultural rural incomes were below agricultural, this implied lower absolute figures for the rural sector than are presented in this table; but there appear to be other differences between the two tables. In any case these figures suggest that when the unemployed are included in the urban figures, average income is lower (than for rural labor force) for the bottom two deciles.

Urrutia-Sandoval (op. cit.) cite a concentration ratio of 0.48 for urban employed labor force and 0.55 for rural; the urban population in question excluded farmers while the rural one included non-agricultural workers. These figures are, then, consistent with our estimate of 0.55 for urban (with the unemployed included) and 0.59 for agricultural.

Why are incomes in agriculture so unevenly distributed? The simple (and almost complete) answer is that land is very unevenly distributed. The high incomes correspond to people with large farms.

Relevant to the priority which should be placed on agriculture is the fact that much evidence suggests that in absolute terms a high share of Colombia's poor live in rural areas. Although on the surface the rural and urban personal income distributions might suggest that the worst off are the poorest city dwellers (see Table I-5c) this may be an invalid conclusion since a distribution by family incomes might not show this.[69] In any case the average monetary income for all deciles is higher for the urban dwellers than the farmers after the first decile. Clearly it is difficult to make meaningful comparisons between rural and urban monetary incomes, but it is indicative that the average income level of the third decile of the urban distribution is already twice that of the agricultural one. What little we know of comparative food consumption is consistent with this general conclusion.

The obvious severity of the distribution problem implies that any sensible policy must take it into account. And a conflict could exist between production and distribution if the direction of investment of resources and effort which would give the highest rate of return is not to the small farmer or to labor intensive agriculture. An extreme form of the conflict would exist if resources directed at the large scale and/or capital intensive sectors would lower incomes of small farmers or workers in absolute terms.

A second noteworthy feature of the agricultural sector is the different types of agriculture found; one useful classification separates livestock

farming; production of plantation crops (bananas and cacao)--not a very important form of agriculture; coffee production, carried on mostly by small and medium size farmers; modern mechanized production of such crops as cotton, rice,sugar, and a few others;and the traditional small farm production of such crops as corn, potatoes, beans, yucca, platanos, etc. In the analysis of factors of particular importance to the determination of the path of income distribution in the future (and to a lesser extent determination of output levels) we will make considerable use of the divisions among farmers both by size categories and by the four important sub-sectors, i.e. coffee, livestock, commercialized crop growing, and non-commercialized or small scale agriculture. The interactions among the different size categories and types will be seen to be quite important. The type of production is related both to the size of the farm--the larger farms concentrating more on cattle raising and commercial crops--and to income levels, since larger farms usually generate more income.

A third relevant feature of Colombian agriculture is the fact that it is still relatively inefficient.[70] This is true for the large cattle farms, to a considerable extent for the producers in so-called "commercial" agriculture, and certainly for the smaller traditional farmers. We use "inefficiency" here in a broad sense, simply denoting the fact that traditional factor productivity is lower here than in many other countries. But inefficiency does not necessarily imply poor farm management; it can result from that or from inadequate market structures, low provision of public services, etc. The senses in which Colombian agriculture is inefficient will be detailed later. What is relevant here is that the technical possibilities of increasing output are very large. Everyone

agrees that this is true with respect to the larger farms, and there is now much evidence that it is also true for the smaller farmers. Therein lies both the hope and the danger with respect to future agricultural policy. For it implies that if agricultural output lags behind demand in future years it can only be due to public decision, active or passive, (by forgetting about the sector). But it raises the fear that increased output on the large scale farms will, in the absence of comparable growth on smaller farms, worsen even further the distribution of income and the extent of poverty.

A final part of what we may call the "setting" is the fact that demand for agricultural products has been rising only slowly, especially in the last decade or so, suggesting that any rapid increases in agricultural output will, unless they are exported, push down prices. And the low rate of growth of the economy since the decline of coffee prices in 1957, and the even lower success of labor absorption in the urban sector, suggest that the overall performance would have to be improved markedly before out-migration could be a major solution to the agricultural problem. There seems to be relatively high out-mobility from agriculture, especially in the low age groups; the lack of demand in the urban sector has probably been a more important barrier to even more out-migration than any lack of mobility.

We turn now to a brief preview of some of the factors which will be of key importance in the resolution of the Colombian agricultural dilemma; how to achieve both a satisfactory increase in output (and in particular output of exports) and an improvement in the distribution of income, so as to alleviate the poverty of the people at the bottom of the agricultural

ladder. Much of the recent increases in production of crops have occurred on commercial farms, and further increases in commercialization and mechanization of agriculture would contribute to the achievement of a sufficiently rapid output of goods to prevent a rise in the relative price of agricultural goods. But it may worsen the distribution of income among the people in agriculture.

The seriousness of the dilemma facing Colombia's agricultural policy depends on the extent to which an improved income distribution is unavoidably inconsistent with a rapid increase in production, and on the difficulties in finding an agricultural policy which will effectively spur the output of the small farmer, or find him a job somewhere else in the economy (possibly working on a large farm).

Relatively few of Colombia's agricultural families are completely landless, but many have either token or very small plots and earn most of their income as laborers. For the bottom 40% of the income earners, about 70% of their agricultural income was derived from working for others;[71] for the bottom 60% the figure was still around two-thirds, whereas for the total population earning income from agriculture the figure was less than 20%.[72] Hence one could argue that policy aimed at increasing the labor absorption on large farms (we estimate, very crudely, that 40% or a little more of worker wages were earned by people working on farms of 50 hectares or more, and 20-25% from farms over 200 hectares)[73] is a higher priority matter than increasing the productivity of small ones. It seems a less hopeful one in some respects since it would involve both substantial research on labor-using adaptation of foreign technologies, which both researchers and large farmers might consider irrelevant or worse,

and persuasion of farmers to use these, thereby subjecting themselves to the undesired uncertainties which go with hired labor, and so on.[74] So much of our emphasis here will be on the potential of the small producer. To some extent, as we have seen, the laborer and the small producer are the same man; and to some extent, where labor displacement occurs on large farms, the individual is pushed into subsistence production, i.e. becomes a small producer on a marginal piece of land.

The issue of whether the marginal productivity of scarce resources is greater on large or on small farms remains an open one; most observers have traditionally assumed the large farms have more potential, yet the fact (see Chapter 5) that small farms are presently more productive on a per hectare basis obviously gives pause to such a conclusion. This question is pursued in greater detail later. It seems sufficiently likely that policy will focus on the large farms, so that the effects this would have on the small ones should be considered in any case. The factors determining the degree of vulnerability of the small farmer to future events include the rate of increase in demand for agricultural products and especially the products which these farmers tend to produce; the relative access to technology, land and capital as between large-scale farming and small-scale farming; the extent to which small and large farmers tend to produce the same products or ones which are substitutes; the rate of growth of output of the large farmers, and the share of this increasing output which goes to exports; the extent to which the small farmer participates in the market and is therefore subject to loss when the prices of what he produces go down; the labor using or labor displacing nature of the technical changes which occur on both types of farm.[75] (The obvious

worry in this latter connection is that the nature of technical change on the commercial farms will be labor saving, so they will not offer new employment opportunities to previous small scale farmers.) We have reasonably good information about some of these aspects of the situation, much less about others. We now consider several of them in a preliminary way with a view to focusing much of the subsequent discussion on the relationships which are less well understood.

Is the Small Farmer Invulnerable Due to Reduced Market Participation (High Home Consumption)

One argument periodically heard, and which could be construed as implying little conflict between the goals of improved income distribution and output growth (assuming the latter can be best achieved by aiding large farms) is that the traditional farmer does not enter the market in any appreciable measure, and is therefore immune to whatever price changes occur.[76] This argument has limited relevance to Colombia in the framework of the problem of low agricultural incomes since, as we just saw, most of the income of the low income groups comes from paid labor.[77] And it refers only to that part of the potential dilemma connected with falling agricultural prices. It must be pointed out, further, that the "isolation" argument, even for these small farmers, requires a further condition to be persuasive, i.e. that the sequence of events will provide for eventual removal of these small farmers from their low income deep freeze. If the phenomenon which makes their isolation desirable in the short run is the fall in relative prices of what they produce, without an increase in their productivity, it

would seem implausible to assume that an eventual solution to their problem would come from a recovery of their competitiveness. The more plausible solution would be their direct transfer to the non-agricultural sector. Unless such a transfer can be foreseen in a reasonable period, the distributional implications of this alternative, while not so disastrous in the short run as if the small farmers were more involved in the market, may be quite negative in the longer run.

Only a few income and consumption studies in rural areas of Colombia have been undertaken to date. And not all the studies present sufficient data to indicate clearly how vulnerable the small farmer is; an accurate calculation would require knowledge of:

1) the extent of home consumption of goods produced;
2) the extent to which goods purchased either for consumption or as inputs for the production process are of agricultural products whose prices are likely to move together with those of the goods sold;
3) the extent of flexibility in production away from the products whose prices are falling to others whose prices are falling less or not at all, either agricultural or non-agricultural;
4) the amount of off-farm earnings.

Note that to the extent that the prices of goods produced on larger farmers did not move with those of the small farmer the off-farm component of income coming from work on larger farms might move differently from on farm earnings. Most likely, however, the direction would be the same, since mechanization is likely to be one of the sources of the increasing

competitiveness of the larger farm and is likely to displace labor directly. Now agricultural incomes could still move differently from on-farm agricultural ones, of course.

A look at the scattered evidence assembled in the Table I-6 suggests that the small farmer in Colombia is not made invulnerable by simply a high home consumption ratio,[78] the first factor mentioned above. The data from the seven regions included is consistent with the logical expectation that the ratio will be a decreasing function of the extent to which the area specializes in a given cash crop (e.g. the Caldas municipios in coffee), the integration with markets, based on nearness and quality of roads, etc. (explaining the low ratios in the flat part of the Cauca Valley and the lower ratios for the Pasto area than the Pupiales one) and the lack of off the farm income sources (the Rio Suarez ratio is high partly in reflection of the high share of people in that sample with off-farm incomes[79]). On the farms of 1-5 hectares in the flat Cauca Valley, (which, it may be noted, yield higher incomes than farms of the same size elsewhere), almost none of crops and livestocks produced are home consumed. The same is true of the coffee zone. It is clear, as is also to be expected, that the importance of home consumption is in general a decreasing function of farm size. The figures for the flat part of the Cauca Valley and the Caldas coffee zone indicate that even quite small farms can have low home consumption ratios if they are in a position to produce saleable products. The figures suggest that, except for the coffee zone and the flat Cauca Valley, for incomes in the neighborhood of 2-4,000 pesos (in 1958 prices) per family, home consumption has usually been in the range 25-60 percent of the value of crop and livestock output and perhaps 20 to 40 percent of

total income. (The poorest sets of farmers referred to here are those in the Rio Suarez area, and the very small farmers in the Pupiales district of Narino.)

Possibly the selection of municipios listed here has tended to be atypically close to markets (its easy access being one factor in the decision to research it) so the home consumption figures may give a downward biased picture of the situation in the country as a whole.

Figures presented in Chapter IV on the relation between farm size and producer's income suggest that perhaps 300 thousand families whose main agricultural income was from the farm, would be earning less than 4,000 pesos agricultural income in 1958; but by no means all of their income would be from their own farm.

If, then, about 20% of the agricultural families were to be characterized by a home consumption ratio of their agricultural output as high as the 25-60% range, with quite a number of them probably receiving a good deal of their agricultural based income as payment for labor, it could not be argued that isolation is a strong defense of the welfare position of the bulk of the rural poor, even of the bulk of those who operate small farms.

Related to the question of the meaning of home consumption is that of the importance to the farmer of the items he has to purchase (e.g. are they real necessities or not) and how their prices are likely to move. To the extent that they are agricultural products whose prices may be expected to move with those of the farmer's own output, he is less vulnerable; and to the extent that they are not necessities the same is true. Table I-7 indicates that food accounts for the majority of purchases by the small

Table I-6

Recent Home Consumption Ratios in Various Regions of Colombia

	Average Family Income in 1958 pesos[2]	Home Consumption[1] as a Proportion of Value of Crop & Livestock Output (1)	Proportion of Value Added in Agriculture & Livestock (2)	Of Value of Food Consumed (3)	Of Total Income (4)	Of Total Income With Value of Housing Imputed (5)
Pupiales, Narino[3] 1957 (?)						
Very small farms	(2300-3300)	.28 - .49		.46 - .68	.21 - .31	
Small farms	(8600-11,100)	.21 - .31		.56 - .75	.16 - .21	
Medium size	(17,700-21,800)	.11 - .17		.40 - .73	.06 - .08	
Large	(23,300-34,000)	.09 - .13		.60 - .87	.09 - .14	
Pasto, Narino[3] 1957 (?)						
Very small farms	(3,500-4,600)	14.8 - 19.5		.21 - .32	.15 - .21	
Small farms	(17,700-19,300)	12.0 - 13.2		.39 - .53	.13 - .14	
Medium	(29,700-32,200)	.04 - .05		.19 - .28	.04 - .05	
Large	(50,900-71,100)	.10 - .15		.21 - .69	.09 - .12	
Flat Part of Cauca Valley[4] 1966						
Farms 1-5 hectares	(5000-7000)[h]	1.15 - 2.44[a]				
5-10	(13,000-18,000)[h]	1.93 - 2.68[a]				

Table I-6, cont.

	Av. Fam. Inc.	(1)	(2)	(3)	(4)	(5)
Rio Suarez Region (1963-64)[5]						
all interviewees (including non-farmers)	(3,000-4,000)[g]	.50 - .60[d] (60 - 75)[b]		.264[j]	.313 (.385)[b]	
farmers only (median farm size: 1.4 hectares)[f]					.45[c]	
Rio Lebrija Region (1967)[6]						
5 or less	(4,300)	12 - 24				
5 - 50	(7,900)	10 - 16				
over 50	(30,400)	8 - 10				
Santardeil Tobacco Zone (1953)[7] (San Gil - Pinchote - Socono)						
full sample	(4,500)			25.4	21.2	
minifundistas (average farm size 6.1 hectares)	(5,670)				22.1	
share-croppers (average farm size 8.0 hectares)	(4,200)				20.0	
Caldas Coffee Zone[8]		very low[e]			very low[e]	

[1]Home consumption is presumably primarily composed of food products, or at least, products which would be classified as agricultural output. In some of the studies referred to here, this was clearly the way it was defined; in other cases it may have included the home consumption of some articles which would be appropriately included in the output of artisan industry.

[2]Income figures corresponding to the year of the study were converted to 1958 pesos by the price index of private consumption of the Banco de la Republica.

[3]From data presented in

Table I-6, notes, cont.

[4]Unpublished calculation by James Plaxico based on figures collected by the Centro de Investigaciones para el Desarrollo Economico (CIDE) de la Universidad del Valle.

[5]Figures are from Marco Reyes Carmona, , Rafael Pueto Duran and Bill Hanneson, Estudio Agroeconomico de la Hoya del Rio Suarez, CEDE and CAR, 1965. The sample itself did not separate out farmers from rural dwellers in other occupations, partly presumably because individuals frequently had more than one source of income.

[6] Figures calculated from data presented in Jose M. Herandez J. y Marco Reyes C., Economia Agricola y Desarrollo Regional de la Cuence Superior del Rio Lebrija, Centro de Estudios sobre Desarrollo, Universidad de los Andes, Bogota, Enero 1969.

[7]Source, Ministerro de Trabajo, Seguridad Social Campesina: Estudio de la Zona Tabacalera Santandereana, Litografia Villegas, Bogota, 1955. This was a small scale sample, referring primarily to 33 families. There were 11 small scale farmers (minifundistas) with an average farm size of 6.0 hectares and 12 share-croppers with an average farm size of 8.8 hectares.

[8]Source, Ministerio de Trabajo, Departamento Tecnico de la Seguridad Social Campesino, Caldas: Memoria Explicativa del "Atlas" Socio-Economico del Departamento." Tomo I, Bogota DE, Empresa Nacional de Publicaciones, 1956.

[a]The low estimates here include only household use, the higher one also includes use as aminal feed, payment in kind and seeds.

[b]This figure includes salary payment effected in kind (and presumably consumed by the recipient), thus giving total share of income (value of crop and livestock output) corresponding to products not entering the market. The figure in Col. (1) has been rounded to avoid the impression of unreal precision.

[c]Based on the data on the share of people in each municipio classified as farmers (See Table I-), the home consumption ratio for the population as a whole (also in Table I-) and the assumption that agricultural and non-agricultural incomes are equal.

[d]The figure presented in the study (p. 131) is 60.4%; but my calculation, based on the figures of Table VII-2 (p. 132), indicates that it is not more than 54% of value added in agriculture and livestock, and therefore presumably an even slightly smaller percent of the value of production (it is not possible from the figures presented to calculate this ratio precisely).

[e]In this study, home consumption was not measured, apparently because it was very low, and the researchers did not feel it was worth while.

Table I-6, cont., notes

[f]Although I could not find figures which would permit calculation of the mean size, data on p. 203 of the study suggest it might be about 3 hectares.

[g]Based strictly on the figures of the study itself, the figure is 3,000. But since the expenditure estimate was 35% above the income estimate, and since the authors felt the former were more accurate, we present the higher alternative as well.

[h]These income estimates are only guesses; the lower value is approximately the value of agricultural output per farm; inputs have not been subtracted out nor income from livestock products or other sources added in.

[j]Share of food, beverages and heating materials.

Table I-9

Distribution of Output of Farms 2-5 Hectares, Excluding Coffee, Tobacco, Export Bananas, Compared to Distribution of Food Expenditures of Families in Rio Suarez Sample Survey

	Expenditure Distribution %	Product Breakdown Country 2-5 Excluding Coffee, Tobacco, Bananas
Cereals	28.8	17.04
Tubers & Roots	23.0	12.82
Vegetables, etc.	4.9	5.75
Fruits	2.3	n.a.
Meat and Fish	12.2	18.38
Milk, Eggs, etc.	16.1	18.74
Other [2]	12.7	16.00[2]
Total	100.0	
Average Income:	5,900	Average Income: 5,000 pesos[1]
Average Expenditure:	8,748	

Sources: The Rio Suarez data is from Hanneson, et al., op. cit., p. 143. Some of the food expenditures reported there were food consumed while working on other farms -- we excluded this on the implicit assumption that its composition was the same as that of the foods reported in detail. Home produced was included, valued at market prices. The sample included a few families whose major source of income was not agriculture, and many farm families had members earning income from other sources.

[1] Our calculation method allows for at least some non-agricultural income though it may underestimate it. Since we were not able to separate out coffee, tobacco and banana farms from the total of farms in this category, we have assumed a figure a little below the estimated average for all farms in 1960 (but in prices of 1963-4 for comparison with the Rio Suarez data), which was 5,300.

[2] Cocoa, bananas, platanos, sugar, cotton. (It appears that platanos and bananas were not classified as fruits in the Rio Suarez study.)

farmers, ranging between 60 and 85% when expenditures for drinks and tobacco (perhaps underestimated in the figures) are included, for the regions for which data were available. The second largest expenditure is usually on clothing. Further detail on the consumption bundle was presented only in the Rio Suarez study, where, for the area as a whole, the important food categories were cereals 28.8, tubers and roots 23.0, milk and derivatives, eggs, and animal fats 16.1, meat and fish 12.2, and vegetables and fruits 7.1. Though figures are not available on the composition of the purchased bundle, the authors indicate that the products which are largely taken care of by own consumption are cereals, tubers, vegetables, and some animal products. And presumably the poorer members of this sample had less meat and animal products than the average.

The Rio Suarez evidence, while providing anything but satisfaction on the current welfare level of such communities (the authors note, for example, that the campesinos suffer considerably from malnutrition[83]) does show a considerable economic isolation; decreases in the prices of what these farmers produce might not affect them too much because of the rather high home consumption, and as long as the prices of the foods they buy do not rise much relative to what they sell; if the fear is that increased productivity of large farms will drive down prices of goods sold by small farms, there would seem to be at least a reasonable expectation that it would also drive down prices of the food products they buy.[84] Items which would become more expensive like clothing and purchased agricultural inputs could create hardships. Health and education available may be determined as much or more by public policy as by the farmer's capacity to pay.

Table I-7

Distribution of Expenditures Among Purchased Items

	CAR Municipios	Pupiales, Nariño				Pasto, Nariño			
		Mini-fundia	Small	Medium	Large				
Food, etc.[1]	78.4[b]	57.2	33.7	27.1	26.3	64.3	36.8	40.5	17.5
Clothing	11.2	20.2	12.5	13.8	12.1	10.8	1.2	6.3	18.2
Other	14.0	22.6	53.8	59.1	61.6	24.9	62.0	53.2	64.3
Education		8.0	22.2	15.2	20.8	-	1.7	2.7	-
Health	3.2	3.8	13.7	14.5	8.7	8.3	2.4	1.6	14.6
Entertainment		0.0	6.8	12.2	10.4	1.3	0.3	3.4	7.3

	Caldas, 6 Municipios Sample				Santander		Belen de Umbria,[2] Caldas
	1-3 hectares	4-9	over 9	laborers	Minifundistas	Sharecroppers	
Food	76.8	72.1	66.0	71.1	84.4	78.4	74.0
Clothing	10.6	12.6	11.3	11.8	9.2	4.7	9.1
Other	12.6	17.3	22.7	17.1	6.4[a]	16.9[a]	16.9
Education	1.0	0.2	1.4	0.8			0.6
Health	8.4	7.2	12.2	6.0	6.4	2.7	11.0
Entertainment	0.5	3.4	6.6	6.0			

[1] In the case of the CAR municipios this category explicitly includes beverages and heating materials.

[2] Ministerio de Trabajo, Departamento Tecnico de le Seguridad Social Campesino, Caldas: Memoria Explicativa del "Atlas" Socio-Economico del Departamento, Tomo 1, Bogota, Empresa Nacional de Publicaciones, 1956.

It is interesting to note in this case that despite the high share of expenditures going for food, these farmers spent a combined 23% of all expenditures for maintenance (9%) or improvements (14%) on their farms.

We were not able to separate groups of farms by size or income but the text indicates that

a) 60% of the farms had less than 5 cuadras;
b) median per family income was about 3,000-4,000 pesos and median per capita income about 500.

[a] The authors indicate that considerable funds appear to be spent on pilgrimages; these are not recorded in these figures.

[b] Calculated as follows: Home consumption plus salary in kind was 37.7% of income and thus 25.8% of all expenditures. It would thus be $\frac{25.8}{81.3} = 31.7$ of food, beverages and heating materials consumed. And the share of all monetary expenditures (74.2% of all expenditures) for these categories (81.3 - 25.8 = 55.5 of all expenditures) is thus 74.8%.

Table I-8

Share of Selected Product Groups in Total Value of Agricultural Output, 1960

I-58 Farm Size	Coffee	Corn, Yuca Platanos, Panela[1]	Beans, Wheat, Potatoes	Onions, Leeks Garden Beans Lentils, Arracacha, Yams	Poultry & Eggs	Hogs	Total This Group
2-5 hectares	24.4	17.9	9.0	4.2	15.9	6.3	77.7
All farms	17.5	12.8	5.4	1.9	7.9	4.0	49.5
200-500 hectares	6.1	7.2	3.0	0.3	2.4	1.9	20.9
All farms over 50	8.1	9.7	3.1	0.4	2.4	2.1	25.8
Share of Same Groups in Total When Coffee and Beef Excluded							
2-5 Hectares		25.6	12.9	6.0	22.7	9.0	76.2
All farms		20.9	8.8	3.1	12.9	6.5	52.2
200-500 hectares		12.0	5.0	0.5	4.0	3.1	24.6
All farms over 50		16.6	5.3	0.7	4.1	3.6	44.3

[1]We assume all sugar cane on farms of 2-5 hectares was for panela, and only 10% of that on the 200-500 hectare farms and 60% of all farms over 50 hectares. For all farms we used the Banco de la Republica estimate that 75% of all sugar is for panela.

To know whether the purchasing power of small farm sales would fall with an expansion of commercial agriculture we must compare the product composition of small farm sales with the composition of commercial farm output. This is difficult. Though it has often been said that "the small farm produces the food for Colombia's cities" it is unclear how "small" this farm was and whether a past role may have by now diminished. Analysing the output composition of small farms (see Table V-) helps in deducing the product composition of their sales, though the output composition tends not to vary as much with farm size as one might have guessed. Consider the size range 2-5 hectares; here there are about 275,000 farm families, and a crude estimate by the author suggests that about 75% of their income based on activities in agriculture comes from their own farms. This figure would probably be smaller if the coffee farms were excluded, but probably not significantly. Their average income was probably about 3,000 pesos per family in 1960. For this group the products which are relatively more important than on the average farms are (besides coffee and tobacco) corn, beans, potatoes, sugar for panela, yucca, wheat, platanos, most types of vegetables, hogs, eggs, and fowl.

In the case of poultry, eggs, and hogs and probably some of the vegetables, there are enough small specialized farms (i.e. small in acreage but not in output)--ones which do not come in the poverty category--to make it unclear whether the sort of low income, rather subsistence type of farm we are trying to isolate here also produces a substantial market surplus of these products. The following data from Table V- give an idea of the differences between the output bundle of farms in the 2-5 hectare size range, the total bundle, and that of the farms in the 200-500 range. The figures are more instructive when coffee and beef are excluded, the former

tending to be a separable (though increasing serious) problem and the latter a product for which competition by the small farm is not possible. As mentioned above, some of the output on small acreages of hogs, chickens, etc. is by farms which should be excluded given the aim of isolating the small, rather poor farmer, so the differences indicated here are overestimates of the policy-relevant ones. But they do confirm rather clearly the extent to which a subset of all the crops sustain these farms and hint at the increasing difficulties such farms will have if modern agriculture encroaches on their markets for these.[85]

For the subsistence crops (corn, yucca, platanos, sugar for panela), the fact that home consumption leans in their direction would lead one to expect their relative prominence on these farms, so one would need more precise data on composition of home consumption to deduce by residual the composition of sales. The data, and impressionistic observation of rural market places suggest that in fact the sold bundle may be not too far from proportional to the produced bundle when we refer to the farm not specialized in coffee, tobacco, or export bananas nor in the category of highly capitalized poultry, egg or hog producers (such farms are small in land size only); the sold bundle probably has a higher share of poultry, eggs, vegetables and such higher income foods, but how much would be difficult to say.[86] It is known to include substantial amounts of panela, beans, potatoes, wheat and barley.[87] The crops where at present there is considerable production both by small and large farmers include corn, potatoes, tobacco and wheat and perhaps barley.[88] The dearth of complete rural income-consumption studies inevitably leaves considerable doubt as to just how the low income farmer fits into the picture and just what he does.

Table I-9

Distribution of Output of Farms
2-5 Hectares, Excluding Coffee,
Tobacco, Export Bananas
Compared to Distribution of Food
Expenditures of Families in Rio
Suarez Sample Survey

	Expenditure Distribution %	Prod. Breakdown Country 2-5 excluding coffee, tobacco, banana
Cereals	2.88	17.04
Tubers & Roots	2.30	12.82
Veg, etc.	4.9	5.75
Fruits	2.3	n.a.
Meat & Fish	12.2	18.38
Milk, Eggs, etc.	16.1	18.74
Other[2]	12.7	16.00[2]
Total	100.0	
Average Income: 5,900 Average Expenditure: 8,748		Average Income: 5,000 pesos[1] (guess)

Sources: The Rio Suarez data is from Hanneson, et. al, op. cit., p. 143. Some of the food expenditures reported there were food consumed while working on other farms - we excluded this on the implicit assumption that its composition was the same as that of the foods reported in detail. Home produced was included, valued at market prices. The sample included a few families whose major source of income was not agriculture, and many farm families had members earning income from other sources.

[1] Our calculation method allows for at least some non-agricultural income though it may underestimate it. Since we were not able to separate out coffee, tobacco, and banana farms from the total of farms in this category, we have assumed a figure a little below the estimated average for all farms in 1960 (but in prices of 1963-4 for comparison with the Rio Suarez data), which was 5,300.

[2] Cocoa, bananas, platanos, sugar, cotton. (It appears that platanos and bananas were not classified as fruits in the Rio Suarez study.)

More information would be necessary on the basket of purchased goods, the basket of sold goods, and the relations among the prices of the goods involved to predict satisfactorily how various price movements would affect the small operator. In the Colombian case the home-consumption rates, while substantial, are hardly high enough to argue that he is effectively isolated; only if the prices of most of the food he buys were likely to move with that of his output could such an argument be made.

To sum up, the composition of purchases data, while only one of a series of relevant bits of data, tends to suggest that decrease of demand for labor may be a greater threat to the agricultural poor than the price effects of the expansion of commercial agriculture, and that other spill-overs from commercial expansion (e.g. increased demand for land) may be more serious than the price effects as such. But it must be remembered that this may be a short sighted point of view, for this mantle of isolation must eventually be removed if the small farmer is to become better off without leaving the sector, and then the conflict could be more serious. Or, in terms of the present, if we looked at medium size farmers (e.g. 5-25 hectares) whose income levels, while they suggest that the group not be the focus of special attention now, are clearly not to be considered satisfactory in the long run, then the conflict would be greater, and would very likely warrant close policy attention.

Prospects for the Easiest Possible (Partial) Solution: Exports

Invulnerability to price effects via "isolation" is never complete and will be decreasingly so if successful rural development occurs. In its

absence, hell-bent expansion of the commercial sector can obviously be damaging. Still, factor productivities could be such in this sector that foregoing its development would entail a heavy price in terms of foregone output. The extent of this conflict[89] (between increasing production on large scale farms and improving income levels of small scale farms) can be diminished if a substantial amount of the increase of output from the large farms (or the small farms) in fact can be directed to exports. When it can, greater increases in output can occur without lowering prices, and hence real incomes. It would also constitute a major engine in the solution of the overall poverty problem in Colombia, both rural and urban, by allowing for a more rapid growth in the industrial and other non-agricultural sectors, thereby creating jobs faster in the urban sector and helping to drain off the excess supply of farmers.[90] The maintenance of a high level of export earnings depends primarily on the perforamnce of the coffee sector (although here the problem is principally slow-growing demand rather than difficulties on the supply side) while hope for rapid increase rests mainly on the beef sector, which has historically been characterized by inefficiency, latifundismo, absenteeism, and waste of resources, and on several crops, including bananas, sugar, cotton, and others, which either are exported currently or are potential exports; most of these are produced in the "commercial" crop sector.[91]

In Chapter VII we consider in some detail the prospects for this "out" of the problem.[92] Unfortunately there is little hope for a really rapid increase of agricultural exports such as might increase the labor absorptive capacity of the urban sector very fast;[93] there is some possibility that

some of the commercial crops also produced on small farms (e.g. corn, potatoes) will be exported before a drastic domestic price decline occurs, but this remains to be seen.[94]

The Domestic Drama: Demand, Commercial Output, Small Farm Output, Rural Industry, and Migration

We saw earlier that most of the income of the rural poor comes from working for others, so it is clear that rapid commercial expansion would hurt this group by lowering the labor demand of this sector itself, lowering that of small and medium farmers by rendering them less competitive, or directly lowering the real income of small producers. We have seen that the insulation of small and medium farmers from the effects of price declines is not high,[95] we know that modern commercial agriculture uses relatively little labor, and it is not arguable that exports will smoothly channel increased output abroad and prevent significant price declines. Taken together, this implies potential conflict; i.e. the problem must be faced directly in all its considerable complexity. We must consider the potential for growth in each sector (in terms of the factors which can be made available to it); the detailed way in which the two subsectors interact; the growth of demand for agricultural products (distinguishing growth of demand for commercial and traditional products if they are likely to occur at different rates, and each sector has a substantial comparative advantage in certain products); and finally possible solutions in other sectors of the economy.

We have already mentioned the way the two subsectors may interact as competitors. The less the extent to which large and small scale farms

produce the same products or products which are relatively close substitutes for each other in demand, the less the danger for small scale agriculture in the future. It is even conceptually possible for there to be complementarity between the two subsectors. The second anticipated impact of commercial agriculture on the poorer rural population is the direct impact of its labor saving technology on workers. Here an obviously important question is the extent to which mechanization is labor saving; and the extent to which it would be preferable from a social point of view to extend it in Colombia.

Probable Development of Commercial, Large-Scale Agriculture and Small-Scale Agriculture

The development of mechanized and commercialized agriculture on medium and large farms has occurred almost entirely within the last two decades.[96]

This is particularly true of mechanization; large scale imports of tractors and accessories began only in the late 1940's and rose very rapidly up to 1957. More or less technified agriculture is also a phenomenon of the postwar, applied earliest by a group of "new entrepreneurs" who produced the "new products" like cotton, rice etc. Little research or extension had been done in Colombia before the second Warld War and the usage of purchased inputs was very low.

Commercial agriculture has been variously applauded for its contribution to otherwise lagging output and its lowering of production costs and therefore of prices for some goods, and bemoaned since it has often been mono-crop cultivation on rented land, with short-run profits as a goal,

little consideration for maintenance of land quality and not labor intensive. It has been argued that the lack of concern for the longer run will eventually slow or halt the increase in this type of farming. But given developments in the technology of agriculture in the developed countries, it seems unlikely that mono-crop cultivation will leave such pervasive negative effects on land quality,[97] and that the increase in commercial agriculture will for this reason soon level off.[98] It is possible that the price elasticity of supply of these commercially grown crops is high, so that a fairly minor decrease in land quality or a fall in prices would slow the increase substantially;[99] but continuing technological change will work against this.

Other factors besides land have had mixed availability to the commercial sector. Public policy measures have been designed to make factors readily available. Credit has become increasingly available, imported capital goods have been increasingly subsidised, and attempts have been made to increase the availability of some other imputs. Despite this, the chronic periodical balance of payments difficulties have made the supply of capital goods, replacements for capital goods, some purchased imputs very eratic causing problems for the farmer trying to technify. But in most respects the situation is improving for the commercial farmer; perhaps the major negative factor he will face in the future will be price increases attendant on import substitution of capital goods and purchased inputs.

Pending more detailed studies we can guess that commercialized farming will continue to expand at a reasonable pace for the foreseeable future.

The prospects of the small scale sector (we will not here call it the "traditional" sector since presumably one prerequisite of success would be the shedding of this characteristic) is more open to question and complicated. While one might guess that something like the poultry take-off could be pushed on to the small farmer, this has not happened so far; it seems less likely that any developments in swine (another product requiring little land) could be.[111] [111 Atkinson, for example, feels that the gap in management practices now followed by the peasants and those required for modern hog production is so wide that this production may not be a real option for the peasant. More likely, if the industry does take off it will be due to the entrance of a whole new group of operators, as has been the typical case with the commercial crops.]

Atkinson concludes in general that the difficulties and uncertainties of applying improved technology to traditional agriculture are impressive and that it would even be risky for commercial farmers with modern equipment, adequate capital and good management ability to venture into the crops characteristic of it. This explains in part why expanding farmers usually avoid the traditional crops and mixed technology crops. Markets are also better organized for the modern crops and its easier to import improved seeds, use new technology, etc.[112]

Most experts feel that technically it would be possible to raise agricultural output by 7 to 10 percent per year. Yet there is considerable evidence of real possibilities, and it seems clear that part of its relative (to the commercial sector) stagnation in the last few years has been due to less favorable treatment from public policy, but the details of how best to make it advance fast remain to be worked out.[1] [[1]An increasing number of economists are coming to view this approach as necessary and efficient. Among the proponents of this view (based partly on his familiarity with the Japanese case) is Bruce Johnston. He says, for example:

> "It is argued here that the existence of yield-increasing innovations which are neutral to scale and consistent with the existing systems of small scale agriculture increases the advantages of the labor-intensive, capital-saving alternative. The essence of this approach (characterized elsewhere as the 'Japanese model' in contrast to the 'Mexical model' to be discussed shortly) is agricultural development which preserves a unimodal distribution of farm sizes. Yield-increasing innovations and expanded use of fertilizer and other current inputs are diffused widely through the agricultural sector, although there will naturally be variations in the pace and efficiency of implementation associated with differences among farmers in their competence and resources. In general, there seems to be a growing recognition of the relevance of this type of approach to developing countries not only in Asia but in parts of Africa and Latin America as well."

His optimism is limited, however.

> "In West Pakistan, for example, many agricultural leaders and development economists are declaring that 'the bullock is obsolete.' Although it is obviously not admitted, prescribing all-out tractor mechanization under these conditions is equivalent to advocating development according to the 'Mexical model,' i.e., a farm economy characterized by a dual-size structure with increases in output and commercial sales concentrated in a small subsector of large scale, capital-intensive farm operators.

> Such views take on considerable importance because there is a strong likelihood that the seed-fertilizer revolution will give an impetus to premature tractor mechanization. The rapid initial increase in cash income, especially in Pakistan, India, and other countries where rapid import substitution is taking place, increases the ability and the incentive to invest in such equipment. In economies in which little structural transformation has occurred and the absolute size of the farm labor force is increasing rapidly, investment in tractor mechanization is likely to be uneconomic from society's point of view even though it is profitable to the large farm operators. Their saving in labor costs as determined by market wage rates is likely to be considerably higher than the marginal productivity of the labor that is displaced. The social costs of exacerbating problems of underemployment and unemployment do not enter into their assessment of costs and returns. Moreover, this general tendency for the private marginal productivity of investment in labor-displacing mechanization to exceed the social marginal productivity is frequently strengthened by policies that distort the prices of productive inputs and accentuate the discrepancy between private and social returns. In a number of countries, a sharply differentiated tariff structure with low or zero import duties on tractors, often associated with overvalued exchange rates and programs of subsidized government credit, alters relative factor prices and encourages tractor mechanization."

(See B.F. Johnston and J. Cownie. "The Seed-Fertilizer Revolution and Labor Force Absorption," The American Economic Review, Vol. LIX, No. 4, Part I, September 1969, p. 573.) Our rather "negative" approach here, formed more in terms of the due results which may be expected if such a route is not taken, is prompted by the current lines of Colombian policy and lack of familiarity with the possible inconsistency between it and general social welfare goals. Other chapters treat more extensively the positive potential in the sort of approach to which Johnston refers.

The yield figures of recent years have not indicated dramatic improvements in many crops, which might lead one to believe that the technological change which has occurred in commercial agriculture has not been great. But technological change in the form of an expansion in mechanization and the improvement of disease control, has made possible extention of cultivation which adds substantially to output, although it does not necessarily raise average yields.

There is a substantial disagreement of opinion on the amount of land which can still be mechanized; Lauchlin Currie, for example, argues that with mechanization more than the present output level can produced with many fewer people than are now used; Dale Adams, on the other hand, argues that "further mechanization of Colombian agriculture is largely restricted by: (1) the current land tenure systems, (2) agro-economic problems in certain areas, (3) the nature of many of the commodities which are produced. There is little scope for expanding mechanization in almost all of the

major export crops from Colombia: coffee, sugar cane (white sugar), bananas, tobacco, and livestock."[100] Certainly there are constraints, implicit in the hilliness of the terrain and in the low labor cost, on the mode of mechanization which can be undertaken. Figures presented in Chapter II indicate the quite substantial increase over the last 15-20 years in the share of crops produced by "commercial" agriculture, but a sufficient data base with respect to the points raised by Adams is not available to estimate the extent to which such changes may be expected to continue.

Yields of some crops are considerably lower on small-scale farms now than on the larger-scale ones (see Table III-3). Technology is in some sense less advanced on the small farms for most crops (coffee is a possible exception) and where yields are as high as on larger farms it is usually due to a much greater application of labor per unit of land. For the small-scale farmer to remain in the same relative position as at present it is true that he does not have to attain the technological level of the large-scale farmer but only to progress at more or less the same rate. A really effective extension program (and this would imply a multiplication of the current service in Colombia) and a great upgrading of quality would probably tend to close this gap. But during the last couple of decades the gap has widened, so one cannot be optimistic about its narrowing in the next decade or so, unless a serious effort is made in this direction.

An aspect relevant for all agriculture and around which there is considerable uncertainty is the extent to which technification of other types besides mechanization tends to be labor using or labor displacing. The possibility that these advances should be labor using is certainly

present, as demonstrated in several Asian countries,[101] but in terms of the Colombian context the possibility is less clear. The major changes presently occurring along these lines are increased use of fertilizers, insecticides, improved varieties, crop rotation, irrigation, etc. It is reasonable to assume that these changes permit increases in labor input per unit of land. But this is not the appropriate concept of labor intensity to indicate the direction of the final effect on labor use and wage rates. An innovation may be complementary with an increase in capital. Thus it might be that an increase in the application of fertilizer would lead to an increase in the amount of labor used per land if the previous technology were retained but it might at the same time make it pay to buy a machine which would decrease the amount of labor used. Also, if the use of new inputs or techniques leads to an increase in total output the amount of labor used per unit of output may decrease even though that used per unit of land increases, and the total amount of labor input to the production of the crop may decrease, especially if its demand tends to be inelastic. This concept of labor intensity per unit of output is the more relevant one in the present context.

Increases in Demand for Agricultural Output

It is apparent that the agricultural sector as a whole, and each individual component of it, is better off the more rapidly the total demand for agricultural products increases. This increase will be the more rapid the greater is the growth of the industrial and other non-agricultural sec-

tors' income, and the greater is the growth of demand for exports from the agricultural sector. In a closed economy, and given an over-time income elasticity of demand less than one,[1] the increase in agricultural output would have to be smaller than the increase in total output of the economy if the relative price of agricultural produce was not to fall.[103] It is necessary to distinguish here between the income elasticity based on the question "If a family's income rises by X%, by what percent will its (direct and indirect) purchases of agricultural products rise?" - we will call this the cross-section income elasticity since calculations of it are based on budget studies usually - and the income elasticity based on the question "If total income in an economy over time rises by X%, by what percent will demand for agricultural products rise?" - this we will call the over-time elasticity, the two would not be expected to be equal unless population is not growing and tastes not changing. The cross-section elasticity is based on an income per capita concept whereas over time elasticity depends both on population growth and the effects of increases in income per capita. If tastes were unchanged, the two would be related by the formula

$$\frac{N_t}{N_c} = \frac{\dot{p}a + \dot{y}m}{\dot{p}m + \dot{y}m}$$

a is the average propensity to consumer agricultural goods,
m is the marginal propensity to do so,
$\dot{y}$ is percent increase in income per capita, and
$\dot{p}$ is percent increase in population.

If consumption and income are measured in per capita terms in over time calculations, then this elasticity is conceptually the same as the cross

section one, assuming tastes do not change. But many calculations are carried out in total rather than per capita terms, and this is the elasticity most directly relevant to the policy question at hand.

Time series and budget studies suggest a fairly low income elasticity of demand for food and for agricultural produce in general. The only detailed budget study yet published (carried out in seven major cities by the Statistical Office (DANE)[104] suggested cross-section income elasticities of demand for food in 1953 on the order of .4 for the highest frequency incomes for white collar workers (empleados) in Bogota and .6 for the highest frequency incomes for blue collar workers (obreros).[105,106] While these elasticities do not imply comparable ones for the demand for agricultural produce in the countryside--because of the lower per capita income there one would expect a higher elasticity - they give a good idea of the range within which the overall elasticity should fall.

[104] Based on the same 1953 survey of urban families, ECLA (United Nations, Analyses and Projections of Economic Development; The Economic Development of Colombia, United Nations, Geneva, 1957, p. 253) calculated an income elasticity of demand of only 0.53 for processed foodstuffs (which presumably have a higher elasticity than all foods together). The methodology was not given, and the figure may well be too low, but is still probably roughly indicative. ECLA also presented estimates of the overall distribution of expenditure in rural and urban areas; (op.cit., p. 26) a calculation based on these figures shows that while urban consumption per capita is 183 per cent above that in rural areas, the consumption of

foodstuffs is 87 per cent higher in urban areas. This suggests an expenditure-elasticity of demand for food of 0.48. The comparable income elasticity would be somewhat lower.

Over time figures on changes in income and absorption of agricultural products (over the period 1950-67) indicate a higher elasticity of demand for all agricultural produce; Note however that, according to our calculation at least, there was almost no price level difference between these two pairs of years. arc elasticity (not allowing for the fact that prices changed) for 1950-1 to 1966-7 was 0.79. This figure implies a cross section elasticity of about 0.70, given the average and marginal propensities to consume agricultural products over these years. The marginal propensity to purchase agricultural products was 0.264. Least squares regressions which included the relative price of agricultural products were not consistent as among specifications, though they pointed to a range of 0.3 and 0.9 for the income elasticity and -0.3 to -0.5 for the price elasticity. The following equations yielded these results:

		Price Elasticity* at the point of means	Income Elasticity* at the point of means	R^2
(a)	$D = a_o + a_1P + a_2Y$	-0.53 (-3.48)	0.89 (29.45)	0.98
(b)	$\frac{D}{N} = b_o + b_1P + b_2\frac{Y}{N}$	-0.30 (-2.17)	0.45 (4.42)	0.59
(c)	$LnD = c_o + c_1LnP + c_2LnY$	-0.31 (-3.21)	0.30 (24.42)	0.98

Where D is quantity demanded in real terms,
P is the relative price of agricultural goods compared to non-agricultural goods,
Y is income, and
N is population.

*t values are in parentheses.

Various other specifications were tried, including the use of a time trend, and the division of the whole period 1957-67 into two sub-periods, 1950-67 and 1958-67. Coefficients and elasticities tended to be unstable under these changes, especially in the cases of (b) and (c) above. This suggests that the simple are elasticity of 0.79 mentioned in the text is our best estimate. Note that the income elasticities of (a) and (b) above are not quite as far apart as they appear to be; that of equation (b) is from an equation with quantities measured in per capita terms so when converted to the terms of equations (a) and (c) (see p. I-74), it would be about 0.50. It seems safe to conclude that over-time elasticity is below one (and would be increasingly so the more rapid the growth of income per capita) and most likely in the 0.6 to 0.8 range. This would suggest that, for prices of agricultural products not to fall (assuming that the demand for net exports i.e., exports minus imports) increases at the same rate as that for domestically used produce), the rate of growth of agricultural output can be only about three-fifths of the rate of growth of the rest of the economy. And price elasticity is such that a faster growth could even decrease the absolute income of the sector.

Solutions Outside Agriculture

Current trends and the preceding analysis make it appear unlikely, even with the best of policies, that satisfactory incomes for all can be achieved without considerable movement of people to other sectors. This implies that part of the solution must involve either migration to towns

and cities, or sources of income outside agriculture.

Possibilities for Non-Agriculture Income Sources

Before proceeding to the discussion of out-migration, it is worth asking ourselves what proportion of a farmer's income comes from non-agricultural activities and what the possibilities for expanding these income sources are. In some countries they constitute a substantial portion of rural income.[1] The ratio is now about % in the U.S. and 53% in Japan; in both these countries the context is one of rapidly expanding off farm opportunities in general, good communication, etc. Countries like Colombia are in a less favorable situation since off farm non-agricultural opportunities are much more limited, and home industry seems to have decreasing potential. We have already seen that off farm income is the bulk of total income for families with little land (and all of it for landless families), but the largest component of this income is from labor on other farms. Both this and income from agricultural service industries depend on developments within agriculture. Rural off farm industry, and on farm production, primarily for home use, are the other major components. The ratio of each component to total income is presumably higher on the smaller farms, where greater available time and lower agricultural income combine to make it more profitable and more necessary for him to engage in such activities. And the prospects of rapid exogenous increases in the last two components do not appear bright. Rural industry, as defined in the population census (presumably mainly off farm) decreased substantially in the 1953-1964 period: Observers

tend to feel that on farm production has also declined, partly because of increasing difficulty to compete with products from the modern sector and partly due to increasing incomes, at least in some regions.[1]

[1] Rural industry as classified in the census (i.e. where it was the major activity of the person in question) and the sort of part-time activity which the farmer and his family might have while still operating the farm may not be subject to the same factors in the determination of their competitive situation. But more likely than not many of these factors are common ones so the census data may suggest that not only is it harder for a person to continue to live in a rural area while shifting fully into handicraft work, but it is also harder for him to productively spend part of his time on that work. Since the extent of production of these items is a function of low agricultural production and poverty, one would expect their output to increase if poverty increased, but other things being equal, this increase would not, of course, prevent incomes from going down. The main implication of our inability to quantify these forms of production is that we may overestimate the degree of change, but we are not likely to err as to its direction.[2] [2] Income related to transportation and commerce to agricultural items is fairly closely related to total agricultural output, and the amount of employment generated is fairly closely related to the amount generated in agriculture itself or in the type of agriculture on which the transport and commerce is based. Thus it would probably not be reasonable to anticipate much employment creation in the services relating to the commercial agricultural production, since when the agriculture is on a large scale basis the accompaning services tend to be likewise on a large scale basis. So the switch from traditional or small scale to large scale agriculture is likely to be employment displacing in the associated services as well as in the agriculture itself.

Unless something changes in the external conditions, (including government policy), it seems safe to conclude that the possibility of shifting into small scale industrial production either for home use or for sale can at best alleviate any changes downward which may be caused by the factors already discussed. And it may well be that the development of the urban industrial sector will make it less and less a possible cushion for rural problems in the future.

The existence of earnings from non agricultural activities might imply that our estimate of incomes of our methodology was designed to asoid this in that it was assumed that the total income of the families classified as landless and having a small amount of land was their income from agricultural production and a wage income determined by the wage rate and a working year of 250 days. This is probably an overestimate of the number of days the average person could work in agriculture at the wage rate, so unless the income from other occupations is more than enough to make up this difference, no downward bias is involved.

The recent trends of course have been in the absence of any government policy favoring rural industry and it is possible that there are policies which would make this alternative more successful than it has been, the more so since industry may still be considered rural in the sense that employees can come from and live on farms even if it is in a small town of a few thousand people. (In the population census rural includes population centers of up to 1,500 people). At present the Caja Agraria is taking some steps along research and action lines in this connection.

Rural-Urban Migration

In the event that commercial farming continues to gain ground relative to small-scale farming, and neither exports nor other rural sources of incomes for small farmers take the pressure off, then the only way out the small-scale farmer is emigration. Emigration from the rural areas has been rapid in the past; while the vegatative growth rate of people living in rural areas (and presumably of people working in agriculture, the largest sub-group of rural dwellers) has in the last couple of decades probably been around 3 per cent, the actual increase in the agricultural population has for some time been around one percent. Thus about two-thirds of the natural increase is drained off via emigration either to rural small towns or larger cities. Yet the process has not (taking the last 35 years as a whole) been sufficient to lead to an increase in the income of wage earners.[109]

Migration can clearly lead to an increase in the incomes of the people remaining in agriculture if the non agricultural sector has the

absorptive capacity to provide jobs for a very substantial migratory flow. This seems unlikely. While the economy had a rapid growth of real income per capita in the late 40's and up until about 1957, both rural and urban wage rates tended to rise [except for a short period during the early 50's when some urban wages were probably falling because migration, pushed by the Violencia, was at an above normal rate] but since then (or at least since 1963) neither wage rate has been rising and the occupational structure in the cities seems to be moving more towards low productivity sectors, suggesting greater and greater difficulties in successful job creation in the cities.

Another question relative to the potential successfulness of the migration process in improving distribution of income is that of which groups tend to migrate. No Colombian data of much value has been thus far adduced on this question. In some other countries, there is evidence that the out-migration rate is higher for poorer people,[110] but it would be risky to assume that this is a universal relation. Here a vicious circle effect has been allegedly perceived in a number of Colombian communities, whereby the poorer the farmer the more unlikely he is to educate his children, and the more likely he is to live in a very isolated area. These considerations make emigration less probable and increasing over-population more probable, with a resultant decrease in income per person. How widespread a phenomenon this is remains to be seen; certainly the rate of rural to urban migration has been rapid in the past, but there is no overall data on the incomes of the migrants to indicate whether the poorest strata of the rural population participates actively in this flow.

Evidence presented in Chap. VI on changes in the dispersion of rural wage rates by minicipios (there was no general tendency for such dispersion to occur) throws doubt either on its prevalence and/or on the extent to which it pushes incomes down.

Dale Adams has concluded tentatively from his research in Colombia, that the "marginal farmer" does not make up a major part of the flow to the cities and, in fact, that the migration process may be rather selective in the other direction with the result of gradually decreasing the number of potential innovators and leaders in the sector. This form of selectivity, although definitely problematic to the future of agriculture, would be less so if the remaining land were then in some way redistributed, but given the high propensity to hold land of Colombians (even of people living in the city), leading to high land prices, and the lack of funds of the small farmer, this sequence seems far from automatic, and perhaps unlikely. Thus the die is cast for a potentially very severe problem unless either extension services can increase the yield on the small farms faster than on the large ones, or selective migration can be greatly facilitated by increases in education, or other incentives which increase mobility, coupled with an increased absorptive capacity of the non-agricultural sector.

To summarize, the more rapidly capital formation, mechanization, and technification of large-scale farms proceeds, the more slowly capital formation and technification occurs on small farms, the less agricultural products go into exports, and the more restricted is out migration from the small farms, the more difficult the position of the small farmer

will become. Continued mechanization of large-scale farming seems very likely. And the small-scale farmers, for whom capital accumulation is difficult because of their low income levels, and who have less access to improved technology through extension services, etc. (partly because of lack of education and partly for other reasons) may well have limited increases in production. If the urban sector of the economy continues to have limited capacity to absorb labor usefully, or the mobility of these very poor farmers to other occupations is very low, then there will be an increasing number of farmers living off the same land. And if the exchange rate policy remains one of overvaluation, agricultural exports will continue to be discouraged. In short, the spectre of lowering real income for the poorest part of the Colombian agricultural population does not involve assumptions which are far from the Colombian reality as it now appears. To determine whether such a decrease will occur, one must quantify the expected changes in variables already discussed.

Can these institutional and other changes be brought about and the traditional farmer removed from his unfortunate state by government policy? In an interesting commentary on the possibility that various government extension services might effect the desired redistribution of agricultural income, the sociologist Andrew Pearse has suggested that with a continuation of the present tendencies

> "...the traditional sector of the agrarian structure can not now be expected to develop, but rather to disintegrate under the impact of government development and reform measures, the changing temper of the peasants, and economic competition, and to be replaced by the urban based incursions of commercial producers of various sizes. The latter group, in conjunction with the industrialized enterprises of the plantation type, would carry the main burden of agricultural production.
>
> Nevertheless, despite increasing internal conflict and impoverishment, large groupings of small holders living at a subsistence level can be expected to survive for generations, waiting in 'cold storage' for the time when industrial development will draw their children or grandchildren

Pearse feels that the likely forms of government intervention will not reach the people who are on the bottom of the income scale. To the extent that such intervention is successful, it would be in helping those who start a little higher and are thus to some degree able to help themselves. This widens the existing economic gulf. And the introduction of promoters of community development and similar programs presents a kind of reference group for the well-off peasants and tends to widen the degree of social differentiation. Pearse exemplifies his ideas with a community (presumably in Colombia) which had been reached by road transport thirty years earlier, with fairly wide ranging results, including adoption of various improvements in agricultural technology, new varieties, etc. This adoption took place independently of extension services. The peasant was incorporated into the market economy. But instead of the improvement which might have been expected, he is now poorer than before, his soils are worse and are producing less, and he has come to rely on money to purchase his necessities. The price of consumer goods rises steadily while the selling price of his products fails to keep pace.

The structure of rural social systems, according to Pearse, operates against the technical development of the small holder in another way. Since the manual performance of productive agricultural tasks implies a low social status, the individual who does manage to accumulate some capital may prefer to invest it in raising his social status, by either moving out of the peasant class himself, or educating his children so that they can move out, instead of investing it in his own agricultural enterprise. Although this may solve the individual's problems, it gives little hope for the eventual formation of an agriculture based on medium sized farms with a more even income distribution.

This slighting up to now by public policy of the poorest people in agriculture is a strong base for Pearse's prediction that it will continue to characterize the future. The political system in general is geared to aiding those who have and forgetting those who do not. But even at times when serious efforts are made, the difficulties of solving the problems of the small farmers, either in the rural areas or in the cities, often appear to be overwhelming. Some public and semi-public institutions which have been aware of the problems have consciously decided that they were insoluble and that the only way to make any progress in agriculture was to concentrate on larger scale production and commercialized agriculture (e.g. Incora); others seem more or less subconsciously to have come to the same conclusion. Most public entities (and especially ones like Incora which naturally have many political enemies) have a strong bureaucratic need for "visible" successes, in Incora's case this led to too much money being poured into a few projects thus raising the likelihood of their visible success; but their benefit cost ratios are probably low because costs are so high per person. When this bias characterizes the policy of the institution which by its nature should be the most concerned with the poorest farmers, it is not hard to guess that he gets little attention from public policy as a whole.

Current Trends and Outlook

As suggested by the above discussion and elaborated upon in the remainder of this study, the future of much of Colombian agriculture's population does not appear bright. Many regions could be cited as examples of

increasing land fragmentation, worsening distribution of income, and so on. One which examplifies a number of these, including the increasing pressure of the people on the land and increasing severity of minifundismo is the Municipio of Fomeque in Cundimarca between Bogota and Villavecencio. Haney[1] [[1]Emil B. Haney, Jr., The Minifundio Dilemma: a Colombian Case Study, The Land Tenure Center, University of Wisconsin, November, 1968.] feels that with the rapid population growth and the mechanization of formerly labor intensive operations it seems likely that minifundio agriculture will be the only escape valve available to many rural people during the next few decades. There has already been a pervasive land fragmentation which still continues. Land prices are as high as $US 1,000 per acre for good agricultural land close to the village. "The restricted alternatives for families, coupled with cumbersome transfer procedures and inheritance patterns, has also fostered 'de facto' land fragmentation -- the stacking up of two or three generations on a single family property."[1] [[1]Haney, op. cit., page 13.] Most families have to rent their lands from someone; they have been forced into informal tenancy and credit arrangements with the merchants, middlemen, and professionals of the village. Eighty-five per cent of the rural respondents had obtained credit in cash or kind from village proprietors in the past two years. Such alliances between the peasants and villagers have a possibly beneficial side, being important in the development of commercial enterprise and the difusion of new technology in the community. Typically the villagers provide the land and the physical inputs while the peasants, known as 'sembradores' or 'partijeros' in this case supply the human and animal labor inputs.

But continued exploitative production techniques threaten the land in Fomeque; soil depletion is making it impractical and even impossible to produce commercial crops without improved fertility practices. But the increasing amounts of chemical fertilizers which are used are not being applied with complementary soil and water conservation practices. The introduction of intensive commercial enterprise such as green beans, onions, flowers, tomatoes, has increased output per unit of land but population pressures have caused a continual decline in the average farm size. Although 83% per cent of the sample rural households reported income from either off-farm or non-farm employment, there has been a decline in former artisan crafts so that peasant families must purchase a greater proportion of their family needs.

The local church has been more successful than the government in extracting resources from the peasantry. In 1966 it collected more than $25,000 in US dollars in the community through Sunday collections, campaigns, paid Masses, etc., while the land tax collected less than 8,000 US dollars. Nearly an equivalent amount was supplied to the Church through labor, food, and building supplies. Previously the Church tended to return more to the rural neighborhood through construction of schools and roads, but recently the growing village bureaucracy (teachers, officials, etc.) has effectively controlled the dispersement of these church funds into village projects including a complete elementary, secondary, and vocational school system, an experimental farm, a hospital, a theatre, etc. But few peasant children can go to the village schools, etc.

Haney summarizes his views of the situation by noting that "Yet the Fomeque case illustrates that there are limitations to increases in employ-

ment which can be brought about by such technological change (i.e., yield increasing technological change like chemical fertilizers and pesticides, new crop varieties etc.). In densely populated rural areas like Fomeque it is unlikely that the existing types of technology and institutional arrangements will permit a further absorption of people into agriculture and an improvement in levels of living for the rural masses without causing irreversible damage in the natural resource base."[1]

[1 Haney, op. cit., p. 17.] He notes that labor intensive conservation practices and irrigation schemes are used to great advantage on the more progressive farms of the community and for most commercial crops yield differentials between the lowest and the highest producers are greater than 10 fold, with most of this variation explainable by differences in technology and management. He concludes that the institutional structure would have to be changed to overcome the problems of the region. The peasants are not able to formulate collective goals with the current institutions and there is little inclination on the part of the community's dominant group to improve the agricultural infra-structure. And the national government is unlikely to give these minifundio communities much priority. The agricultural service structure is grossly inadequate and out-moded; the more progressive farmers have access to the research stations, supply agencies, financial institutions, etc., but the peasants must rely upon local sources of information and physical inputs.

General Theories of Agriculture in Development: Evidence from Other Countries

The remainder of this study tries to trace out some of the elements of change which have occurred in agriculture and in the rural areas of Colombia over the last 40 years or so, to take a relatively more detailed

look at the present structure and characteristics of the sector, and to draw from the two types of evidence some conclusions as to future policy. Not unexpectedly, we will find that the lack of a sufficiently detailed understanding of the sector and its dynamics makes it impossible to provide many conclusions. To some extent more research is needed into current structure and characteristics; to some extent it is unlikely that any amount of research would give us really good ability to predict the outcome of a given policy. It is in view of this situation that a consideration of historical developments in other countries, along with various types of evidence on current situations in them, becomes particularly useful.

Theories interpreting the pattern of development of the agricultural sector in underdeveloped countries and the role of its development in the growth of the economy as a whole are relatively recent and few in number. One with relevance to Colombia is the labor surplus theory, which posits a marginal productivity of labor either zero or very low in a "traditional" sector (with much of the agricultural sector usually assumed to be in the traditional sector), with the process of growth basically constituting a transfer of this excess labor from the traditional to the modern sector, in which marginal productivity is equated to wage rates through the operation of the usual classical market mechanisms.[114]

The question of whether "surplus labor" something like the type discussed in this model exists in Colombia is an important one; if it does, then wasted resources are present, which might be tapped by increasing employment in the modern sector (either urban or rural) or by more invest-

ment in the small farms on which it may be assumed that excess labor exists, to increase the potential productivity of that labor. And the implications of rural to urban migration, rural to rural migration and many other phenomena are dependent on whether this surplus labor exists. Many economists have argued on the basis of observations in a variety of countries that it does exist; a substantial number have argued the opposite, and a number of studies have failed to produce strong evidence of its presence even in such countries as India. This is not, however, the place for an extended survey of the literature on this issue; we wish only to note that it will be a major concern of this study to consider the possibility of such surplus labor in Colombia, and that we will conclude that in some relevant senses a surplus does exist.

Another major discussion found in the literature on agriculture in underdeveloped countries concerns the basic explanation of the low average output per person; one group of students of backward agricultures (made up to a considerable extent of anthropologists) has argued that a major obstacle to higher productivity lies in the people themselves, their backward traditions, lack of willingness to innovate and change, and inefficiency in the use of the resources at their command. In reaction to this school of thought, another group has developed, arguing that the campesino is usually a shrewd maximizer of utility given the resources at his command, and the fact that he does not produce more is a result of the fact that he does not have access to a lot of land and/or to the modern inputs necessary to achieve higher output per person.[115] It is increasingly obvious that the more extreme versions of each of these views

do not apply to most underdeveloped agricultures; there is plenty of evidence that less developed countries abound with campesinos who try hard to "maximize" and that modern inputs are frenquently not at the disposal of traditional agricultures, so that increases in output which could be achieved easily by individual efforts are not great. Few students of agriculture in developing countries would argue that a successful development could occur without improvements in input markets and infrastructure, such as roads, schools, marketing systems, etc. But at the same time much of the difference in income levels of farmers under similar circumstances is due to different management capacities or different levels of work effort.[116]

A final major issue running through much literature on agriculture in developing countries pertains to the relationship between the growth of agriculture and that of industry. It has frequently been assumed that countries have to make a choice between pushing one sector or the other, and that success in overall growth depends much on this choice. The interpretation that there is a high degree of competitiveness or conflict between rapid development in one sector and in the other is based on the idea that the same factors of production would be required in the development of either sector. The use of more labor in one sector would imply use of less in the other; the same would be true for imported capital equipment, financial funds or credits, administrative capacity, etc. An important school of thought, however, has come to the conclusion that in many cases such a conflict is in fact not present, and the two sectors are really complementary, since the resources required tend to be of different types, and the interrelationship of reciprocal demand between the two sectors is such as to make it unlikely that one can grow at a rate much above that implied

by the growth of the other and a sort of normal relationship between the two rates.

This is another important question in the Colombian context. It appears, at least on the surface, that the second line of thought has considerable validity, partly because labor is in excess supply, so that the use of more in one sector does not make the factor scarce to the other; and partly because there is a reasonable possibility that the use of optimal factor proportions in agriculture would not imply a need for much imported or domestically produced machinery and equipment.

As mentioned above, there are many aspects of the process of development which are never well understood, and about which one can only make guesses based on results from other countries. As Colombia now faces a dilemma as to whether to develop its agriculture by pushing modern commercial farming or by fostering smaller, less capital intensive types of farming, one of the most necessary lines of research involves evaluating the experiences of countries which may have faced a similar dilemma or had other relevant experiences in the past. Japan and Taiwan are countries which most quickly come to mind as having successful development processes, with almost their whole agricultural sectors being based on small scale farming. But the assumption of easy transferability of such experiences is clearly unwarranted. The extent to which these cases provide lessons of relevance will be discussed later.

The remainder of this book will focus on the sources of output growth in the past (Chapters II and III); the nature of and changes in the institutional characteristics of the sector and the policies of the public and semi-public government organizations dealing with the sector; (Chapter V);

the implications of the land tenure system and other structural aspects of the sector for the level of output and for income distribution (Chapter IV);the historical movements of real incomes for various segments of the agricultural population, including coffee farmers, other small farmers, and landless workers (Chapter VI); the contribution, past and potential, of agriculture to exports (Chapter VII); and a general consideration of the implications of past developments and current trends and characteristics for agricultural policy. We will focus especially on such issues as land reform, mechanization and supervised credit. (Chapter VIII).

Footnotes, Introduction and Chapter I

[1]ECLA estimated this ratio at about 69% in 1925 and since it has decreased secularily, it seems probable that it was around 75% or even a little higher in 1900.

[2]This relationship is discussed at length in T. Lynn Smith, Colombia: Social Structure and the Process of Development, (University of Florida Press, Gainsville, 1967). Smith argues that an uneven distribution of property underlies many problems--including a caste system--and resultant low income levels. He points out that among the characteristic differences between societies based on the large farm with landless workers and the family sized farm are the degree of vertical social mobility, which is much greater in the latter type of society; revealed levels of intelligence and development of personality are also much greater as is the search for progress; and the attitude towards manual labor is a positive rather than a negative one. He argues that the source of most discoveries and inventions in agricultural technology is the family size farm both in the U. S. and elsewhere. Cattle raising usually goes with latifundia, a high share of all land going to this use even when the land is of quite high quality; as a result value added per hectare is low.

[3]It is, needless to say, an oversimplification to refer to "the distribution of land" in Colombia. For there were substantial changes over the course of time before the turn of the present century, some of these leading to greater concentration of land, and some to less. The point we are making here, however, is simply that at every point of time, the distribution has been very unequal.

[4]From an income distribution point of view, of course, the directly relevant distinction is between farmers with low incomes and those with high incomes rather than between small farmers and large farmers. For each farm size, the range of incomes achieved is substantial; still the correlation between size of farm and income is high, and the range of farm sizes so wide that this variable is the main determinant of differences in income levels.

A solution to the income distribution problem is not theoretically in consistence with the prevalence of large farms as long as the agricultural techniques used are labor intensive. In such a situation there would remain the problem that people prefer to own their own land, but there is presumably some reasonable amount of income they are willing to give up for this privilege. In any case, in terms of the Colombian reality and current trends, it appears that many of the low income small farmers will be working their own land for some time to come, so it is not unrealistic to phrase the issue in terms of small farmers and large farmers.

[5]For most of the postwar period the official import exchange rate has been below an "equilibrium" rate so anyone who could import at that rate was receiving a sort of subsidy; and credit has been readily available for imports of agricultural machinery, further lowering the obstacles to purchase.

[6]Fals Borda, for example, feels that education is a sine qua non in the transition to better living for the farmers; it is important on the production side, but no less so on the consumption side. With more purchasing power, many farmers would use neither their free time nor their larger income to their own personal and social advantage; he observed this problem during the construction of the Cisca dam, near Saucio. (See his Peasant Society in the Colombian Andes). ~~And~~ A number of other people who have worked in rural areas concur in this judgment.

[7]Our calculations indicate a very substantial relative price increase for agricultural products; this increase may have been overestimated somewhat in which case the figure of 45% or even a bit higher might be the accurate one.

[8]Part of this discrepancy may be artificial, if prices are lower in rural areas. But this has not yet been demonstrated or measured. It is also worth noting that some income generated in agriculture goes to absentee farmers (either traditional or modern), some of whom in a real sense are not part of the agricultural population. A considerable part of the narrowing in the gap between average income earned in agriculture and in non-agriculture is undoubtedly due to the increasing share of income going to the modern commercial farmers; the increase between 1925 and the early 1950's was mainly due to increasing coffee prices, it would seem.

[7a]As mentioned above, our figures may overestimate relative agricultural price increases in the 1925-50 period. If the current price share of agricultural value added in total output in 1925 were 45% the relative income figure would be 37.5 and if it were 50% the figure would be 45.9. The chance of its being about 40 seems small.

[9]The calculation is of course crude, among other reasons, because there would be different "multipliers" for each of the basic sectors, there being no reason, for example, that the average transport and commerce component of an agricultural sale be the same as for an industrial one.

[10]See the discussion later in this chapter.

[11]The Banco de la Republica estimates, for example, that only a little over 10% of value of agricultural goods corresponds to inputs purchased, and not all of these are from the non-agricultural sector. And domestically purchased capital goods for agriculture are limited in quantity. These purchases therefore represent only a quite small portion of industrial output.

[12]The value of production of industrial goods (excluding processed coffee, primarily for export) was about 40% of G.D.P. at market prices in 1964 (value added was about 19%). Total purchases by the agricultural sector were probably about 1,150 millions (or about 5-6% of total industrial output) in intermediate products, 75 millions in capital goods, 3.0 to 5.0 billions in consumer goods (assuming about 20-30% of income generated in agriculture went to buy industrial products. For the median farmer this percentage

would be far too high, but since most of the income goes to the top 10% of income earners, it may not be an unreasonable average.) This is, thus, about 20-30% of industrial output. The ratio has presumably fallen over time as the total share of income and output generated in the agricultural sector has fallen, although such a trend might not be strong in the period of recent rapid growth of commercial agriculture.

[13]The profitability of commercial agriculture, coupled with the tax advantages agriculture has had over much of the postwar period, make it quite competitive for funds. And a fair proportion of these farmers were in some other sector before getting involved in commercial farming.

[14]The last couple of decades have changed this picture considerably. High quality flat lands (e.g., in the Cauca Valley) have gradually been switched from extensive cattle raising to modern "commercial" crop growing, partly as a result of the renting of land by absentee owners. The features of the earlier picture which have not changed are the numerous small hillside farms and the land concentration in the flatlands.

[15]See, for example, the description in International Bank for Reconstruction and Development, The Basis of Development Programs for Colombia, Baltimore, Johns Hopkins Press, 1950.

[16]It should be noted here that "backward" technology (in the case of crop varieties, forms of cultivation, or whatever) does not necessarily imply backward farmers, in the sense of farmers who are resistant to change. Much heated dispute on the behavioral characteristics of uneducated farmers in poor countries has passed through the journals in recent years. The anthropological literature has often pointed to the peasant's resistance to change and discussed it in cultural terms. (An interesting example of the cultural characteristic of some poor societies which allegedly holds back progress is the idea that one man's gain is another's loss; it thus becomes socially undesirable or dangerous to get ahead. This concept is discussed in George Foster, "The Concept of the Limited Good.") At the other extreme, a number of economists have defended the "rationality" of peasant behavior, pointing out that many of the innovations which someone else thinks the peasant should undertake are either downright unprofitable under prevailing conditions, or are too risky for him in his precarious financial situation to reasonably undertake. (A leading exponent of this position is Theodore Schultz, Transforming Traditional Agriculture, New Haven, Yale University Press, 1964.) The concept of rationality is clearly a relative one, and if one distinguishes it from maximization of expected income or profits, it is less hard to believe that peasants are rational. While there is certainly some truth, depending on the peasants referred to, to each of the above views, it seems likely that the Schultz view is closer to the truth in that of all the cases of alleged "resistance," a high percent could be explained by

(Footnote 16 continued)
erroneous perception on the part of the outsider of the advantages of the innovation to the peasant himself. We discuss this question in the Colombian context farther on. In any case, we do not imply in our discussion of the "backward" characteristics of Colombian agriculture that these are due to the farmers themselves; they may be due to the lack of appropriately adapted technologies, high prices of "modern" inputs, poor extension service, etc.

[16a] As will be discussed later, in some regions of the country failure to use such improvements does not imply any economic irrationality, simply relative factor abundances, with land being cheap and the application of the improvements expensive. But this depends on the region, and not all extensive non-technical farming can be explained by factor prices and lack of research effort by the public sector.

[17] United Nations, op. cit., pp. 172-173.

[18] Seed improvements and yield increases do not necessarily go together, of course. Some of the new varieties can be grown on more marginal land than previous ones; they may increase yields on previously cropped land and allow new land to be brought under cultivation (at lower yields) with the result that the positive effect cannot be detected in the average yield figures.

Further evidence of the looseness of the relation comes from the fact that yields rose for some crops like wheat during periods without muc seed improvement, partly because the acreage was being reduced with the marginal land probably being eliminated first.

In general, the problem of identifying what part of the increase in yield is due to better varieties and what part to other changes (on which not enough research has been expended to date to provide us with the answer) makes any judgment as to contribution of improved seeds a guess--see Chapter III.

[19] Colombia does not have a high man/land rate if all land used for cattle (usually on large farms) is included, but in the relevant crop sector the ratio is high.

[20] Recent estimates of the area under coffee cultivation tend to show that it has stabilized, so that this particular crop may no longer be a serious source of forest depletion. But many other crops are also grown on very steep land, including annuales which contribute in particular to the erosion problem.

[21] The above erosion problems are due partly to his failure to allow for the external diseconomies of his activities, and perhaps partly to a short time horizon, though it is possible that not even this point is valid, if he has no other way of earning a subsistence living in the short run.

[22]Most of these farms grow several crops. This feature constitutes an advantage in the sense that plagues are less likely to strike when there are several crops than in the case of monoculture. This advantage probably outweighs the problem implicit in the fact that the various crops are attacked by different plagues and complete control would involve all of these farms exercising the appropriate measures for several crops; the possibility that any one farmer will do so effectively is less the more different crops he has, and the possibility that a crop to which a certain amount of land is planted will be treated throughout an area is less the greater the number of farmers growing it.

[23]As of the early 1950's, ECLA (United Nations, op. cit., p. 142) indicated that plague killers were being successfully and fairly widely used on bananas for export, cotton, tomatoes, potatoes, and tobacco. The use of weed killers in rice, wheat and barley and in cane plantations of the sugar mills was also becoming a general practice. All of the above crops with the exception of potatoes, tomatoes, and tobacco are grown primarily on medium to large size holdings. Control has advanced further in the subsequent years with a fairly steady increase in imports of pesticides, (despite fluctuations associated with the balance of payments situation) leading to over four times as much being applied in the mid-60's as in the early 50's. This expansion has been very much associated with the advance of commercial agriculture; though rapid, it does not mean that more and better use would not pay off. In the case of cotton, new plagues have arisen so that even the application of the latest control measures has not always been sufficient. It has been estimated recently that 15 percent of the grain produced annually in Colombia is destroyed by fungi and pests (The Rockefeller Foundation, Program in the Agricultural Sciences, Annual Report, 1959-1960, p. 114).

[24]Most experts believe that the technically easiest way to increase agricultural production at the moment is by icnreasing the intensity of cultivation of these lands, which would partly involve switching from cattle to crop growing, partly switching among crops, and partly an increase in yields. Several studies have been done at various times on the currently unutilized land susceptible to cultivation or more intensive use. One of the first general surveys was that presented by ECLA (United Nations, op. cit., p. 1963), where it estimated the area which could be incorporated in each department. As a fraction of the land utilized at that time (about 1953 or 1954) this ranged from 3 percent in Caldas to about 100 percent in Cordoba. For the departments as a whole it probably averaged around 35 percent. No estimates were made for the intendencias or comisarias. This analysis, as suggested by ECLA itself, was very superficial. There was a discussion of the way in which the land could be brought under cultivation in the various regions, and also a crop by crop discussion of the possible expansion of acreage. The comments were generally rather bullish with respect to the availability of land for the various crops.

(Footnote 24 continued)
INCORA (the Colombian Institute of Agrarian Reform) has more recently performed a classification of the country's land by quality; it concluded (in contradiction of ECLA's ideas), that the amount of underutilized good quality land was relatively small. But this analysis was also superficial; INCORA's political motive of demonstrating that not much good land could be expropriated in any case, is alleged by some to be not unrelated to its conclusions.

[25]An estimate of the rate of increase of land in major crops in the years 1948-52 to 1962-66 is about 1.8 percent, and for 1938 to 1948-52 in the range of 2.1 to 2.7 percent (see Tables II-2 and II-3).

[26]The implications of the use of machinery in a country like Colombia with a definite surplus of labor in some rural areas are complicated, both in terms of the effect on output and that on income distribution. These are considered in some detail in Chapter VIII.

[27]The use of machinery has not been as good as it might have been, due in part to inexperience of the users, in part to periodic but often serious difficulties in getting repairs and finding skilled repairmen. A good cadre of extension workers knowledgeable in this area might have helped resolve some of the problems.

[28]As soil science progresses in the developed countries and as the nutrients removed from the soil by a particular crop can be estimated with more precision, many farmers are returning to the old single crop pattern, since a given type of soil usually does have some comparative advantage in the production of one or a few crops as against others, and there is always a potential loss from over-diversifying. But this is not to suggest that in a country like Colombia, where soil science is very little developed, that single crop farming (or more precisely, lack of a <u>good</u> rotation plan) is not a serious danger.

[29]The agricultural census of 1959 has the basic data, but it has not been tabulated and cross-classified in such a way as to give us this piece of information. One can deduce roughly the extent to which the farms on which a particular crop is grown tend to concentrate very heavily on that type of crop; but this leaves very much in doubt, including the possibility that even if a given farm plants only 50 percent of its land in wheat each year, it may still plant the wheat in the same land year after year and thus bring about the same loss of soil fertility. Although the agricultural census tends to give a certain amount of circumstantial evidence against the idea that single crop farming is really extreme in Colombia, there remain many impressionistic versions of how people have switched from one crop to another completely, and been wiped out due to the arrival of pestilence or plague of the new crop, etc.

Footnotes, Chapter I, p. 7

[30]A number of factors conspired against the early development of agriculture, especially crop farming, in the tropical lowlands. The only advantages which they might have had were their flatness (contrasted to the rugged terrain of much of Colombia's highlands) and, in some regions, good soil. (There was a reasonable amount of good soil in the highlands, too, though.) Health conditions were very poor in the lowlands, with yellow fever and malaria being prime scourges, but not the only ones. The many pests which attacked plants and animals (their numbers not reduced, as in temperate regions, by a winter), and the rapidity of growth of weeds, all constituted negative factors. In some areas rainy season floods drowned crops and livestock and cut off communications with the outside world. Finally, it may be, as alleged by some, that the extermination of the ferocious Indian tribes of the lowlands at the Conquest put this area at a further disadvantage vis-a-vis the highlands, where the more docile tribes were subjugated and became the backbone of the labor force.

[31]It is interesting to note that the rural population (i.e. people not living in municipal seats) fell in each of Valle, Tolima, and Huila. This suggests that the non-agricultural part of the labor force in the country and small town received a stronger push out of those areas than the agricultural labor force, an understandable result in that for some other occupations it is not crucial to be located in the country. This result is especially striking for Huila, whose agricultural labor force did rise considerably, and whose non-agricultural rural population must therefore have fallen quite considerably.

[32]The statistics themselves, however, do not enable one to explain migrations except as a result of violence, if the agricultural wage rates by departments are any indication of the relative returns which a farmer can get in the different departments, since the rates are still among the highest in the departments of Tolima, Huila, Caldas, and Valle. It is possible, of course, that many of the migrants were not landless agricultural workers, but land owners, and that the relative yields by departments were different for this group of people than for the agricultural workers themselves.

[33]Ospina Vasquez, Luis, Industria y Proteccion en Colombia: 1810-1930, Editorial Santa Fe, Medellin, 1955, p. 453.

[34]Cotes, M., "Regimen Alimenticio de Los Jornalareos en La Sabana de Bogota" en Anales de la Academia Nacional de Medellin, Tomo 1, Entrega 1, Bogota, 1893, p. 104.

[35]The major source for the ideas in this paragraph and the previous one is Ospina Vasquez, op. cit., cerca p. 446.

[36]Smith, op. cit., p. 58.

[37]Various laws were clearly designed to prevent this, but this fact by itself does not constitute much evidence, though, given the characteristic irrelevance of laws to reality in Latin America.

[38]Early in the period of the conquest Spanish law held that all the land in the territories belonged to the Crown and individual property rights were to be dispensed at the pleasure of the King. Periodically the King and his lawyers gave indication that land must be used or the claim was nullified; this doctrine flourished from decade to decade. The first part of the colonial period saw distribution of lands by the Crown in a variety of ways. Quickly the whites began to appropriate the best pieces of land and royal promulgations were set up to try to control this. By 1591 the situation was chaotic, with much land illegally held and with various types of mutual recognition of "tomahawk rights," etc. The "cedulas del Pardo," promulgated in 1591, with the aim of judging each case of land holding in its own light, regained for the Crown tracts which had been seized by land grabbers and providing legal titles for some who had been holding in irregular ways. In 1617 sale of state lands at public auction was legalized.

The national period brought no radical changes. The government sold public lands in order to pay the officers and soldiers of the revolution, and granted land to victorious generals, etc. See Smith, op. cit., Chapter 3.

[39]A number of these issues are discussed in Alameda, "La Tenecia de la Tierra y la Reforma Agraria en Colombia," Economia Colombiana, No. 58, Feb. 1964. The author notes that one source of the current extreme subdivision of the land or minifundismo is the fact that the Indian population in the reserves, who were usually placed on the worst land, tended largely to stay there after their reserves were disbanded leaving a very high man to land ratio on poor land. The revolution itself did not, of course, lead to land break-ups.

The author points out that the Civil Wars towards the end of the last century also had a tendency to concentrate land as they left a good lot in the hands of the generals and other leaders involved in them. There was also turnover of land among large owners; at the end of the 19th and the beginning of the 20th centuries some land previously under the control of owners of Conquistador or Wars of Independence origin passed to the hands of the powerful commercial importers. The rapid industrial growth of this century, coupled at various periods with the difficulty in reinvesting the large profits obtained, led to the investment of a good amount of these funds in the land. This has given rise, in the last 25 years, to the large capitalistic farm, and to the fusion of industrial, banking, and rural interests.

With the founding of the Republic, the pushing of colonization and the adjudication of large holdings of the Spanish royalists to important patriots, who received them in payment for services, helped along or at least assured a failure to decrease in the concentration. In 1821 a law was passed allowing a system of sale of lands which also made possible further consolidation. The liquidation of the Indian reservations produced two accompanying phenomena; on the one hand the expansion in holdings through the purchase at ridiculously low prices of large pieces of land on the part of the semi-feudal class, and the pauperization of the Indians.

[40]At times small farmers have been able to wrest control from large ones (especially, absentee owners) in similar fashion. But the balance probably lies in the other direction.

[41]This type of law, whereby anyone not able to prove he is appropriately employed according to the standards of a law (whose conditions and application can always be varied to define one as a vagrant when desired) can be in effect conscripted to work at subsistence wages, has been popular in a number of countries with archaic social structures, most recently perhaps in Guatemala. It is similar in concept to the "press gang" of English notoreity.

[42]This, and the previous paragraph, are based largely on Smith, op. cit., Chapter 9.

[43]Rufino Gutierrez (Monografias, Tomo 1, Bogota: Imprenta Nacional, 1920) described social stratification on the savanna of Bogota about 1850 in terms of the three social classes--the Great Capitalists, the Small Proprietors, and the Proletariat or Indians. His study constitutes a slashing indictment of the morals of all three groups. He observed that the upper class were strictly out for themselves and took part in government only when it could be of fairly direct benefit to themselves; the middle group were jealous of the upper and contemptuous toward the lower, with their children often giving themselves up to dissipation in the Capital and propagating infections and vices to the members of all classes on their return; the lower class was not able to propagate itself due to its lack of vigor, the filthy conditions, etc. in which the people lived.

[44]Whiteford's description of the class system in Popayan accords with this conclusion of a very emulating and non-self-reliant middle group. (See Whiteford, Andrew, Two Cities in Latin America.)

He notes the frequent use of class terminology in Popayan as indicative of the acceptance of class divisions. Whiteford felt that the middle class was not just the "group between the lower and the upper"; they recognized their position and were recognized by others and identified with others whom they regarded as their equals. Ascension to the upper class was almost impossible, since such things as a coat of arms were very important and difficult or impossible to acquire through effort alone. The rigidity of the class structure was responsible to a large degree for the city's lack of industrialization and progress. The wealthy aristocracy had little inducement to take financial risks and the struggling members of the middle class considered it necessary to use every resource to maintain themselves at an appropriate consumption level; the latter group would skimp greatly to send children to school, dress properly, etc.

While some elements of the rigidity of this system were probably due to Popayan's small size, which created a situation in which everyone knew exactly who the upper class families were, thus reducing possible ambiguities, the overall picture tends to ring true for much of the country, only perhaps a little more extreme.

[45]Various observers, including Smith, have noted that most of the professional men and the minor officials in the government come from once high families, and have in a sense moved down the social ladder. In the United States and in most countries of Western Europe the upper middle and lower upper class did not reproduce themselves fast enough to fill the fairly rapidly increasing need for professionals, etc.; this left a sort of suction effect on those below, and made ascent natural. With the faster natural reproduction of these groups and the slower economic growth of the Latin countries, it may be that no such suction or at least a weaker one has been created. But these points remain open to question and to measurement. For an opposite point of view (re the degree of social mobility in Colombia) see James Payne, Patterns of Conflict in Colombia, New Haven and London, Yale University Press, 1968.

If in fact the origins of those middle groups are considerably different from those in what might be called the "democratic countries" (in terms of attitudes among people) then it may be difficult for them to be happy with middle class status and to accept the desirable values of middle classes elsewhere. Nepotism has almost always been a sacred obligation of the successful politician or statesman and provides many fairly low paying jobs. Smith argues that most middle class residential areas are defendants of unchallenged domination by the upper class.

[46]As of a decade ago, "derecho de pernada" (first night privelege of the landlord to sleep with a bride of someone on his land) was still found in parts of Bolivar, Cordoba, and Magdalena; although not legalized it has had so much force of custom that it has remained a recognized right and service in these areas. The high degree of illegitimacy is partly a result of these personal services; if the owner does not make use of them his mayordomo does. The obligation of political tribute is another feudal carryover which the workers and sharecroppers must render to the owner of the land; it is the source of the gamonallismo in the municipal seats and the creation of the subordinate bureaucracy. (See Virginia Gutierrez de Pineda, "El Pais Rural Colombiana," Revista Colombiana de Antropologia, Vol VII, Bogota, 1958, p. 12.) Mrs. Pineda cites especially the eastern part of the country, along with Caldas, Narino, and some parts of the northern plains as following this system. The campesinos' need for attachment to the land is so great that he kills and defends, loves and hates, at the word of the owner. The changes in government are the most serious problem for this dependent rural mass.

[47]T. Lynn Smith noted in the case of Tabio that on the average white farmers occupied higher status than mestizos. Racial differences led to greater status difference among the category of farm operators than the farm laborers. Thus the white family which has gotten a piece up the social ladder is living better than his fellows of mixed blood and Indian stock. Still, there seems to be considerable overlap in this region in terms of the welfare of the two groups. (See T. Lynn Smith, Justo Diaz Rodriquez, and Luis Roberto Garcia, Tabio: A Study in Rural Social Organization, Washington, Office of Foreign Agricultural Relations, U. S. Department of Agriculture, 1945, p. .)

[48]Robert Dix, Colombia: The Political Dimension of Change, Yale University Press, 1967, pp. 64-5. Although most of these comments are based on twentieth century studies, they refer to aspects of the social system which certainly existed in the 19th and earlier centuries, presumably in even more extreme forms,

[49]Dix, op. cit., p. 65.

[50]Centro de Investigaciones Sociales, Estudios sobre Desarrollo, Informe No. 3, Condiciones de Desarrollo y Reconstruccion en el Municipio de Sonson (Antioquia), Bogota, CIS, 1963, p. 216.

[51]Havens, A. Eugene, and Michael Romnx, A Socio-Economic Survey of Cerete, Cordoba: An Area of Latifundia, Facultad de Sociologia, Universidad Nacional, Bogota, 1963, p. 40.

[52]Gerardo Reichel-Dolmatoff and Alicia Reichel-Dolmatoff, The People of Aritama: The Cultural Personality of a Colombian Mestizo Village. Chicago: The University of Chicago Press

[53]Comparisons among different regions of Colombia lend weight to the idea that the human element and the social structure were important; differential performances among different regions of Colombia in the agricultural sectors may be at least in part attributable to the different types of people. It is not surprising to find the citizen of Caldas independent and aggressive; some of the colonizing exploits as people moved down from the South of Antioquia into Caldas were very dramatic and showed real initiative and perserverence. Since there were few Indians in the area the settlers themselves cleared the land, sowed the crops and set the economy running; during most of the last hundred years, median agricultural incomes in Caldas have been among the highest in the country. The generally more rapid advance of Antioquia relative to other regions is often interpreted in terms of "human differences," i.e. the initiative of the Antioquian, which in turn is related to having come from many different areas and become, as a result of natural selectivity, a man of drive. There are alternative explanations (e.g. gold mines leading to easier capital formation), but the "human element" version remains a persuasive hypothesis.

[54]Smith, op. cit., p. 63.

[55]For example, in 1821 importation of coffee, cacao, anil and sugar was prohibited, in 1824 these plantations were exempted from all taxes and in 1825 a million pesos was supplied to develop these areas. In 1828, 1832, and 1847 decrees were promulgated to stimulate immigration with a concession of up to 200 fanegadas of free land for agriculturists and 3,600 for cattlemen. (Ministerio de Agricultura, Servicio Tecnico Agricola Colombo-Americano, Compendio de Legislacion Agropecuaria y Organismos Agricolas de Colombia, Bogota, Diciembre de 1962, p. I) In 1879 the first Quinta de Experimentacion was organized near Bogota. But these efforts were few and far between, and out of all proportion with what would have been necessary to produce a real impact.

[56]An interesting contrast between the success of coffee, in terms of leading to a transformation of the whole economy, and the failure of tobacco to do the same, is presented in a mimeographed paper by William P. McGreevey, "Agriculture, Exports, and Economic Development: A Colombian Counterpoint."

[57]These grasses, introduced around 1850, could be sown with corn in the freshly burned over lowland (up to 6,000 feet), and brought such areas into effective cattle production. See also Smith, op. cit., p. 203.

[58]Bell, P. L Colombia: A Commercial and Industrial Handbook. Washington: Government Printing Office, 1921, p. 175.

[59]See Smith, op. cit., p. 221.

[60]Exceptions were the sugar plantations, some of the largest coffee plantations, and some areas of Narino where clustered settlement is a vestige of the resguardos, or Indian concentrations. (Smith, op. cit., p. 259.)

[61]Settlement was not originally dispersed in Colombia; the switch resulted from the fact that Indians (who had learned that it was best to keep away from the Spaniards) became sufficiently difficult to control that many "got away" from the villages, and partly from the fact that the marginal position of the mestizos facilitated their dispersion; further, the wars of independence caused people to flee the more settled areas and go to remoter ones and economic advantages attracted the Spaniards away from the administrative centers. The laws required that encomienderos inhabit a house in the municipal seat of their encomiendas and not live in the Indian pueblos. These laws were presumably promulgated because the Spanish were tending to move out, and presumably failed to keep them from doing so.

Early commentators, including many priests and archbishops, noted with disfavor the tendency of the population to disperse, and how it led them to savage and unbridled lives, as a result of a lack of spiritual care and justice. The revolt of the comuneros of 1781 confirmed this impression in many people. These accounts indicate that dispersal had largely occurred before the wars of independence, but this struggle presumably increased the tendency. Both friendly and unfriendly armies lived off the land. Foreign travellers during the wars of independence confirmed the impression that great movements of people were occurring at the time.

[62]Its contribution to the balance of payments, in the form of exports is also of particular importance for a country like Colombia, in the midst of a process of industrialization requiring many imported capital goods and raw materials. And increased exports are particularly crucial for a country which, like Colombia, usually maintains an overvalued exchange rate.

[63]See Table II-4 for the detailed price series. There was a mild (10 percent) increase in food prices as compared to other prices in the blue collar workers cost of living index during the two decades 1945-1964. Prices (received by the farmer) of crops other than coffee did not change relative to prices of non-agricultural goods over this period; those of livestock did rise (presumably accounting for the mild increase in food prices in the urban areas). Coffee prices rose substantially but this, of course, had no adverse effects on other sectors.

Prior to 1945 there had been increases in relative prices of agricultural products; it is possible that the advent of commercial type farming (a post-World War II phenomenon) contributed to the leveling off of prices. While it is true that the two decades 1945-1964 saw only a mild increase in the price of domestically consumed agricultural products (due entirely to the increase in prices of livestock), one could argue that the prewar upward trend in the relative price continued to the mid-50's and was then reversed, the relative stability of the whole period resulting from the averaging of the earlier upward trend and the later downward one. The advance of commercial farms might again be adduced as a factor contributing to this reversal. Other factors will be discussed farther on.

[64]Although population growth has been between 3.0 and 3.5, the acceleration in its growth has meant a younger and younger population, and a growth of "adult-equivalents" (where babies and children receive a weight less than adults) smaller than the growth of population.

[65]While we have only very rough ideas as to how income distribution in the economy as a whole may have changed during earlier decades in Colombia, there is some evidence of a worsening in the last decade and especially in the last five years. Working in this direction is the increasing dualism both in agriculture and in the urban sector. But it is difficult to demonstrate that this has been a major factor in the low income elasticity of demand for agricultural products, since most budget studies also reveal very low elasticities, e.g., the 1953 consumer survey of seven cities carried out by DANE,.

[66]We have not presented a series for caloric consumption per person since it is more difficult to estimate and perhaps less meaningful than a "value of food" series. Though the latter does not necessarily constitute a good measure of changing dietary conditions either, it is probably fairly accurate as a representation of such conditions in this case. There may be some tendency to underestimate relative consumption of adult equivalents in recent as opposed to early years since the population has been getting younger. But this bias is also likely to be small over a relatively short period.

[67]A casual comparison of some successes and failures in the economic growth of Latin American countries suggests that the development of the agricultural sector may be the key. Mexico, for example, during its phase of exceptional growth between 1940 and the present has had an unusually high rate of growth in the agricultural sector, but only a more or less normal rate in the industrial sector. Argentina, on the other hand, one of the failure stories of the last 20 years in Latin America, has had an exceedingly slow growth of agricultural output, and the failure of the economy as a whole is probably rather directly related to this.

[68]It must be noted, however, that many people are involved both in the agricultural sector and in the non-agricultural sector; that many of these people have very high incomes in both sectors, and that a good deal of the recent increases in agricultural income have probably gone to some of these people--in particular the cattle farmers and the commercial agriculturalists. The double role of these people creates a problem in the definition of "average agricultural incomes". Since, as we shall see, the average income is not a very helpful concept in any case, this problem will not detain us here. Strictly speaking, we should probably not use the term "farmers" here, but rather "recipients of agricultural income."

[69]There is much evidence suggesting that many very low income urban dwellers live with relatives or friends, so the income figures underestimate their consumption. This might (though it is hardly obvious) be the case in rural areas.

[70]It is widely agreed that the major problems of the sector lie in the people and the way they are organized. At the individual level, lack of education, lack of initiative in some cases and lack of a sufficiently strong desire to get ahead which would promote higher savings tendencies are all problematic characteristics. At present only perhaps 70 % of rural children enter primary school, about 40% reach the third year, and probably about 15 % enter some form of secondary education.

[71]The share of this group's income which is directly subject to the changing profitability and labor intensity of commercial agriculture includes also that of small farmers operating on rented land; if modern large scale methods induced the landowners to rent to large operators rather than this group, they would be dispossessed.

[72]Based on figures from Berry, "The Distribution. . . ", op. cit.

[73]These figures are particularly subject to doubt in view of the guesswork involved in their estimation. See Berry, "The Distribution. . ." op. cit., appendix.

[74]The large modern Colombian farmer, like everyone else, prefers a machine to a man when they can do the same job, since the former can give him less trouble.

[75]We do not include here the possible breakup of small farms. Clearly over the long run this is an important factor, which, along with the size of family and the rate of outmigration, determines changes in the amount of land per small farmer. But our concern at this point is short run analysis. The extent of decrease in average income per capita which might be precipitated over, say, a ten year period by the land division due to increasing population and not too much outmigration is probably fairly small compared to that which could occur, in certain types of small scale farming (i.e., highly commercialized) by rapid decreases in prices of the goods sold. As long as the marginal productivity of labor is not equal to zero, the fragmentation of the farms presumably does not imply a decrease in income per capita as rapid as the increase in population.

[76]This price isolation would not imply constant income for the small farmer, since population growth could push it down, and capital accumulation, technical change or land acquisition could push it up. These latter positive factors (especially technological change) could not be expected to provide big pushes for a group of farmers defined by their isolation; population pressures, on the other hand, might be particularly severe since lack of communications may decrease the rate of out-migration.

[77]At best the worker who could shift to a small farm in some isolated region would suffer a loss doing so, if we assume that in the presence of potential gain he would already have taken the step.

[78]The home consumption ratio may be relatively low in Colombia, compared to other developing countries, though little evidence appears to be available. In one part of Brazil (a county in Rio Grande do Sol), where farms are much bigger than those typical of most of Colombia, the ratios are much higher for given farm sizes, though not much higher overall. See Table I-6.

[79]The extreme poverty of the people located near Ubate has led to about 50 percent of them working in commerce, transportation, services, artisanry etc., in order to supplement the scarce income from agriculture.

[80]This very rough calculation assumes the typical family has 1.5 earning individuals (we exclude unpaid family workers), so that a 4000 peso family income (1958 prices) is equivalent to a 2,670 peso personal income--about 3,100 in 1960 prices. It appears that almost 500,000 producing families earned less than this in 1960, but, as discussed elsewhere (Chapter VI) about 200,000 of these got most of their incomes as paid laborers.

[81]As noted in Table I-6, there were some difficulties in interpreting the data from the Rio Suarez (CAR) area study. Whatever the precise interpretation of the share of output consumed at home, it is undoubtedly high. (The study estimated that total share of income in kind, either

(Footnote 81 continued)
home consumption or partial payment of salary in kind, usually food, accounted for 38.5% of total incomes in the valley; home consumption alone got as high as 50% in one municipio, though the median percent was in the 20's.) But it is true also that the same small size farm of low output which leads to the very high home consumption ratio, also forces the farmer to search for other sources of income. In the CAR region, almost 33 percent of all income came in the form of salaries and another 6.1% was from "business profits" and artisanry; thus probably 60% of total income was earned on the farm (salaries may not have been the only off-farm form of income). No classification of salary income is made, so it is not clear how much comes from agriculture; this region includes some mining. And it is possible that salary income and output income tended to accrue to different families, though the opposite is more likely.

[82]The peasant's isolation from the rest of the economy, either physical or due to limited desires for modern goods, has more frequently been treated in terms of a possible obstacle to overall economic development, in the context of an increasing demand occurring for its output. It has frequently been hypothesized that there may be difficulty in increasing the marketable surplus from peasant agricultures even when output rises, i.e. that increased income from agriculture, either due to increased output or to a reduction of the population, could well lead to no increase or even a decrease in the marketable surplus since the marginal propensity to save of the peasant would be low, his increases in consumption would be directed primarily to agricultural products, and he would limit increases in output when they were an alternative to increased leisure. (See, for example, Vinod Dubey, "The Marketed Agricultural Surplus and Economic Growth in Underdeveloped Countries," The Economic Journal, December, 1963.)

Dubey feels that there is a seepage of wants from the advanced sector of an economy to the backward sector creating an imbalance between the actual and desired pattern and levels of consumption in the latter. This suggests that the marginal propensity to consume food might be low. We do not have data to test this hypothesis adequately in Colombia, but most of the figures of Table I-6 and I-7 at least do not appear to be inconsistent with it, nor does impressionistic observation. Dubey refers to statistical information available from India which seems to suggest low income elasticities of demand for food products on the part of farmers.

[83]Harrison et al., op. cit., p. 142.

[84]If small farmers as a group are net buyers of a food item, they must be buying it from the large farms (since they buy almost no imports).

[85]One must be careful to distinguish market encroachment from market expansion. Modern agriculture may produce the same product as does small scale but with some characteristic only attainable under special conditions, and which opens a new use for the product.

[86]Much more could be deduced on this if the census data had permitted the splitting off of the really specialized small farms, and if we had calculated value composition of output by region (since composition of consumption on small farms is also a function of region).

[87]Adequate description of the composition of the market surplus must await better, probably direct, quantifications. Table I-9 makes a passing interest comparison between the product composition of small farms (2-5 hectares) which do not specialize in coffee, tobacco, or bananas, and the consumption bundle of a sample of (mostly) farm families near Chiquinquira. If the small farms did not include some modern producers of hogs, eggs, etc., one might conclude that the small farm was a net seller of animal products; in fact it does not really permit any conclusions.

[88]This group was defined by Atkinson (L. Jay Atkinson, Changes in Agricultural Production and Technology in Colombia, Foreign Agricultural Report #52, U. S. Department of Agriculture, Economic Research Service in Collaboration with the Ministry of Agriculture and the Central Planning Agency of Colombia, Washington, June 1969) as the "mixed-technology" group.

[89]Conflict in the sense that public funds and bank credit directed to help one group will at best help the other less is probably inevitable under almost any conditions; but we refer here to the more extreme problems where aiding the large can hurt the small.

[90]There are some questions as to whether the poorest farmers are the ones who would in fact migrate out or be helped by the out-migration of others: this point will be discussed further along. In any case, an increase in agricultural exports would be almost sure to create a big overall gain for the economy as a whole.

[91]With the passage of time it is hoped that more of the livestock sector will become modern and "commercialized" as part of crop growing is now. But, partly in deference to current usage in the Colombian literature, we use the term "commercial" to refer to crop growing, although this involves imprecision.

[92]And we note also that the greater discussion of the export potential of commercial type crops than ones grown on small scale farms reflects at least as much the popular preconception that only the modern sector can be a motor of progress (making it worth researching the export possibilities) as any objective evidence to that effect.

[93]The same is true for import substitutes (e.g., wheat, fats and oils, cacao, wool) where there is no grounds for expecting any possible curtailment to be large relative to total agricultural output.

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[94]Agricultural policy directed towards the commercial production of a crop also produced by smaller farmers, and having export possibilities, is particularly complicated and risky, especially when the country has an overvalued exchange rate. This is due to the fact that the social implications of a lowering in price are very different depending on whether it brings the product into the export category or only close to it. When that limit is reached, increases in production suddenly become very productive (the marginal usefulness of imports being normally much higher than the marginal social costs of exports due to the disequilibrium exchange rate). One can thus conceive of a situation, for example, that of corn -- a product whose commercialization and price lowering is being sought avidly by the Ministry of Agriculture -- where a half way success in commercialization, which lowered the price somewhat but not to the export margin, would be positively harmful; it would of course help the urban poor but it could hurt the even poorer rural poor who produce corn and sell it. (One would have to verify to what extent really small farmers sell their corn.) If the program were so successful that prices fell even farther and the crop were exported (or if it were exported with subsidies) the effects of the price decline on the rural poor could be more than outweighed by the effects of the imports and their creation of jobs in the cities. The net social result of the price lowering policy could be a quadratic function of the extent of price lowering--negative for small decreases and positive for larger ones. This means that it is particularly important from the outset of such a program to have some idea as to how successful it will be; otherwise something which if it went a certain distance could be very beneficial may turn out not to be simply low yielding but actually negatively yielding.

[95]Especially for the medium size farmer who appears to be an important employer of labor, even outside the coffee sector (which is not relevant to our present discussion).

[96]The term "commercial" has, as pointed out earlier, come to be used somewhat loosely in Colombia to refer to production of certain crops such as cotton, rice, sesame, etc., in a relatively modern and usually mechanized fashion on medium or large size farms. This is clearly a somewhat misleading term, in that in general one would assume that "commercial" farming would refer to any farming which was not done on a subsistence basis. This would include nearly all farming in Colombia, and obviously the coffee sector, even though most of the farms are small. In any case we will continue to use the term here more or less in accord with its typical usage in Colombia.

Another confusion likely to arise from the typical usages in Colombia is that between "commercial" and mechanized farming. The two are likely to be almost equated here, while it is obvious in a technical sense that they need not be, and that coffee farming, for example, is quite commercialized but is never mechanized.

[97]If severe erosion resulted from the poor cropping practices the effects might be serious, but since most of the commercialized crops tend to be grown on fairly flat lands this is unlikely. And the rental of land is in some cases a transitory stage leading to its purchase.

[98]The typical pattern in the development of frontierlands is a certain amount of soil mining at first, followed by a more balanced form of production later on.

[99]Commercial agriculture is characterized by higher material input-output ratios than traditional agriculture. This makes the supply curve of the output more responsive to its price since the supply of these inputs is likely to be much more price elastic than that of labor or agricultural fixed capital.

[100]Dale W. Adams, comments made to the author. The points of view of Adams and Currie are not as contradictory as they may appear; Currie assumes that the tenure problems which Adams treats as a restraint will disappear during the growth process.

[101]The combined problem of a very bad income distribution in agriculture and the possibly negative effects of technological change is so far from being unique to Colombia that even Asia's "green revolution" has real possibilities of damaging many small farmers, for the new very high yielding crops require higher inputs of fertilizers, much more careful water control, irrigation, and other technological sophistication which is more easily achieved by the large scale farmers than the small ones. So far the spectacular results of this revolution have been achieved primarily among the relatively larger commercial farmers. (See, for example, Clifton R. Warton, Jr., "The Green Revolution: Cornucopia or Pandora's Box?", Foreign Affairs, April, 1969, Volume 47, No. 3, page 466.)

[102]This feature comes out strongly if we compare this distribution with a comparable urban one. (See Miguel Urrutia and Clara Elsa Villalba, La Distribucion de Ingressos Urbanos Para Colombia, 1964, Centro de Investigaciones para el Desarrollo, Universidad Nacional, mimeo, 1969.) The urban concentration ratio is 0.55 when unemployed persons are excluded; when they are included, the coefficient rises to 0.59.

[103]For example, if the over-time income elasticity of agricultural goods was 0.7 then agricultural output could only increase at a rate seven-tenths as great as that of the economy as a whole, i.e., about three-fifths that of the non-agricultural sector given that value added in agriculture is about 30% of value added in the economy. The greater the proportion of total output produced in the agricultural sector, the greater the required difference in these relative increases in output for agriculture prices not

Footnote 103 continued to fall. Given a 5 per cent rate of growth for the economy as a whole, this would suggest that relative prices would stay the same if agricultural output were growing at 3.5 per cent and the rest of the economy somewhere around 6 per cent. In fact, one must allow for the existence of exports and imports in drawing such a relationship between agricultural production and price.

[104] See Departamento Administrativo Nacional de Estadistica, Economia y Estadistica, No. 85, 1958.

[105] Comparable figures for the other cities were Cali 0.57 and 0.54; Medellin, 0.64 and 0.71. Small samples elsewhere made the figures erratic, but their average fell in the same general range.

[107] For a discussion of these items in the peasant economy, see Stephen Hymer and Stephen Resnick, "A Model of an Agrarian Economy with Nonagricultural Activities," American Economic Review, Vol VIX, No. 4, Part I, Sept. 1969.

[108] Urrutia and Villalba (Miguel Urrutia Montoya and Clara Elsa Villalba, "El Sector Artesanal en el Desarrollo Colombiano" Revista de Planeacion y Desarrollo, Vol. 1, #3, Oct. 1969) estimated a decrease from 120.7 to 101.8 thousand people occupied over this period. No direct information was available on how per capita earnings may have changed for the group, but the decrease in number suggests no improvement in this respect, possibly a worsening. (Artisans as a whole did have an increase in per capita income over this period).

[109] In the decade after 1935 there was a decrease in real wage rate in agriculture, and then for a fairly long period from the mid 40's until 1963 there was an increase. This might suggest that the migration process, which was occuring faster in the later period, was sucessful in that period in raising the incomes of the people towards the bottom of the rural income distribution. But this would be an optimistic conclusion, since even though migration and urban growth (of the large cities especially) has continued strongly in the last few years, there has been no increase in real agricultural wages since 1963.

[110]E. g. Taiwan.

[111]Atkinson, Jay, US Department of Agriculture, Foreign Agricultural Report #66, Agricultural Productivity in Colombia, Washington, US Government Printing Office, 1970.

[112]As we will discuss later, there seems reason to believe that the conclusions of many observers are affected by their greater familiarity with commercial than with traditional agriculture, their training in North American schools, and so on. So these pessimistic conclusions should not be taken as gospel. But they do suggest at a minimum the difficulties in the path of successful solution to the problem, not the least of which may be these attitudes themselves.

[113]Andrew Pearse, "Agrarian Change Trends in Latin America," Latin American Research Review, Vol. 1, No. 3, Summer 1966, pp. 67-68.

[114]This model was first presented by Arthur Lewis (The Manchester School) and was further elaborated by John C. Fei and Gustav Ranis, The Development of Labor Surplus Economy: Theory and Policy (1964).

[115]See, for example, Theodore Schultz, Transforming Traditional Agriculture, Yale University Press, New Haven, Conn., 1966.

[116]See, for example, John Mellor, The Economics of Agricultural Development, Cornell University Press, Ithica, New York, 1966.

[117]For a general statement of this line of thought, see (Bruce F. Johnston), and John W. Mellor, "The Role of Agriculture in Economic Development," American Economic Review, LT (September 1961), pp. 566-93.

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CHAPTER II

THE GROWTH PROCESS: INCREASE IN TRADITIONAL INPUTS, TECHNOLOGICAL CHANGE AND PRICE CHANGES IN COLOMBIAN AGRICULTURAL DEVELOPMENT: A BROAD VIEW

In the previous chapter the performance of agriculture in Colombia was judged in terms of rate of growth of output, changes in income distribution, changes in agricultural prices, etc.; a broad interpretation was also presented of the dilemma that output increases based on further mechanization and technification of larger scale farms appear likely to worsen the income distribution. This chapter attempts a broad description of the growth process and the functioning of the sector, past and present, in order to be able eventually to reformulate such policy questions more precisely. First, in a surface look at the growth process, we try to distinguish among the proximate sources of growth--increases of labor, capital, and land, and the "residual" output growth not explained by increases in these factors and therefore due to such things as improved organization, better markets, higher skilled labor, etc., or to technological change more narrowly defined as changes in the production function of the crops or livestock on the farm.[1] We also discuss briefly the

[1] We abstract in this much oversimplified discussion from the fact that the residual is probably not the result of additive effects from each of these factors but is some complicated function of them.

relative growth of sectors and crops, distinguishing among traditional crops, livestock, commercial crops, etc. Finally we consider whether the price increases occurring for agricultural products as a whole until the mid 50's,and for certain products since then, have been important stimulants to production.

In the following chapter the process of growth of these broad input categories is considered. To ascertain what policies should be pursued to effect the optimal increases in these variables or to further technological change, the knowledge that land, capital, or whatever increase and that the increase was responsible for a certain share of the output growth is only a first step in the analysis. Ascertaining which branches of agriculture have had the most rapid growth may give some feel for what types of people or farming are most likely to bring about further increases in output. But this chapter is chiefly a preliminary to the attempts at a deeper, generally more micro, analysis in subsequent chapters.

Aggregate production function analysis over time is complementary with a comparative analysis for individual crops, regions, etc. The "residual" in aggregate production analysis catches a variety of phenomena besides the technological change which would be captured by a production function analysis of a given crop (new varieties, new methods of cultivation, better administration, etc.) such as gains due to shifts from low value crops to high value ones, improved organization of the sector as a whole, better distribution of labor over the land, economies of scale, etc.

Part I. Sources of Increasing Output Over Time: Land, Labor, Capital and "Other Factors"

Data on output in the agricultural sector, as well as on the inputs of land, labor and capital, are all of such dubious quality as to preclude a very instructive production function analysis. Nevertheless, the series available are presented and used in a crude way.[2]

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[2] The weaknesses of the figures on agricultural output are obvious; the estimates for such things as fruits and vegetables are particularly weak; a little less so but still shaky are the estimates for milk, eggs, etc. To ascertain the potential error in total output figures it is worth noting that, according to DANE'S consumer survey of 7 cities in 1953, the agricultural products not separately estimated in the national accounts accounted for about 10 percent of total food expenditures by obreros and a somewhat smaller percent (5 or 6) for empleados. The fact that estimates of milk, eggs, etc., are weak does throw doubt on the overall output series, but the error introduced by the failure to take account of fruit and vegetables could not be too great in percentage terms over relatively lengthy periods of time.

The implication of the above is that most of the error in the output series is probably due to errors in the estimation of crops which are included in those series. Further discussion of the adequacy of the data accompanies Table II-1.

Tentative guesses are made as to the relative importance of additional land, labor and capital in the output increase over fairly long periods of time; the degree of error in rate of change estimates based on such data is probably less than for shorter periods. The contributions of increases in such specific factors as fertilizers, credit, etc., cannot be analysed satisfactorily using aggregate production functions; in Chapter III we discuss micro-economic evidence available on some of them.

The broad statistical outlines of the agricultural growth appear as follows. Over the period 1925-67 output rose at an average of about 3% per year while output per man rose about 2% per year, thus a little more than doubling over the period. (See Table II-1 which gives summary figures on output and the major inputs, along with some ratios of these variables. This trend has shifted slightly upward in the course of time Diagram II-1 shows on semi-log paper the trend in productivity per man based on Column 8 of Table II-1) and there is evidence that the sources of increases in output and in output per man have changed in various ways over time.

Data on inputs and outputs are too shaky to more than suggest the relative contributions of the different measured inputs to output growth and the residual growth not accounted for by them.[3] Diagrams II-2 to II-5 which show the ratio of output to various inputs, and estimates of the

[3] See the discussion under "Sources and Methodology" of Table II-1 for details on the most likely weaknesses in these data and the consistency checks which were carried out.

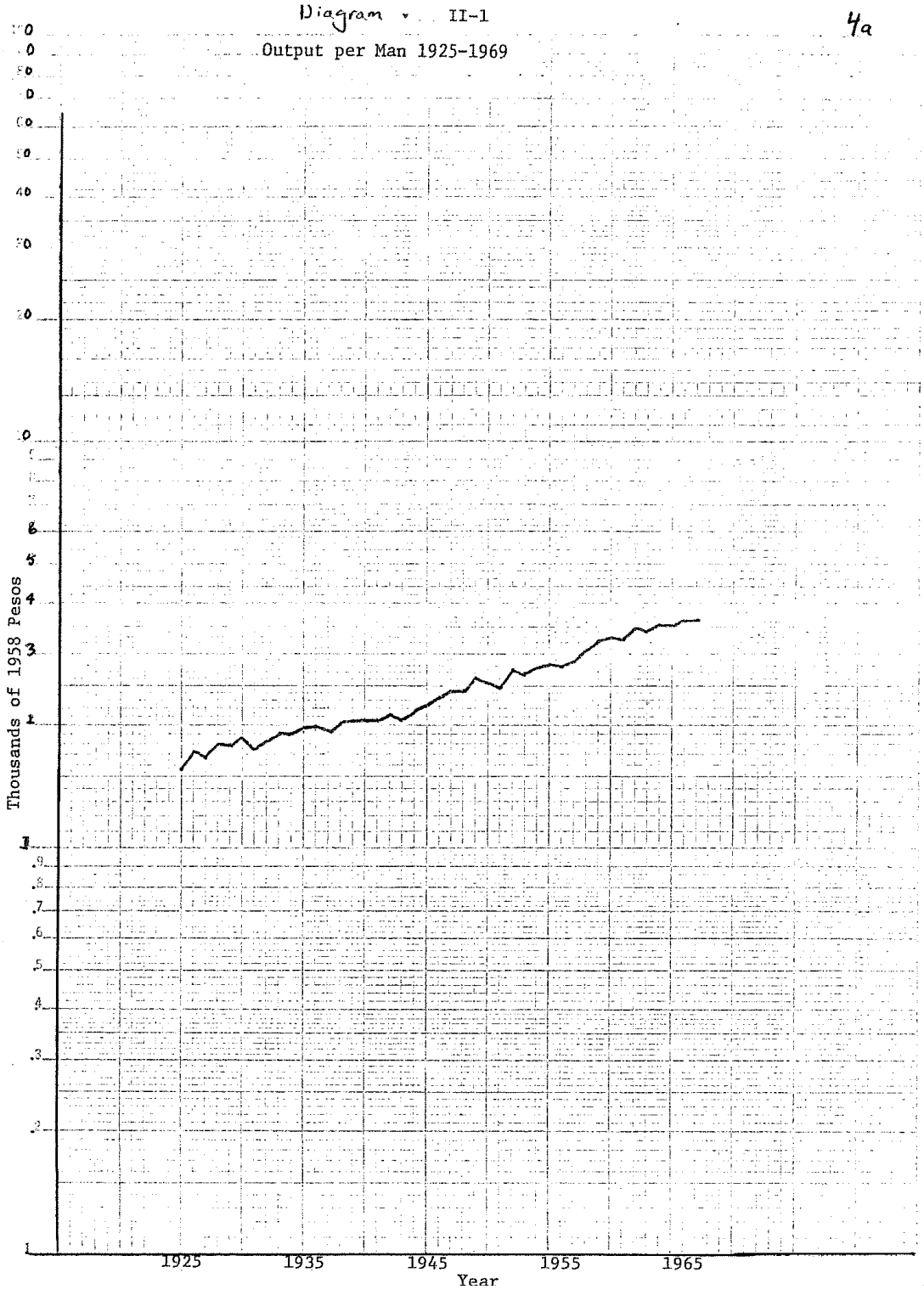
Diagram II-1
4a
Output per Man 1925-1969
Thousands of 1958 Pesos
1925
1935
1945
1955
1965
Year

Table II-1

Output, Inputs and Their Ratios: 1925-1967

	Value Added (Output) (Millions of 1958 pesos)	Value Added (Alternate series 1(a))	Output Indices 1958 = 100			Active Population	Capital (Millions of 1958 pesos)	Land in Major Crops	Index of Total Land Input	Output/Man	Capital/Man	Output/Capital	Land in Major crops/Man	Index of Yields for Major Crops	Value Added (pesos) per Hectare in Major Crops
			Crops	Live Stock	Total										
	(1)	1(a)	(2)	(3)	(4)	(5)	(6)	(7)	(7.a)	(8)	(9)	(10)	(11)	(12)	(13)
1925	2.694.7		31.7	45.4	37.4	1.717	8.402.5			1.57	4.89	0.32			
1926	2.997.3		39.4	46.3	41.6	1.737	8.582.8			1.73	4.94	0.35		(Holding crop weights constant)	Col. (1)/Col.7
1927	2.954.1		36.8	47.8	41.0	1.756	8.757.3			1.68	4.99	0.34			
1928	3.191.8		41.9	49.3	44.3	1.776	8.967.0			1.80	5.05	0.36			
1929	3.235.0		44.5	47.8	44.9	1.796	9.145.4			1.80	5.09	0.35			
1930	3.400.8		48.8	47.0	47.2	1.814	9.349.2			1.87	5.15	0.36			
1931	3.227.8		44.5	46.3	44.8	1.841	9.523.6			1.75	5.17	0.34			
1932	3.422.4		42.1	50.9	47.5	1.869	10,001.9			1.83	5.35	0.34			
1933	3.609.7		49.7	54.0	50.1	1.898	10.162.6			1.90	5.35	0.36			
1934	3.689.0		48.8	59.3	51.2	1.927	10.319.4			1.91	5.35	0.36			
1935	3.746.6		49.6	58.6	52.0	1.956	10.511.5			1.91	5.37	0.36			
1936	3.955.5		53.9	57.9	54.9	1.987	10.715.3			1.99	5.39	0.37			
1937	3.933.9		54.7	56.3	54.6	2.016	10.907.4			1.95	5.41	0.36			
1938	4.164.5		56.5	57.9	57.8	2.047	11.105.4	1.815-1.965		2.03	5.42	0.37	0.89-0.97		
1939	4.229.3		58.2	57.0	58.7	2.067	11.317.0			2.05	5.47	0.37			
1940	4.323.0		65.8	56.3	60.0	2.086	11.607.1			2.07	5.56	0.37			
1941	4.380.6		61.1	58.6	60.8	2.104	11.938.4			2.08	5.67	0.37			
1942	4.524.7		62.4	60.9	62.8	2.124	12.346.0			2.13	5.81	0.37			
1943	4.423.9		59.0	64.8	61.4	2.146	12.804.7			2.06	5.97	0.35			
1944	4.654.4		62.4	68.6	64.6	2.166	13.282.9			2.15	6.13	0.35			
1945	4.820.1		65.9	70.2	66.9	2.186	13.735.7			2.21	6.28	0.35			
1946	5.187.6		70.9	73.7	72.0	2.191	14.184.5			2.37	6.47	0.37			
1947	5.396.5		73.5	76.7	74.9	2.193	14.590.2			2.46	6.65	0.37			
1948	5.382.1		72.6	77.8	74.7	2.197	15.046.9	2.369		2.45	6.85	0.36	1.08		
1949	5.792.8		81.4	79.0	80.4	2.199	15.237.0	2.532		2.63	6.93	0.38	1.20		
1950	5.598.7	5889.5	73.8	83.1	77.7	2.202	15.634.0	2.410	86.7	2.54	7.10	0.36	1.09	90.8	2323
1951	5.524.6	6084.6	78.6	73.2	76.7	2.216	15.606.4	2.630		2.49	7.04	0.36	1.18	89.2	2101
1952	6.112.0	6446.9	89.7	76.6	84.8	2.215	15.638.6	2.778		2.76	7.06	0.39	1.25	99.8	2200
1953	5.966.4	6421.5	87.6	74.7	82.8	2.215	15.638.6	2.783		2.69	7.06	0.38	1.26	90.8	2145
1954	6.215.6	6568.8	92.3	76.1	86.3	2.237	15.842.7	2.923		2.78	7.08	0.39	1.31	90.0	2126
1955	6.372.0	6664.3	90.3	84.5	88.4	2.263	16.186.4	3.010		2.82	7.15	0.39	1.33	89.6	2117
1956	6.433.1	7018.7	87.1	91.6	89.3	2.288	16.506.4	2.913		2.81	7.21	0.39	1.27	89.8	2208
1957	6.695.0	7480.1	89.7	96.7	92.9	2.313	16.712.7	2.787		2.89	7.23	0.40	1.20	89.9	2402
1958	7.240.0	7667.2	100.0	100.0	100.0	2.340	16.929.7	2.908	100.0	3.09	7.23	0.43	1.24	100.0	2490
1959	7.698.9	8253.3	108.5	102.6	108.0	2.366	17.228.2	3.029		3.25	7.28	0.45	1.28	102.1	2542
1960	7.890.4	8162.5	109.9	107.1	109.5	2.393	17.651.4	3.106		3.30	7.376	0.45	1.30	100.6	2540
1961	7.959.0	8571.7	110.7	108.8	110.5	2.420	18.214.2	3.027		3.29	7.527	0.44	1.25	104.3	2629
1962	8.550.8	8917.4	120.2	114.2	118.7	2.447	18.796.4	3.123		3.49	7.681	0.46	1.28	107.8	2738
1963	8.437.0	8938.3	112.9	122.0	117.1	2.475	19.473.1	3.071		3.41	7.868	0.43	1.24	102.5	2747
1964	8.769.4	9317.8	119.2	123.8	121.7	2.500	20.326.5	3.239		3.51	8.131	0.43	1.30	103.8	2707
1965	8.918.2	9669.8	124.1	125.5	124.7	2.529		3.431		3.53			1.36	103.9	2599
1966	9.245.3	9704.1	126.7	126.7	126.4	2.559		3.431		3.61			1.34	107.6	2766
1967	9.420.4	9866.5	132.2	129.7	131.2	2.589		3.300	108.71	3.64			1.27	109.2	2855
1968	10.098.7		141.3	135.9	139.3	2.617	(21,0865)			3.86	(8057)	(0.48)			
1969	10.483.4		145.6	141.9	143.3	2.644				3.96					

Source: See Table A-9

residual must therefore be interpreted with great care.[4]

[4]Not only is each individual datum underlying these tables subject to considerable doubt, but some of the data are not conceptually the ones which would be desirable in any case. For example, we do not have a direct estimate of total land in crops and livestock, either in hectare or in value terms.

Further, as discussed below, it is not clear how to interpret labor increases, since some areas of the country appear to have surplus labor; it is open to question whether increases in labor inputs should be expected to have any significant effect on output of agricultural goods in such areas. (High labor densities may push people into handicrafts and such things, but such output is hard to measure and is not caught well, though conceptually some of it is included in our figures.) And it is possible that they would have had a positive effect during some periods under consideration and in certain regions, but not in others.

The scattered bits of evidence available are all consistent with the hypothesis that there was a change in the nature of the growth process sometime soon after World War II, more specifically that little technological change occurred before the War and that since then it has occurred at a faster, though possibly still not very fast, rate. Output per man, as seen in Diagram II-1, accerlerated its growth after about 1945 (a rather arbitrary cut off point given the fluctuations of the series), with very rapid growth occurring in the 1945 to 1949 period. Possibly a good part of the faster growth of output per man in the 1945 to 1950 period was due to greater increases in capital/

man and (probably) land/man ratios than those which prevailed in the two preceding decades.[5] Since 1950 the growth of output per man has remained

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[5]This was, according to ECLA, a period of very slow growth of active population in agriculture (presumably due to violence). If their population figures are wrong, so are the output per man figures, so they must be interpreted carefully. In any case, abstracting from the accuracy or inaccuracy of such short-term fluctuations, the growth of output per man does appear to have been faster after 1943 or 1945 than before.

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consistently high. During the early 50's land per man was increasing rapidly and was no doubt important in the labor productivity increase. As discussed farther on, it appears that technological change was most important in the 1956-62 period; growth of capital stock became important again in the 60's.

The capital stock figures we have (from ECLA) suggested rather rapid growth during the period 1925-1950 (about 2.5% annually) and therefore about 1.5% annually on a per capita basis-See Table II-1; (this growth then slowed markedly in the fifties and speeded up again in the sixties.) Meanwhile, the amount of land under major crops grew reasonably fast in the period 1937-38 to 1950 (Table II-2); (it continued to grow relatively fast up to 1955, then levelled off on a per capita basis but recently appears to have turned up again). Labor grew much

Table II-2

Average Annual Percent Changes in Input and Outputs for Crops and Livestock, 1925-1950

	1925-50	1925-9 to 1948-52
Output	2.95	2.79
Capital	2.52	2.49
Labor	1.00	1.00
Output/Man	1.93	1.77
Capital/Man	1.55	1.48

Source: Figures of Table II-1. See the discussion with Table A-9.

Table II-3

Average Annual Percentage Changes in Inputs and Outputs for Crops and Livestock; late 1930's to 1950

	1937-8 to 1950	1936-9 to 1948-52
Output	2.63	2.70
Capital	2.73	2.74
Land in major crops	1.60 - 2.31	2.12 to 2.74*
Labor	0.65	0.67
Output/man	1.97	2.02
Capital/man	2.07	2.06
Land in major crops/man	0.94 - 1.65	1.44 - 2.15

*(1937-8 to 1948-52)

Sources: Figures of Table II-1. It should be noted that the estimate of land change is very weak, the figures for 1937-38 being based on data of The Anuario General de Estadistica, with vague methodology. There were no acreage estimates for some of the major crops then, and rough assumptions were made for them. As a result, it is possible that cropped land was underestimated in 1937-38 and therefore the rate of growth of cropped land from then to 1951 was overestimated. On the other hand, an increase in the cropped land/man ratio seems not unreasonable since in this period crops were increasing in importance relative to livestock (but the agricultural population figure we have includes people engaged in both), and land under coffee was going up rapidly--a substantial portion of it may not have been under other crops previously.

The figures for 1950 and on are Jay Atkinson's estimates. "Major crops" include coffee, yucca, beans, platanos, sugar, corn, potatoes, wheat, tobacco, bananas, cocoa, cotton, rice, sesame, barley, soy beans and sorghum (Atkinson's definition). The inclusions for 1937-38 were the same.

more slowly (less than 1% per year) as indicated in Table II-3 for the period 1937-38 to around 1950, for which we have crude figures for all the inputs, output grew at about the same rate as capital and land under major crops. Thus, if (a) the total amount of effective land[6] under

[6]Land measured by productive potential.

crops and livestock was growing during this latter part of the 1925-50 period at the same rate as land under major crops, and if (b) the marginal productivity of labor were low enough, then almost all of the growth in output and in output per man may have been due to the growth in capital per man and land per man. While either assumption is likely to be precise, the error involved is unlikely to be so great as to render the calculation irrelevant.[7] If the marginal productivity of

[7]Probably the more dubious assumption is that total effective land (i.e. adjusting for quality differences) grew at the same rate as did land under major crops. There is almost no evidence on the way in which land used for livestock changed over this period, and the few data there are must be taken very cautiously due to the great quality variation in pasture land, some being worth almost nothing, some being good quality. For 1950 Atkinson estimated that a little under 40% of the total value of land was under pasture; if output/land ratios in crops and livestock did not change much from 1925 or 1937-38 to 1950, the proportion of land used each way would not have, since the growth rates of the two subsectors were very similar. On the crop side we do have impressionistic evidence

Footnote 7 continued:

which tends to corroborate the area figures presented in a rough sense. But, apart from the crudity of the basic statistics as measures of area, the assumption that the newly introduced land is of the same quality as the older land may not be realistic. If it is of poorer quality, as simple area measure overstates the increase in "effective land." This could occur if the increase in land under cultivation is dueto a switch from one crop per year to two, or if the new land is simply of less potential than that already used. One plausible case where neither of these two possibilities would hold is where good land has in the past gone unused due to the vagaries of the tenure system, and is now put to use. A particular complexity results from the tendency in Colombia to "mine" the land in new regions, achieving high yields for a few years, and then to have decreases in yields due to lack of familiarity with fertilizers and improved cultivation techniques.

It is difficult to generalize about the average quality of Colombia's new land over time. It would require very detailed knowledge of the new lands brought under cultivation to ascertain disease control, construction of infrastructure, etc. A little can be guessed by considering their geographic distribution. Table [illegible]6 suggests that the big increases in land under cultivation between 1953 and 1966 were in Meta, Magalena, (tripled or more), Cordoba, Tolima, Cauca and Santander (all doubled or more) and Norte de Santander (almost doubled). In some of these areas land of high quality was certainly incorporated but if the need for social infrastructure to bring it into the market system is allowed for (and it is not included in the capital stock measures in agri-

Footnote 7 continued:

culture) then in economic terms the land is not really equal in quality to that previously cultivated. Comparable data for the pre-1950 period are not available.

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labor had been equal to zero over the whole period, the residual (assuming constant returns to scale) would have been zero or close to it, respectively, depending on whether the relatively faster rate of land increase or the slower one was more accurate; if it was above zero the residual would have been correspondingly greater.[8]

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[8]The general methodology, then, is to make a variety of rather arbitrary assumptions with respect to the marginal productivity of labor (hoping that the true figure lies between the extremes chosen) and deduce the amount of technical change implied by each assumption. The unexplained increase was estimated using the traditional assumption of a constant elasticity of substitution production function so that the percent increase in output attributable to a given factor equals its rate of growth times its income share.

The relation between the marginal productivity of labor and the average wage rate over this period is a matter of speculation.[9] The

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[9]The marginal productivity in question is an "average" one since there must be some range of marginal productivities over different regions, different types of farms, different occupations, etc.

former could conceivably have been greater than the correctly measured wage rate, but more likely the opposite was the case. Small farmers probably apply their own labor to a point of marginal productivity somewhere below the going wage rate. As discussed further below, recorded wage rates are likely to correspond in disproportionate measure to periods of peak seasonal demand, also, so it is even more likely that the appropriate figure here would be below most recorded rates. The increase in labor force that occurred between these years was likely concentrated in either paid workers or family helpers,[10] a further factor suggesting

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[10] If my interpretation to the effect that family helpers must have been wholly or largely included in the category of "obreros" in the 1938 census is correct. This interpretation is open to question, of course, since family helpers might have been included in the category of the person they were helping. Note that the figures here do not correspond to those of Table II-1 as they are unadjusted census data.

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that the wage rate might, if anything, overestimate the contribution of labor increase to output increases.[11] (See Table II-3.5) If the marginal

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[11] These groups have, in general, the lowest income per person levels in agriculture. It seems probable that the wage rate does not overestimate the marginal productivity of paid workers, except under limited circumstances; but that wage might be an overestimate of the marginal productivity of family helpers. Unfortunately, we have no information as to which of these categories showed the major increase in the period under consideration.

Table II-3.5

Breakdown of the Male Agricultural Labor Force, 1938 and 1951

Population Censuses										
1938			1951			1964			1970	
Owners, managers, etc.	582,667	861,433	Employers	315.566	778,317	289,234	(289,740)	961,160	343.6	893.6
Renters, tenant farmers and squatters	278,766		Independent operators	462,751		671,926	(685,777)	(975,517)	550.0	
Empleados (white collar workers)	9,124		Empleados	24,651		37,280		(37,916)	101.4	
Obreros (manual workers)	780,152		Obreros	794,075	1,056,588	942,506	(946,976)	1,284,617	969.9	1,322.1
			Family helpers	262,513		342,111	(343,553)	(1,290,529)	352.2	
No information	31,985			70,673		6,996	7,097			
Total	1,682,694			1,930,229		2,290,053	(211,058)		2,317.1	

Sources and Methodology: The 1938, 1951 and 1964 figures come from the Population censuses of the respective years. The 1938 figure excludes two categories of unknown meaning-household duties (oficios domesticos) and servants (sirvientes). Possibly these categories correspond in part to what is later defined as "family helper." But since women working at household chores have been excluded from the labor force since 1938 we assume here that the same has held for males. The two categories in question had 57,226 men in 1938.

In 1964 the figures in parentheses include men in fishing, hunting and silviculture; the others include only those in crops and livestock.

productivity had been equal to the average wage rate during the period in question, the residual would have been about 1% per year;[12] if mar-

[12] The average labor share (defined as the labor force in agriculture multiplied by some average wage figure.) was perhaps 50% during this period. (The figures of Table II-7.5 suggest that it was higher during the early part of the period, then declining; but as indicated in the discussion accompanying the Figure, they seem implausibly high and there are predictable upward biases in the methodology used. Nevertheless the wage share was almost certainly substantial, making it less reasonable to assume that the economy was in a labor surplus condition and the marginal productivity of labor very low.

Assuming a 50% labor share, the predicted growth rate of output based on growth of the traditional inputs is thus (0.67) (0.50) + (2.74) (.25) + (2.4) (.25) = 1.77 if we assume 25% shares for each of land and capital and take the average of the lower and upper limit estimates of the rate of growth of land. For these years there is no information on land and capital shares but as long as their growth rates are similar, the final estimate is insensitive to this division. The difference between 2.70 and 1.77, about 1%, is the "unexplained" residual.

ginal productivity was one half the wage rate[13] it would have been about 0.5%. When it is remembered that the residual captures the positive effects of public investment in such infrastructural items as roads, which are not included in the capital stock, the part of it corresponding to the narrower concept of technical change would appear to be

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rather small, probably less than 1/2% per year.

[13]Given the considerable growth of land under cultivation according to the figures, it would not appear reasonable to assume an average marginal productivity of labor less than half the wage rate during this period.

We have no serious estimates even of cropped land for pre-1937-38, but the very rapid increase in coffee output almost certainly reflected substantial increases in land under coffee. It seems not unlikely that about the same rate of growth of land cultivated characterized the whole of the 1925-50 period as characterized the latter part of it. If this was the case, the size of the residual is the same as for 1937-38 to 1950, i.e. still consistent with a low rate of technological change (cum public investment, etc.). With a marginal product of labor equal to the wage rate (and corresponding labor share of about 50% for this period also) the residual would have accounted for 1% growth per year; etc.[14], this would once again appear to be an upper limit estimate.

[14]Impressionistic evidence would suggest, if anything, less "unexplained" growth during the earlier part of this period than during the latter.

The figures for this pre-1950 period are consistent with the impressionistic (but probably more persuasive) evidence that only slow

technological improvements were occurring; neither type of information suggests that change was wholly absent. Impressionistic evidence would point to a greater share of the increase in total output in the post-1950 period being accounted for by some form of technological change (in the broad sense of the term); taking the period 1950-64, it does appear, under reasonable combinations of assumptions, that such change probably accounted for growth of between one and two percent per year (see Table II-4). A residual of 1.20 to 1.70 corresponds to a marginal productivity of labor of 0;[15] if M.P.L. was equal to the wage rate the implicit residual would account for growth of 1.65-1.95 percent per year.[16] Thus, unless the input or output

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[15]Depending on whether land is assumed to have grown at 2.14 or 1.34%, and on the precise income shares assumed for capital and land.

[16]Depending, again, on the assumption with respect to increase in the land input. The results are only marginally different for the period 1948-52 to 1962-66. Note that this residual includes the effects of increases in human capital as a result of better education, better health, etc. There is little evidence on their possible importance.

Labor share figures , which attempt to measure the share of income accruing to that component of labor services which corresponds to the skill level of the average paid worker in Colombia (presumably somewhat above a "pure" labor share) show a decline. The fact that wages have not shown little of any long run increase, and impressionistic evidence that the average skill levels have probably not changed

Table II-4

Average Annual Percent Changes in Output and Inputs for Crops and Livestock Together: 1950-1964

	1950-64	1948-52 - 1962-66
Output	3.25	3.16
Capital	1.89[c]	1.85[c] (1948-52 to 1962-4)
Land in Major Crops[a]	2.14	1.79
Land in Crops and Livestock	1.34[b]	-
Labor	0.92	0.90
Output/Man	2.34	2.24
Capital/Man	0.96	0.94
Land in Major crops/man	1.20	0.84
Land in crops and livestock/man	0.44[b]	0.84

[a]The share of minor crops in total crop output fell from a little over 11% in 1953 to about 10% in 1955. If we assume the land shares moved in above the same way, then land in major crops can be used as a proxy for all land in crops; it is used here in that way.

[b]Refers to 1950-67. The growth implicit in figures of Atkinson, Agricultural..op. cit., p. 15. Crop land and pasture are weighted by relative rental prices.

[c]My estimate of growth of capital is above Atkinson's, (only about 1% per year over 1950-67 (ibid., p. 15). He felt that the Planeacion estimate may have been two high in the latter part of the period, perhaps due to inclusion of coffee inventories. Since that source did not appear to include coffee inventories and did appear consistant with other bits of evidence on investment, we do accept the Planeacion series here.

Source: Table II-1.
Figures for land in major crops and for output are from Atkinson, Changes op. cit. Labor figures are based on the population census of 1964 and the ECLA estimate (Analysis and Projections.... op. cit., Statistical Appendix) for 1951. Capital stock estimates are from ECLA, El Uso de la Maquinaria Agricola en Colombia, mimeo, August 1967.

Footnote 16 continued:

over the 30 year period in question suggest both that using the wage to approximate a "pure" labor share does not imply a serious bias for the period considered, and that the residual is probably not much due to this factor.

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figures have serious errors, the growth not associated with the use of more of the traditional inputs has increased substantially in the post 1950 period.[17] The contribution of this "residual" has, it appears, been

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[17]At the time of writing, there were no agricultural capital stock figures available for the post 1964 period. During that period land in major crops per man continued about constant as it had since the mid-50's, production continued to go up, and it is reasonable to assume that capital per man also did. So there is nothing in the figures that we do have from the post 1964 period which would suggest a change in the nature of the growth process from that of the previous decade.

A major weakness in the figures is the absence of a good indication of the variable land, which would reflect the productive potential of both crop and cattle land; the series refers only to crop land. Atkinsons figures for rental value of pasture land in 1950, 1958 and 1967 imply a quite slow increase (USDA, Agricultural Productivity, op.cit, p. 15).

In general, with a considerable amount of pasture land being switched to crop production, there could be a danger of overestimating

Footnote 17 continued:

increased factor productivity associated with the switch in use of land). New pasture lands have been opened during this period, of course, but no data are available either on quantity or timing. Fortunately the period in which the residual appeared (1957 or 58 to the early 60's) was not characterized by an increase in crop land, so the phenomenon in question could not be responsible for that appearance.

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considerable though not dramatic,[18] when it is remembered that it picks up positive effects of increases in public intrastructure, education, etc.; it is possible that "micro" technical change (improved production functions for individual products) has been small,[19] a conclusion which might appear inconsistent with the rather noteworthy increases in mechanization, uses of improved seeds, etc. in the expanding commercial subsector. Impressionistic evidence suggests little technical change in livestock growing,[20] that most of the change has occurred in crop growing (mechanization, use of new varieties, and so on) and that much of it has occurred in the modern sector. It may be, however, that the dualistic structure of Colombian agriculture throws up global figures which disguise technical change occurring in the modern sector. One effect of the trends towards commercialization and mechanization may be to shove laborers and small farmers into subsistance (or farther into it, as the case may be) and decrease the overall efficiency of labor use; since this decrease in allocative efficiency shows up in a slower growth of output per man, it could,

[18]Preliminary calculations by Jay Atkinson (Atkinson, Agricultural op.cit. p. 23) give about the same results. For 1950-58 he estimated an annual increase in total factor productivity of 1.6%, for 1958-68 it was 0.9 - 1.5 (depending on which of the alternative measures of the growth of capital stock were used); he estimated a total factor input index by using the average of first and last year prices as weights and dividing this into the output index . The decrease in the residual over the latter part of the post 1950 period shows up using my data also. Atkinson's figures correspond methodologically to my (wage rate = marginal productivity) variant, so data and slight methodological differences are responsible for the difference between my 1.75 estimate and the roughly 1.5 he would obtain using the same 1950-64 period.

[19]Always with the caveat that quality of new lands may have been inferior, and the data is in general of low quality.

[20]During 1950-55 animal production was about constant largely due to a decrease in cattle production; there was a decrease not only in slaughter but in stocks. Crop production has suffered greater fluctuations than that of cattle; there was a great expansion between 1950 and 1954, a decrease in 1955-57 and an increase in 1958-60.

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if sufficiently strong, cover up (in the global figures) technological change which did occur in a subsector.

Table II-5

Average Annual Percent Changes in Output and Input for Crops, 1950-64

	1950-64	1948-52 to 1962-66
Output	3.51	3.06
Capital	3.04	2.88
Land in Major Crops	2.14	1.79
Labor	0.92	0.90
Output/Man	2.57	2.14
Capital/Man	2.10	1.96
Land in Major Crops/Man	1.27	0.87

Source: Table II-1; the capital figures come from the same source as cited in Table II-1.

Whether technical change has in fact been more prevalent in the crop subsector than in livestock can be partially tested, though the data is again too weak to provide a satisfactory answer. Table II-5, which refers only to crops (as nearly as possible, given the data),[21]

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[21]Unfortunately, there are no over time estimates of the breakdown of agricultural population by whether crop farmers or livestock producers, to permit an estimation of how the ratio of land/man has moved within the crop sector. The rate of growth of output for the two categories has been very similar; if one assumed (as we implicitly do in the labor figures of Table II-5) that output per man rose at the same rate in the two sectors, then the "cropped land/per man working in crops" ratio would move parallel to the cropped land/ agricultural population ratio. The latter ratio seems to have risen markedly during the late forties and early fifties and somewhat between the late thirties and the late forties, although in both cases the figures are open to question. Somewhat less uncertain is the near constancy indicated since the mid-fifties.

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suggests a residual for this sector not too different from that of all agriculture:[22] if the wage reflected marginal productivity accurately the implicit residual would be 1.5%[23] and if the marginal productivity of labor were zero, it would be 1% per year.

Within the period 1950 and on, Diagrams II-3, II-4 + II-5 suggest changes in the relative importance of the residual vis-a-vis growth of traditional inputs.[24] Diagram II-5, on whose data we can

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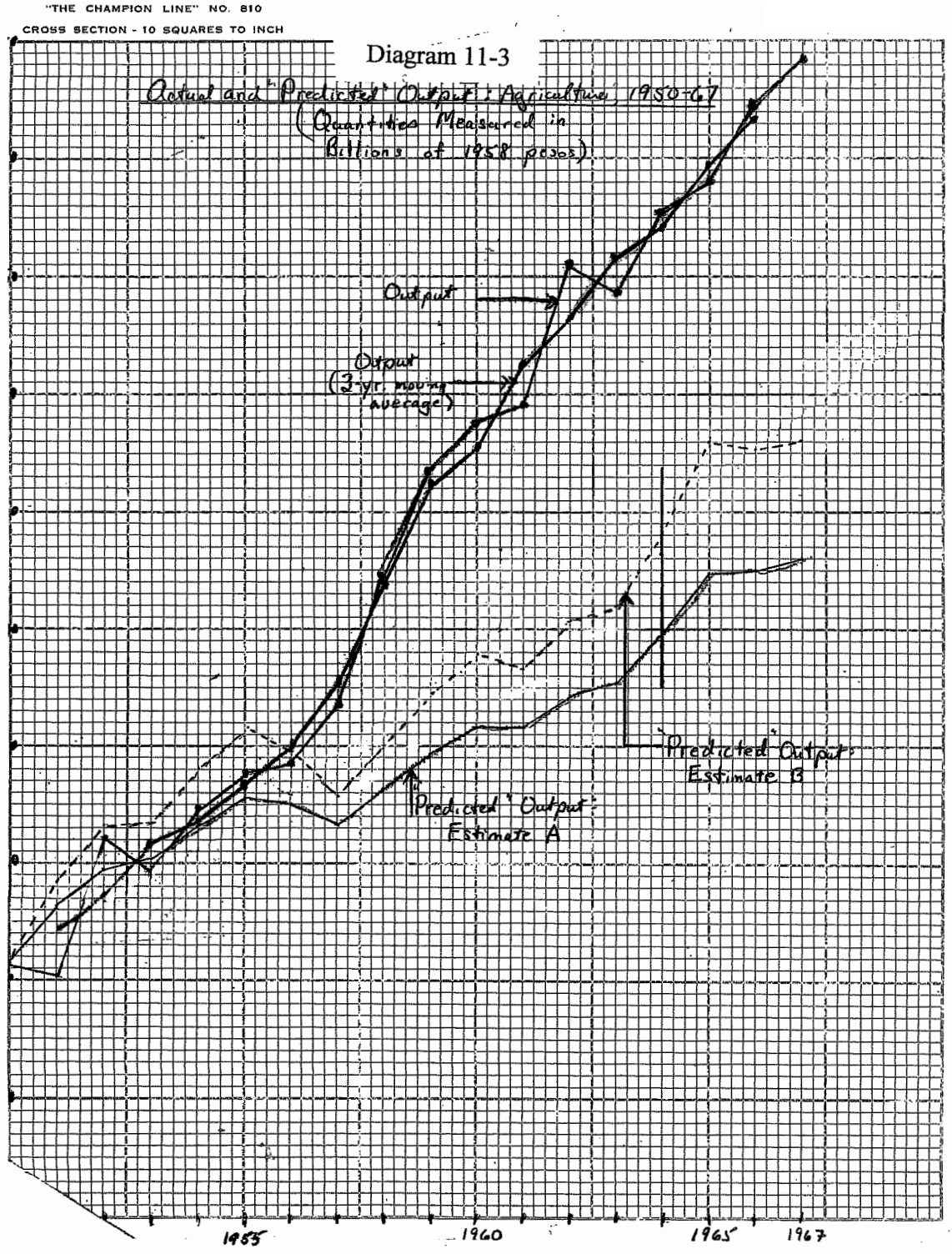
[22] Its lower measured value (the opposite of what might have been expected) is not significantly different from that for all agriculture, when the possible errors in the data are taken into account. The calculations for all agriculture are particularly weak because of the lack of pasture land figures, and those for the crop subsector because of our inability to distinguish labor force trends as between crops and livestock, and the probably weak allocation of capital (and perhaps even of land) between the two subsectors.

[23] We assume that about two-thirds of the total investment in land and capital is in land and that the labor share in crop growing is above that for agriculture as a whole, specifically 50%. For 1959, we have elsewhere estimated that there were about 400,000 people employed in the livestock sector; possibly the figure should be raised to 500,000 to count part-time for people on mixed farms. This would imply that there were about 1,850,000 in the crop sector. Applying the national average wage rate would imply a labor share of 42.5 to 56%. The overall labor share calculated for 1959 is a little below that of nearby years so our 50% assumption may not be far off.

[24] The two estimates of predicted output were based, on the following formulae:


"THE CHAMPION LINE" NO. 810
CROSS SECTION - 10 SQUARES TO INCH
Diagram 11-3
Actual and "Predicted" Output: Agriculture, 1950-67
(Quantities Measured in Billions of 1958 pesos)
Output
Output (3 yr. moving average)
"Predicted" Output Estimate B
"Predicted" Output Estimate A
1955
1960
1965
1967

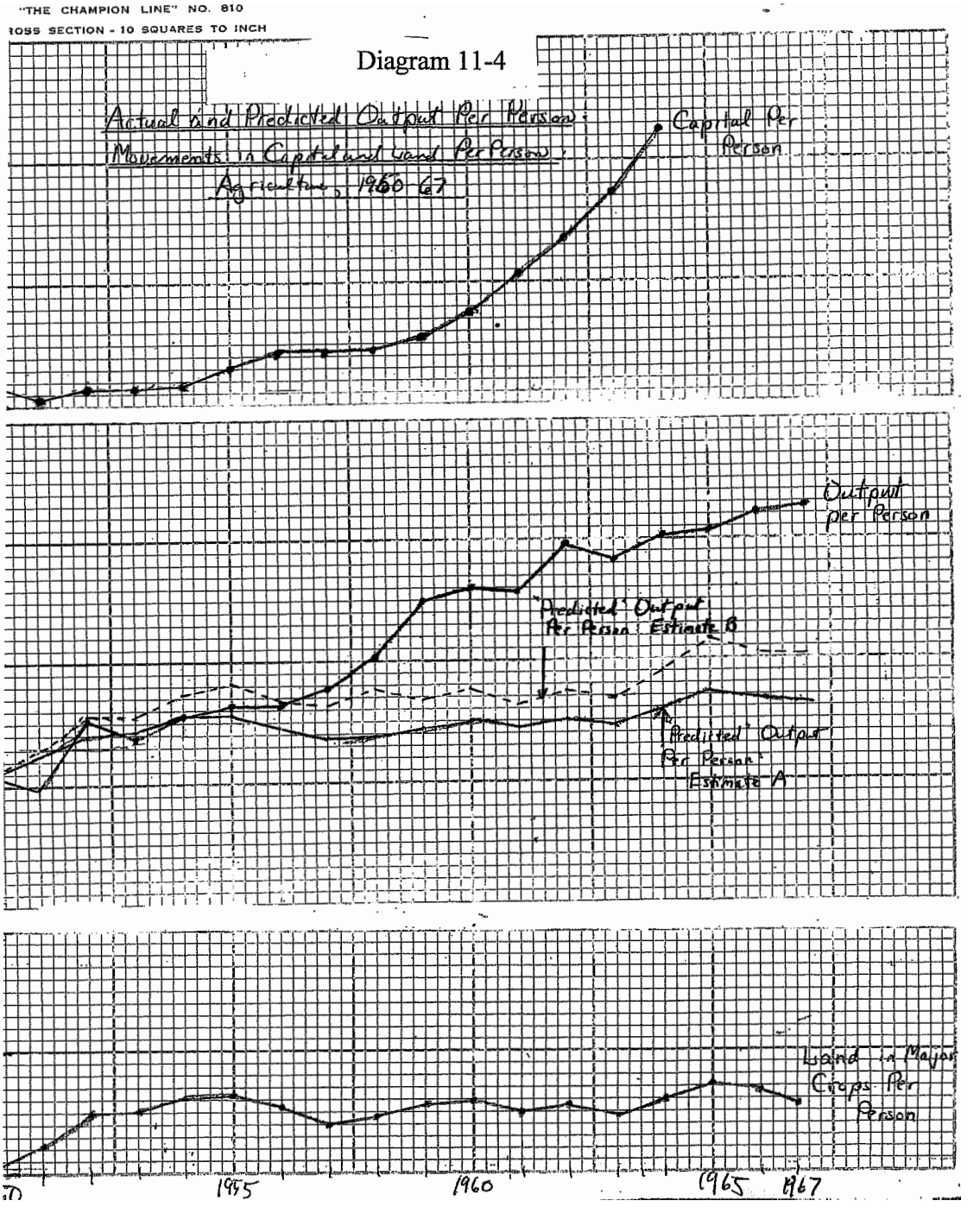
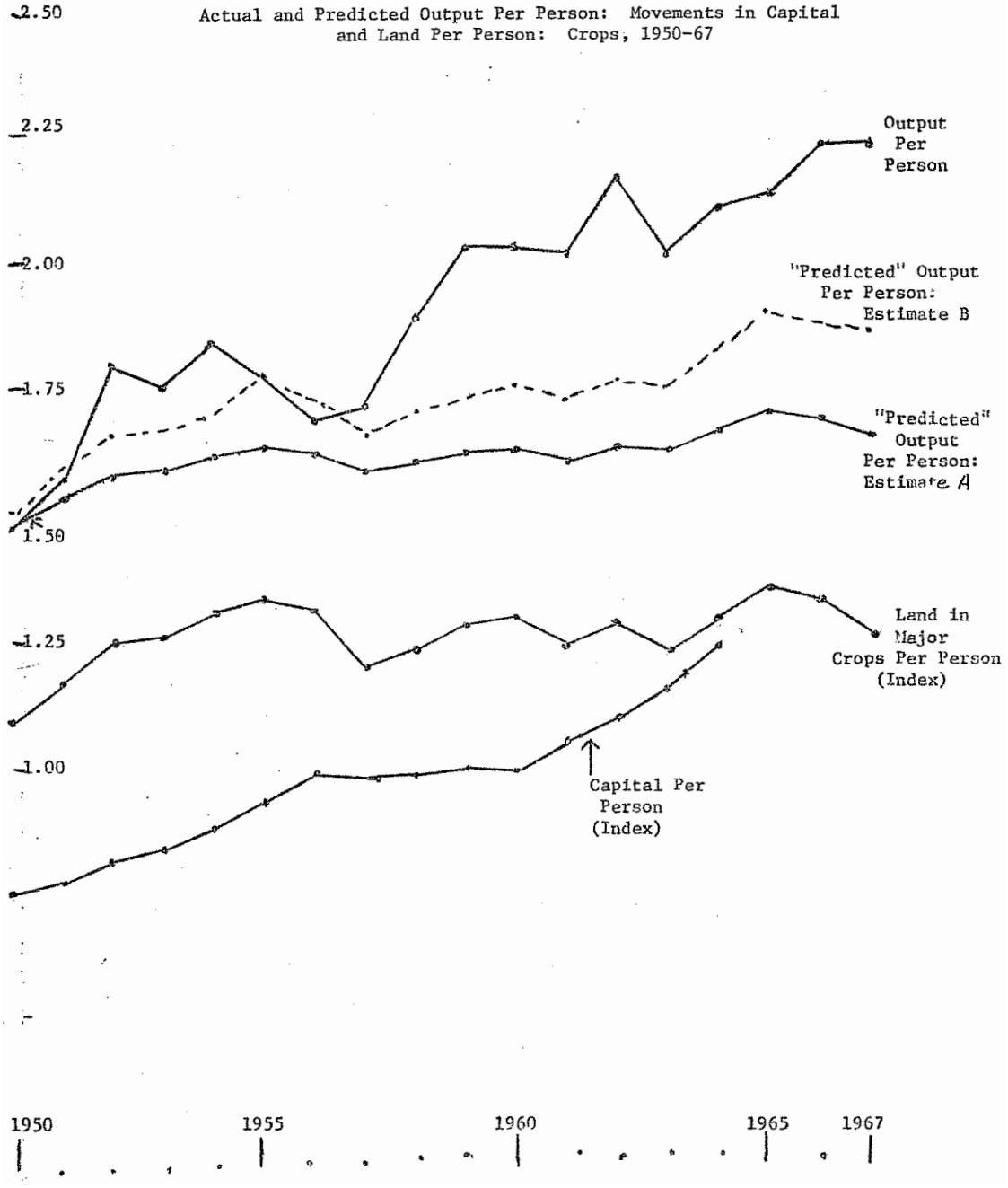

"THE CHAMPION LINE" NO. 810
ROSS SECTION - 10 SQUARES TO INCH
Diagram 11-4
Actual and Predicted Output Per Person:
Movements in Capital and Land Per Person,
Agriculture, 1950-67
Capital Per Person
Output per Person
Predicted Output Per Person: Estimate B
Predicted Output Per Person: Estimate A
Land in Major Crops Per Person
1955
1960
1965
1967

Diagram II-5

Actual and Predicted Output Per Person: Movements in Capital and Land Per Person: Crops, 1950-67



Footnote 24 continued:

$$\text{Estimate A: Pred. Output}_{t+1} = \text{Pred. Output}_t \left[\left(\frac{\text{d Labor}}{\text{Labor}} \right) (0.40) + \left(\frac{dK}{K} \right) (0.20) + \frac{\text{d Land}}{\text{Land}} (0.40) \right]$$

$$\text{Estimate B: Pred. Output}_{t+1} = \text{Pred. Output}_t \left[\left(\frac{dK}{K} \right) (0.33) + \left(\frac{\text{d Land}}{\text{Land}} \right) (0.67) \right]$$

Thus Estimate A assumed a constant elasticity of substitution production function with the factor shares, labor 40%, capital 20%, and land 40%; this division corresponded closely to Atkinson's estimates for 1958 and to my own. Estimate B assumed a marginal product of labor equal to zero and assumed the marginal productivies of the other two factors were proportional to their income shares.

Note that the statements in the text as to the relative importance of the residual for different sub-periods are not apparently very sensitive to the (very uncertain) assumptions about the labor series.

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perhaps rely the most, indicates that the land input per person in major crops rose rather rapidly until 1955; capital was also rising on a per capita basis during that period, with the growth in output per capita therefore an expected result. But during the period 1955 to 1960, during which output continued (with some substantial fluctuations) to rise on a per capita basis, land per person did not rise at all and capital per person was almost constant; considerable factor productivity increases must then have occurred during this period. It was a period of successful introduction of new varieties of several crops (including

Table II-6

Average Annual Percent Changes in Output and Inputs for Crops and Livestock, and Crops Only, 1960-1966

	Crops and Livestock 1959-61 to 1965-7	1959-61 to 1967-9	Crops Only 1959-61 to 1965-67	1959-61 to 1967-9
Output	2.70	3.07	2.54	3.06
Capital	3.54 (1959-61 to 1964)	2.57	4.20 (1959-61 to 1964)	2.49
Land in Major crops	1.60	1.05[d]	1.60	1.05
Labor	1.12	1.12	1.12	1.12
Output/Man	1.56	1.92	1.41	1.92
Capital/Man	2.39	1.36[a]-1.43[b]	3.17	1.35[c]
Land in Major crops/Man	0.47	-0.07	0.63	-0.07
Implicit Residual		1.34 -1.54		1.43-1.62

[a]Based on the figures of column 10, Table II-7; since estimates are available only for the two end years, no averaging is done around the end years. This figure corresponds to the rate of increase in total fixed capital per man.

[b]This rate corresponds to the increase in total capital, including working capital per man, assuming that working capital per man in 1960 was the average of that of 1953 and that of 1967.

[c]This estimate of the increase in capital (and therefore capital per man) is based crudely on the exclusion of livestock and artificial pasture from the total capital stock. This leaves a residual which in reality is greater than total capital in crops, and the implicit assumption is that that part of capital not really applied in crop production grew at the same rate as the total. It appears that the growth rate of capital in crops could not be very sensitive to the error introduced in this way.

[d]1959-61 to 1968.

Source: Data of Table II-1 for crops and livestock together; data of Table A --for crops alone.

barley) a tremendous increase in cotton productivity, some increase in rice and so on. As we see later in this chapter, a considerable share of the increase in constant price value added per hectare for the period 1950 and on (as a whole) was associated with a shifting composition of crops towards the new and higher yielding commercial ones; this phenomenon was particularly prevalent during the late 1950's (see Table II-14). Although that part of technological change related to the introduction of new capital forms such as tractors and other machines might have been expected to show up more in the 1950-56 period when the rate of growth of the stock of machines was particularly rapid, the cross period difference was not dramatic and in any case there may be a gestation period involving learning by doing.

In terms of diagnosing the current state of the agricultural sector the most recent years are of special interest. Table II-6 (see also Diagram II-5) suggests that factor productivity has continued to rise markedly in the crop sector over the 1960's, probably around 1.5% per year,[25] yeilds have continued their undramatic but positive

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[25] With marginal product of labor equal to zero, the growth of output explained by the other factors would be (2.49) (.40) + (1.05) (.60) = 1.6 ± or a little over half of the growth. With marginal product equal to the wage rate, the output explained by the three factors would be (2.49) (.25) + (1.05) (.37) + (1.12) (.38) = 1.43, leaving a little over half as residual.

Looking at crops and livestock, marginal productivity of labor equal to zero would imply a residual of 3.07 - (2.57) (.45) - (1.05) (.55) = 1.34; marginal productivity equal to the wage rate would imply a residual of 3.07 - (2.57) (.30) - (1.05) (.37) - (1.12) (.33) = 1.54.

tended to go up during the period. Including livestock and crops together, it appears that the residual has been less than 1.0 to 1.5.

One broad conclusion, then, is that a relatively greater share of output increase has been due to residual factors in the post 1950 period than in the pre-1950 one, factors which were particularly important during the latter part of the 1950's and the 60's. Other changes in the nature of the growth process between the two long periods are related to the changing importance of land, labor and capital increases. Although there were short period fluctuations, the labor force grew at about the same rate in the two periods. But the growth of land under major crops and capital was slower in the latter period taken as a whole while that of capital was faster.
For the most recent years (i.e. 1960-1966) there has been a continuation of the rather high rate of growth of capital and what appears (though it is difficult to ascertain due to the shortness of the period and the fluctuations of the series in question) to be a slowing down of the increase in land under crops. Labor has probably continued to grow at about the same rate as before,[26] so has output per man.

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[26] Though some evidence from the late 60's suggests a slowing down, possibly a levelling off.

The average for the period 1925 and on is a little over two percent (crops and livestock) while for this most recent period (1960-66) it appears to have been around 1.9 percent.[27]

[27] This estimate is guess work due to the fact that we have no solid information on changes in the agricultural labor force except for inter-censal periods. It is conceivable, for example, that its growth over the 1960's has been slower than the 1% plus estimate we are using based on the 1951-64 change (where, also, the estimate is open to some doubt).

Over a period as short as 1960 to 1967-68 and with all the data uncertainties present, it is risky to venture any interpretation of changes in the growth process. But they do suggest a slowing down of growth of land under cultivation (as it becomes more difficult); a continuing growth of capital per man and continuing contribution of technical change. Continued Technological change and capital formation.

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[28] Predicting the successful introduction of more productive varieties and methods of cultivation is very difficult. With respect to a number of crops, the sector has seemed perpetually to be on the verge of technical breakthroughs but they have not come. (In a few cases, of course, they have, e.g. broilers.) It might appear relatively safe to speculate that not many dramatic breakthroughs are in the offing for the near future either. Cases like rice, where a new variety has apparently allowed large increases in yields over the older varieties in 1968, leave the issue in doubt; but if one considers that really rapid introduction, either of new varieties or new techniques of cultivation seem

Footnote 28 continued:

unlikely except in the "commercial" crops which account for perhaps 30% of total crop output, "global" breakthroughs in average yields do seem unlikely. But continued gradual increases are fairly predictable as the institutional infracture to produce and tranmit technical change becomes more developed and more sophisticated.

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are, by implication, likely to be the keys to future output growth.[28]

Some Characteristics of the Process of Changing Factor Proportions

The figures presented above (Table II-1) point to some--though not at all dramatic--increase in the cropped land/man ratio and to a substantial increase in the capital/labor ratio (about two thirds in total or 1.3 percent per year) in the agricultural sector over the roughly 40 year period being considered. Interpreting this latter increase in terms of the possible conflict between modern and traditional agriculture, it is of interest whether the increase was concentrated in forms of capital complementary to labor or forms which are substitutes; the suspicion that the latter was largely the case is fueled by the fact that real wages have not increased substantially--and perhaps not at all--over a 30 year period during which average incomes in agriculture have risen very substantially.

In Table II-7 we present some limited evidence on changes in the value of plantations, cattle, machinery, and other forms of capital per man over the last two decades. Total land under plantations has not risen rapidly since the area under coffee stabilized in the late 1950's and has decreased a little since 1960. Plantation capital per man was only a little higher in 1967

Table II-7

Agricultural Capital (Including Land) Per man, By Components
(Values in 1958 pesos)

	Land in Major Crops (Hectares) (1)	All Land in Crops (Hectares) (2)	Total Land Value in 1958 pesos (3)	Tractors: Horsepower (4)	Machinery (5)	Plantations (excluding artificial pastures) (6)	Cattle (7)	Other Livestock (8)	Irrigation Artificial pastures Buildings, fences, etc. (9)	Total Fixed Capital (10)
1948	1.14			.569	67.5					
1949				.662	83.9					
1950	1.22	1.34	1.017	.780	107.4					4.704[b]
1951				.980	142.4	348.7	3.031			
1952				1.175	169.0	351.5	3.076			
1953				1.330	188.0	357.6	3.046			
1954				1.521	205.0	413.2	3.013	485.1	559.3	4678.6
1955	1.26	1.39		1.876	241.6	423.8	2.947			
1956				2.220	275.8	406.9	2.886			
1957				2.544	293.4	371.3	2.917			
1958			1.103	2.586	297.4	390.4	2.947			
1959				2.851	327.2	402.4	2.974			
1960	1.27	1.40		3.078	356.5	407.2	3.002	495.1	589.6	4905.0
1961				3.254	373.6	418.7	3.028			
1962				3.520	395.1	395.7	3.098			
1963				3.669	421.9	389.3	3.132			
1964				3.749	426.9	387.7	3.154			
1965	1.32	1.45		3.858	436.6	389.2	3.180			
1966				3.946	437.7	382.4	3.201			
1967	1.32		1.124	3.745	413.0	385.5	3.219			
1968				4.307	447.9	380.0	3.292	575.7	662.5	5358.0
1969				5.003	496.0					
1970							3.661[a]			

[a] Based on preliminary figures, both of cattle stock and of population.

[b] This figure is deduced from the 1953 figure by the change in this variable indicated in Table II-1.

Source: Figures on types of capital are from Table A-11.5. The labor force figure by which they are divided are from Table II-1. Column 10 is the sum of columns 5 through 9; it excludes capital in rural housing and capital corresponding

Sources to Table II-7 continued:

to the clearing of the land. The latter decision is based on the practical grounds that since there is virtually no information available on the cost of clearing land over time, it would probably be more appropriate not to try to estimate that variable but rather to assume implicitly in the analysis that land, after clearing, is homogeneous. The figure for 1953 is less than that of ECLA by around 20% (their total fixed capital estimate was 8,236 millions; ours is 6,508); the difference involves our exclusion of soil improvements--that accounts for more than the total difference; apart from that we also excluded rural housing and had different estimates for some of the other categories, including higher estimates in livestock other than cattle, for example. Overall, allowing for the different degree of inclusion the two estimates do not differ by more than 5 or 10%. This is due partly, of course, to interdependence of sources. The capital per man series in Table II-1, column 9, agrees closely with the one presented here with respect to the 1953-60 period; in the former capital per man rose by 4.5% and in this one by 4.8%. There seems, therefore, little internal inconsistency. The source of the capital figures in Table II-1 from 1953 on was Planeacion, and this similarity of trend suggests that their methodology and figures must have been similar to my own.

than in 1950; its share of fixed capital had fallen from say 9% in 1953 to 7% in 1967. Other traditional forms of capital have also tended to remain constant on a per worker basis; i.e. cattle and land. The stock of cattle per man was virtually constant over the 1950's; it then eased up in the early 60's and rose quickly over 1966-70. The dramatic increase, of course, has occurred in machinery - the form with the most obvious potentially negative impact on labor use - from about 3% of fixed capital in 1950 to about 8 1/2% in 1967. (Its share of total capital in crop farming was perhaps 25-30 in 1967). Between 1947 and 1968 an almost 10-fold increase in tractor horsepower per man occurred; total stock of machinery rose only a little less fast; the continuity of its rise (at least as suggested by these figures) is surprising when it is taken into account that the balance of payments situation varied sharply from one period to the next. It is true that tractor imports fluctuated less violently than some other imports, especially when measured in terms of horsepower. This was partly due to the high priority afforded these imports, and probably partly due to the coincidence of a decreasing dollar cost per horse power with Colombias period of foreign exchange tightness.

Also rising rather rapidly have been working capital (reflecting the increased use of modern purchased inputs). Capital in livestock other than cattle rose rather quickly in the 60's as did that in irrigation works. If cattle and plantations were defined as traditional forms of capital one might conclude that their share in fixed capital fell from about 72% in 1950 to about 67% in 1967; the increase in cattle stocks by 1970 might have reversed this decline a little. Machinery, artificial

Cultivated Area, by Departments, Selected Years

	1953[1]	1960[2]	1966[3]	1967[4]
Antioquia	370	375 (547)	498.1	477.0
Atlantico	37	19 (35)	15.95	14.1
Bolivar	159	113 (202)	233.8	225.4
Boyaca	270	270 (433)	320.5	322.7
Caldas	290	323 (379)	335.9	378.8
Cauca	92	187 (243)	176.5	180.7
Cordoba	90	81 (177)	199.0	177.3
Cundinamarca	355	315 (478)	377.1	347.6
Choco	38			
Huila	80	116 (158)	126.1	143.9
Magdalena	97	219 (404)	320.4	342.9
Nariño	198	232 (299)	185.4	207.6
Norte de Santander	91	184 (250)	162.2	153.7
Santander	161	285 (485)	370.1	382.0
Tolima	237	325 (443)	503.4	458.1
Valle	285	321 (343)	286.2	272.3
Total Department (Excluding Meta and Choco)				
Annuals	1550			2362.0
Perennials	1262			1790.0
Total	2812	3365 (4806)	4110.0	4152.0
(Including Meta)				
Annuals	1610*	1921	2384.0	2444.0
Perennials+	1290*	1515	1841.0	1413.0
Total	2900*	3436 (1611)	4225.0	4266.0

+Excluding sugar cane
*Also includes Choco

Sources and Methodology: It should be noted that this table has been used exclusively to try to indicate how area cultivated has changed in the different

(continued on p.II-20a)

departments; as a result, we have not tried to make the figures consistent with those on total land under cultivation as presented in Table II-1. There appears to be considerable doubt as to whether the definitions of cultivated area remain reasonably similar among the three or four different sources. For 1953 we do not have a good idea of the definition used by ECLA, although it appears that it probably included only areas in production, as did Atkinson; the two estimates were quite close for 1953 - ECLA's estimate was 2,900 thousand hectares and Atkinson's was about 2,800. Presumably in both cases double cropped land was counted twice. For 1960 it appears likely that the distribution between cultivated land in crops and in fallow is in accord with that of the moment the census was taken. But for sample surveys of 1964 and on (figures are presented for land sown and land cropped), the question asked with respect to annuals was the amount of land cultivated in the first semester and the amount of land harvested in the second; the figure we present here is the total of these two figures. The figures for 1966 would thus tend to overestimate the real increase from 1960 cases where land was cropped twice in a given year or land which was fallow at the time of the sample taken in 1960 was being cultivated in either semester in 1966. The artificial part of the increase between the non-fallow land estimate for 1960 and the total cropped land estimate for 1966 is therefore made up of these two components; that there was an artificial increase between the 1960 census and the subsequent sample figures is consistent with the fact that Atkinson's figures for land in major crops are 6 - 7% below the 1953 figures presented here, about 9% below the 1960 figures, but much (about 18%) below the 1966 figures. Apart from this question of an upward biased growth of land being implicit in a comparison of the 1960 and 1966 figures, it is not clear why Atkinson's figures are so far below those of the census. The figures we present for 1960 and 1966 do include about 20,000 hectares of permanent crops not in cultivation, which the Atkinson figures presumably exclude, but this still leaves a substantial difference. Either the encuesta figures are systematically overestimated or those of Atkinson underestimated. Both the sources, since they refer only to major crops, underestimate total land in crops; the sample does not include all the minor crops -- in fact only arveja and millo among these are included. The artificial part of the difference between total land either being cultivated or in fallow at the time of the sample in 1960 and the total cropped land estimate in 1966 is made up of the two components mentioned above, minus total fallow measured in the 1960 census. Since total fallow in 1960 was 1,610,000 hectares and second semester cropped land in 1966 was a little under 1,000,000 hectares, it is clear that the total estimate for 1960 including fallow has to be upward biased relative to the 1966 figures.

Our major interest at this point is in locating the regions where output has gone up most rapidly. This must be done with care since there is no reason to believe that the upward bias of the 1966 figures as measured against those of 1960 is constant from department to department. This upward bias is presumably a function of the extent of double cropping and of the extent of second semester

(continued on II-20b)

up of fallow land; without good information on the amount of double cropping by departments, the only piece of evidence which might help us to wor out interdepartmental differences in the upper bias, is the amount of fallow land present in 1960. This suggests that some of the rather unlikely looking increases (i.e. those which do not seem to fit with the impressionistic evidence) may be due to this; the rapid increase in area indicated for Antioquia and for Santander might both come under this category; this might be also true for Tolima. If half of the area which was fallow at the moment of the 1960 census was cropped that year, the increase in cropped area would have been just about wiped out for those two departments. Of the other departments of most rapid growth - Bolivar, Cordoba and Magdalena - this is the case only for Magdalena. And it seems in fact likely that the share of fallow land cropped in the other part of the year is lower in these three departments. Unfortunately, we have no direct evidence on the extent of double cropping.

[1]ECLA, Analysis and Projections ..., p.

[2]DANE, Censo Agropecuario, 1960. It is worth noting that data on land use patterns refers, for each department, to the moment the census was taken; for most departments this was 1960, but for a few 1961. The figures in parentheses include/and under fallow.

[3]From DANE, Encuesta Agricola Nacional, 1966. Here cultivated area is defined as land harvested in annual crops in the first semester plus land harvested in annual crops in the second semester plus land under permenent crops. It should be noted that land sown is not equal to land harvested. The sample presents both figures.

[4]We have used here the same definition of cultivated areas as for 1966, though since the Encuesta Agropecuario Nactional de 1967 did not present figures on harvested area in the second semester it was necessary to estimate this on the assumption of the same ratio of harvested to sown area as prevailed in the first semester for each department.

pasture, and irrigation works rose from about 3.2% in 1950 to 9% in 1967. These figures, while they show clearly the direction of change, are perhaps surprising in the gradualness they imply in that change.

Studies on the substitution and complementarity relationships between factors in Colombian agriculture are still very limited. If we ask the relevant question, "what has been the ultimate effect of certain types of investment on the demand for labor?," care must be taken to note that the meaningful version of this question is a mutatis mutandis one rather than ceteris paribus; in some cases the investment decision may have determined or been codetermined with a decision to expand the amount of land under cultivation or to change the technology.

Investment in plantations may be assumed to be in general complementary with use of labor since the typical man hours per hectare is higher for plantation crops than in the probable alternative uses, especially where that use is livestock.[29] The case is strengthened by the fact that the

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[29] Not all perennials involve higher man hours per hectare or labor income per hectare than all annuals, e.g. cocao and platanos rank low, tobacco and potatoes rank high. But coffee, the major plantation crop is high, as noted, cattle is sometimes the alternative use, and when such is the case the labor-plantation complementarity is particularly strong. It is further strengthened by the export orientation of these crops as a group, implying that increased output has over time been less likely to lower product price and hence labor income. Recently, however, this sort of problem has been present in the case of coffee.

alternative production on a significant share of land under perennial crops (e.g. coffee, bananas) would probably be livestock. In some cases there would be no production so the investment decision implies an expansion of land under cultivation.

Cattle raising (Colombian style) being the least labor intensive of the major forms of agriculture, the labor use impact of investment in cattle depends very much on the circumstances: if new land is being opened up or intensity of production stepped up on previously used land, it is labor using; if it displaces crop production it is labor displacing.

Working capital is invested mainly in wages and current inputs such as fertilizers, insecticides, etc. It is thus complementary with labor inputs in the sense of implying that more will be used on a given piece of land. Its total effect of labor use is, as for the other forms of investment, more difficult to estimate, since higher yields per hectare brought about by more current inputs in general can lead to lower prices and less hectares under cultivation; if additions to working capital would go more to the purchase of material inputs than labor, the impact on labor demand could be negative. The impact could well vary by farm size.

Machinery can obviously be labor displacing in some circumstances; but it can increase the demand for labor in a context where the land owner does not consider labor intensive crop production to be an alternative and would choose cattle raising if mechanized crop farming were not feasible. If the set of institutional possibilities were extended

to include more labor intensive cultivation (presumably in a different tenure arrangement from the above), mechanization might then, under the same technical conditions, lower labor demand.[31]

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[31]Gauging the flexibilities of the land holding situation is of course difficult, but it is certainly not so fixed as to warrant the assumption that it cannot be partially modified.

Fortunately some evidence is available on the relation between this form of capital and labor demand;[32] Wayne Thirsk has concluded that a typical range for the partial elasticity of substitution between labor and machinery in commercial crops is 1.0 to 1.5.[33] In a number of calculations referred to by Thirsk there is a systematic tendency for

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[32]This issue is discussed further in Chapter VIII.

[33]Wayne Thirsk, The Economics of Farm Mechanization in Colombia, unpublished Yale Ph.D. dissertation, 1972, p. 103. The other major source, in this case exclusively for information on the microeconomic substitutability between machinery and labor is Ministry of Agriculture, is Consideraciones del Papel de la Maquinaria en La Agricultura Colombiana, Bogota, March, 1971.

one tractor-combine hour in mechanized production of a given crop to substitute for between 2.5 and 4.5 man days in non-mechanized production. In general yields are higher in the mechanized production, although the machines cannot be attributed with all of the higher yields. If, however, they can be attributed with some of it, these rates underestimate the trade-off between the machine hour and the man day.

Interesting comparisons are presented in the Ministry of Agriculture's study (1971, op.cit.) in which mechanized agriculture is compared with modern non-mechanized agriculture; again roughly the same range of trade off is observed, between 2.5 (in the case of potatoes) and about 5 (in the cases of barley and wheat, and 4.6 in the case of irrigated rice.) The implicit trade offs are higher with respect to traditional production in general, although potatoes constitute an exception.

Where the actual alternatives are modern non-mechanized agriculture and mechanized agriculture, and where yields do not differ significally between the two, the cited figures are the relevant ones, and imply quite high ranges of substitutability of capital for labor; the ratio of labor in mechanized agriculture to labor in modern non-mechanized agriculture is as low as about 1/10 (wheat) and as high as about 80% (potatoes), but usually ranges between 1/4 and 1/2, illustrating once again that the labor which is made unnecessary in this sense as a result of the mechanization is substantial. (See Table A-45 Between mechanized and traditional agriculture the differences are less (see Table A-44 since traditional agriculture uses less labor than modern non-mechanized agriculture.

Thirsk's important analysis attempts to ascertain the general equilibrium impact of mechanization on labor income in the economy as a whole or, what is the same thing in his model, on the demand for labor. Employing a four sector model (small farm, cattle, large mechanized crop farm and non-agricultural), Thirsk analyses the impact of a subsidy on capital to commercial crop agriculture. Since precise specification is impossible and parameter values not always clear, his results are expressed in terms of ranges rather than points. He concludes that, even allowing for the fact that the conversion of livestock enterprises to mechanization crop growing (as a result of the feasibility of mechanization) increases labor demand and use on the area involved,[34] when

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[34]The ratio of number of workers or of man days per hectare on the average mechanized crop operation relative to cattle raising is about 3 or 4 to one. This ratio emerged from interviews undertaken by Thirsk (see Thirsk, op.cit. p. 71) in cases where specific farmers made the switch; a somewhat higher ratio is implicit in the aggregate figures, but this is to be expected since some land used for grazing is too low quality to be used for crops and would be expected to have a lower labor/land ratio. The figure of relevance here seems to be the 3-4 range.

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the negative impact associated with the decreased availability of capital in non-agriculture is allowed for

The subsidy (which could be in the form of low import prices, for example) would lower total demand for labor outside the small farm traditional sector, and lower the wage rate if that variable were not institutionally fixed (see op.cit, p. 225). Thirsk's results are (as seems plausible) quite sensitive to labor-capital substitutability in non-agriculture; he argues for low elasticities, on the basis of various empirical studies. This parameter is probably the hardest to estimate of all those which enter the model; if, as seems plausible to me, it is above 0.5, the increase in surplus labor which Thirsk's results point to might not occur. Further, if mechanization does not require a subsidy, i.e. if one asks rather whether a tax should be instituted to try to block it, the results are not quite the same.

These conclusions are considered in greater detail in Chapter 8; the lack of information on the structure of the economy as a whole and the agricultural sector in particular makes it difficult to use a general equilibrium analysis such as that employed by Thirsk, although the weaknesses of partial analysis are even more apparent.

The nature and meaning of changes in the composition of inputs in the various types of agriculture is discussed in greater detail in subsequent chapters. Its relevance and implications depend partly on whether factor proportions tend to be optimal at each point of time. There is reason to believe that in profit maximizing large scale agriculture, there is a tendency to use less than the socially optimal amount of labor and more than the socially optimal amount of complementary factors. This raises the possibility that labor saving technological change may lower the sector's efficiency. In some situations,

it is not clear whether the various factors are substitutes or complements for labor; in some cases it is clear that machinery is a substitute, in others it may be complementary. It is important to ascertain the changes in factor proportions in each type of agriculture. If one concludes that with the passage of time profit maximizing small farmers have--like larger farmers--increased the ratio of machinery to labor, and especially if they do so at a similar rate to the large farmers, it would be less likely that mechanization led to serious misuse of factors than if large scale agriculture was moving in one direction and small scale agriculture in another.

Historical Changes in Factor Shares

One possible indication of how the capital formation and technological change occurring in agriculture affects labor demand is the change in labor's share of total agricultural value added overtime. Table II-8 suggests that the share which corresponds to the income of pure labor (i.e. that part of labor income which is in some sense attributable to the use of unimproved human working capacity) has suffered a substantial decline over the last 30 years.[35]

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[35]Note that the figures of Table II-8 do not represent estimates of total paid plus imputed income due to the application of labor; they are rather, a crude estimate of the component of that income which may be thought of as a payment for more or less "pure" labor, i.e. relatively unskilled work. Since most labor in agriculture is unskilled, the figure has more meaning than it might have in industry. Probably most human capital income in agriculture accrues in the form of profits.

Table II-8

"Pure" Labor Share[1] in Agricultural Value Added, Selected Groups of Years

1935-39	(66 - 84%)[2]
1940-44	(56 - 79%)[2]
1945-49	46 - 57%
1950-54	40 - 47%
1955-59	34 - 42%
1960-64	35 - 43%

[1]The labor share figure used here has been calculated by multiplying the average male agricultural wage (figures from DANE) by the estimated labor force in agriculture. It would tend to overestimate the labor share since there are some, but not many, women and children (with lower average wages) in the labor force, and would perhaps underestimate it, though this is uncertain, in that it assumes the average quality of labor inputs is that of the paid worker. To the extent that the quality of the labor force has probably risen a little over time it would not quite refer to the implicit income of the same type of labor over time.

[2]It must be remembered that figures on agricultural output and wages probably get worse and worse the farther back the period to which they refer. The much higher labor share which emerges from our calculations for early years almost certainly reflects errors in these figures. But for labor's share not to have fallen at all the errors would have to be bigger than suggested by consistency checks.

A possibility which should be mentioned is that for that population defined in the census as agricultural, the share of the total working time which is applied in agriculture has increased, i.e., they may be spending less time in the production of non-agricultural products which are not caught in the national accounts as part of agricultural output. There has probably been some drift in this direction and it would imply that the decline in labor share has been overestimated in our figures. It would probably not, however, imply any substantial downward bias in our estimated real wage trend, unless the increase in total days worked per year rose along with that in agriculture.

In some other countries it seems that wage figures recorded during earlier phases of a country's agricultural development bear a higher ratio to actual annual agricultural income than is the case later; this result comes out strongly in the Japanese case. Perhaps the most plausible explanation is that as the sector advances the use of resources becomes more efficient, less time is applied to non-agricultural pursuits, surplus labor declines, etc., and the typical wage laborer works more days per year. There is some independent evidence of this in Japan. Since the calculation of Table II-8 assumes a constant number of days worked per year (225 to 275), the potential for bias is there. But the relatively short period for which the calculation was made could hardly have seen the almost doubling of average days worked which would have to have occurred if the labor share did not fall at all. A best guess remains that it underwent a substantial decline.

In the figures the movement is a gradual and continuous one, until what may be a levelling off beginning with the late 1950's.[36]

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[36]As a check on the labor share calculations performed here, it is interesting to adduce evidence from the nature of share-cropping and similar arrangements. Evidence from the coffee industry, in particular from the larger farms which frequently use a manager or share cropping system is that the manager gets 50% of the receipts, out of which all wages and cash expenses are paid; (Rowe, op.cit., p. 28). The owner thus gets 50% of the gross receipts, i.e. something over 50% of value added, indicating a capital share of over 50%. A guess, based on the FAO-CEPAL coffee study of 1955-56, might put the gross receipts/value added ratio at 105%, in this event the capital share on these large coffee farms was about 55%. Note that this matches almost precisely the calculations of the labor share (45% including administrator costs) based on the FAO-CEPAL survey cost figures.

Why such a decline? The first hypothesis, which should be tested with respect to the over time determination of the labor share, is that the agricultural sector is connected via sufficient factor mobility to the rest of the economy so that the same wage rate for a given type of labor and the same rate of return to capital characterize the two.

In such an economy, the factor prices observed in a given sector may have little or nothing to do with events in that sector. Analysis of a sector as if factor remunerations in it depended on its own structural change, (capital accumulation, technological change, and so on) makes sense either when such factor mobility is limited, or when the sector in question looms large in the total economy so that, in a sense, it pulls the rest of the economy along with it. Agriculture was undoubtedly the dominating sector of the Colombian economy until the post 1950 period, so the "importance" argument in favor of supposing that its factor prices and shares were determined primarily or substantially by events within the sector would carry a lot of weight in that period; it would carry less weight at the present.[48]

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[48]As discussed in Chapter 1, agriculture tended to have over 60 percent of the output of the "goods producing" sectors before 1940 (this share was high again after 1950 because of the high price of coffee) and before 1940 around 2/3 or more of total unemployment was in agriculture.

Whether the agricultural sector was isolated enough or large enough to make an attempt to relate movements of factor prices in agriculture to structural change in the sector a valid one, it is in any case useful to have as background some information on the relationship between wage movements in agriculture and in other sectors. Given the lack of information on rates of return to capital, comparisons must be limited to the wage rate.

The still somewhat limited evidence available indicates a consistency of the agricultural wage pattern with that of blue collar workers in manufacturing and construction, which suggests an economy where labor is

sufficiently mobile to prevent large divergences in real wage movements across sectors. The decline of the agricultural real wage (1935-43) was, it appears, accompanied during the period 1933-39 (roughly) by a parallel drop in urban wages.[49]

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[49]At least this is the evidence from a series for female factory workers in Medellin, and for construction workers in Bogota. Although some of the urban series start up before the agricultural wage series, the similarity of overall trend is noteworthy; no precise year to year correspondence would be expected. The agriculture wage figures indicated bottoming out in different years according to the department, in any case.

For the years from the early 40's on there has been a strikingly parallel movement of agricultural and non-agricultural wage series. Both rose rapidly from 1942 or 1943 to 1947 or 1948, then fluctuated with little apparent advance till around 1953 or 1954.[50] Manufacturing wages then

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[50]At first glance it might be hypothesized that the rise after about 1950 might be distinguished from the earlier one in that it followed the reaching of a turning point or "commercialization point" in Fei-Ranis terminology, and was based on a real scarcity of labor rather than a market imperfection. Although there have been labor scarcities in some regions of the country, it would be hard to believe that such is the case in other areas; yet wages rose fast in some poor (and labor-surplus) departments like Cundinamarca and Boyaca. It seems very doubtful, given the nature of labor markets in rural zones, that even a secularly rising wage rate can be taken to signal the absence of labor surplus.

started a long upward drift which continued with out pause until the early 60's. Agricultural wages did rise over the period 1953 to 1963, but with sharp drops in 1956 and 1957. These drops, and their timing, suggest a relation with the fall of coffee prices, though the absence of any relation between the development in individual departments and the importance of coffee does not lend support to the idea; it is more probable that these decreases resulted from the faster price increases of these to years after several years of relatively little inflation. Since 1963 most wage levls have tended ot rise marginally.

Taking the post 1935 period as a whole, the above discussion makes it clear that agricultural wages have shown markedly similar trends to those in non-agriculture; the relationship to unskilled construction wages is of particular interest, since both activities involve low skills and since construction wages are essentially determined by market forces.[37] As indicated in Table II-8, daily construction wages in Bogota were on average 35% above cold climate Cundinamarca agricultural wages over 1938-42 and about 20% higher during 1965-69. Though this differential was by no means constant,[38] the evidence is consistent with sufficient mobility as to imply

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[37]Unions are unimportant, as the institution of sub-contracting still prevails even for large firms; they maintain very few people directly on their payrolls.

[38]Agriculture wages were, in this region, above those in construction over at least 1950-55 (possibly before as well but construction wages are not available for that period). This might be due to the rural violence which did seem to promote some rural to urban migration or to the coffee boom pushing the agricultural wages up, for a period, before labor mobility had a chance to restore the typical long run relationship. The former explanation seems much the more plausible of the two.

that wages in one sector respond more to the developments of the economy than those specific to the sector. The similarity of wage movements in agriculture and non-agriculture suggests in part that in explaining the wage trends and the labor share, economy wide phenomena should be the reference point; but since agriculture was so important at this time specific events in the agricultural sector might well also have been assumed to be very important in determining economy wide trends. The joint focus will characterize our discussion of the over time wage pattern.

The Decline of the Agricultural Real Wage: 1935-41

At the economy level, two hypotheses would suggest themselves immediately wis a vis the wage decline; first, that it was a result of the world depression which led to a worsening of Colombia's terms of trade and a general stagnation of the economy, and second, that it involved a "return to normalcy" after a period of above equilibrium wages caused by declining prices in the previous years--this disequilibrium was being erased via an increase in prices which permitted a decrease in real wages with little or no decrease in monetary wages. The first hypothesis is not convincing; judging at least from ECLA's figures, Colombia did have an economic slowdown around 1930, but output growth had picked up

long before the onset of the real wage decline in the period 1933-35.[51]

[51] ECLA, op.cit, Statistical Annex, page 1.

A related hypothesis is that, via some mechanism or other, the substantial drop of coffee income in these years was the important factor. (This drop can be seen in the figures of Table VII-7.) Year to year movements in the national real wage averages and coffee income do not match well, however, even for the coffee departments, so although this may still have been an important factor, the evidence is not conclusive in this direction.

An alternative hypothesis is based on the assumption of considerable downward rigidity of nominal wage rates, and is consistent with evidence from Japan, where the real agricultural wage and real wages in non-agriculture fell in a period of general inflation after rising in a period of falling prices.[52] The phenomenon of falling real wages in

[52] Ryoshin Minami, "The Turning Point in the Japanese Economy," Quarterly Journal of Economics, Vol. 82, August 1968, pp. 380-402.

Colombia might then suggest that an increase had occurred prior to 1935, . . . coupled with falling prices, and that this (perhaps somehow artificial) increase was then eaten away by inflation.

Although agricultural wage figures are not available before 1935, the figures presented in Table II-8 indicate that for manufacturing and construction workers this is exactly what happened; real wages which had been rising in the late 20s continued through the early depression years,

for the most part hitting their peaks in 1932 or 1933, before starting the descent already referred to. And the time pattern of prices is consistent with such an explanation. They had fallen sharply before 1935, especially from 1928 to 1933, and were rising again from 1935 on. Though there were considerable decreases in monetary wages in both agriculture and other sectors, price declines were drastic enough (over 50% between 1928 and 1932) to outweigh such downward flexibility as existed for wages.[1]

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[1]The possibility that this mechanism played a role can be better tested by looking at the money wage rates in the individual departments than at averages for the nation as a whole. When one looks at the money wage and real wage movements in the departments of Atlantico, Caldas and Tolima, including the period of falling real wages (usually about 1935-1945), the relative constancy of the money wage rate over periods of several years is suggestive of the hypothesis, but not convincing even for these (purposely chosen) departments, as there are some decreases. Some of the decreases may not be real in the sense of implying that someone's money wage must have fallen. Published wage rates are "most frequent" rates; it is not clear whether they are modes or medians. Less statistical uncertainties would have plagued the test if it had been possible to use the figures from municipios; unfortunately these were apparently not published annually during this period. Even that test would not be perfect since a non random sample of workers' wages could always be lower than the previous period average even if no worker's wage had changed. I am not aware whether the sample was changed each year or trimester in the collection of these figures. A further disadvantage of working at the municipio level is that the sample was, and still is (I believe) quite small. But even if money wages were not perfectly rigid in these departments (and the hypothesis received even less support in the other departments)

their behavior suggests enough downward rigidity as to possibly make inflation a necessary vehicle in the achievement of a rapid decrease in real wages.

The period 1935-41, one of rather gradual price increases, saw rather gradual real wage decreases in agriculture and that the first years of rapid price increase, 1942 and 1943, were the years of the sharp decrease in the real wage; it might be hypothesized either that the labor market reacted with a lag (in 1945 and on) to the wages being below equilibrium or was finally righted (1942-43) after having been above its equilibrium level in the late depression years and then resumed its upward trend.

If real wages had risen above their equilibrium level in the previous period of falling prices, and were moving back toward equilibrium during the period in question, then the return of inflation after a period of declining prices explains the timing of the decline; the original increase in real wages (which we hypothesize despite the lack of empirical evidence) was brought on by the deflation.[1]

[1] If downward rigidity is an important factor, it probably suggests some stability in employer-employee relations in agriculture. Unless the rigidity is simply due to a careless failure to maximize profits on the part of the employer, it must imply an unwillingness on his part to decrease an employee's nominal wage or of the employee to take a nominal price cut, or both. No figures are available on the job stability of landless farmers.

Two sector specific hypotheses may be mentioned for the decrease in the wage rate during this period--competitivemess of capital with labor (a generally possible explanation) and expulsion of small scale farmers from their land, swelling the labor force (an explanation specific to this period).

Displacement of farmers from their land as a result of Law 200 of 1936 could have been a factor in the decreasing wage rate of the late 30s, and even though that decrease is not unique to agriculture, the hypothesis warrants some consideration both because . . . the decrease in agricultural wages appears to have been . . somewhat more severe that that of the urban workers and secondly because, of course, the above discussion is no demonstration that price phenomena constitute the whole explanation. It is difficult to test the "squatter expulsion" hypothesis since little data is available on the nature of changes in land tenure over the period in question (1935-- or possibly before--to about 1943); a comparison of the 1938 and 1951 population censuses does suggest that the main increase in the active agricultural population between those two years was in landless farmers[53] (see Table II-8.1. This would be consistent

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[53]Unfortunately there is enough doubt as to the comparability of the definitions used in these two censuses to detract substantially from the confidence with which this assertion can be. No complete definition of the categories used is available with the 1938 census (though some volumes e.g. Boyaca, give more hints than others); it seems likely that the people listed in subsequent censuses as landless workers were included (especially in view of the fact than wives were) and no other category man "workers" seems a likely one, especially given that these are quite young people in general.

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with, but not be a demonstration of the alleged tendency of landowners to evict squatters and renters from their lands after Law 200 of 1936 to prevent

their acquiring rights to the land, a tendency which would swell the army of potential laborers[54] and push down their wages. There is dispute as to how often these evictions actually occurred; Hirschman argues that there is little solid evidence that Law 200 was really counterproductive.[55]

[54] Unfortunately no data are available on changes of this sort over the precisely relevant period, 1935-1943.

[55] Hirschman, op.cit., p. 112.

An alternative interpretation of the apparent increase in proletarization over 1938-51 would be that for some other reason (e.g. simple increasing scarcity of land as the rural population expanded) the landless population was being swollen and that the disturbances of the peace were more a result then a cause of this phenomenon.

If a competitiveness between capital and labor lay behind the declining wage rate, there should have been an increase in the capital/man ratio during this period; our limited information (Table II-1) does not support this.

It is interesting to observe that imports of machinery rose to a new high in the period 1935-38 then fell and bottomed out in 1942 and 43; since this period of declining wages saw the first large scale wave of machinery imports, the speculation may be aroused that the imports (perhaps in part a reaction to the land law of 1936) led to labor displacing mechanization and had something to do with the real wage decline.[55.1]

[55.1] ECLA suggests (Annex, page 6) that the agricultural

labor force was growing faster over the period 1935-1942 (about 1.35 percent) than in the succeeding period 1942-1950 (about 0.45 percent). ECLAS 1938-51 population growth rate overall seems valid, judging by the censuses, though it is not clear how they interpolated. If their appraisal is accurate, this could have been a feature in the situation too. But no further evidence of a general nature seems to point in this direction. For example, one would, if this hypothesis were valid, have expected a relation between departments which suffered wage reductions in this period and ones which were mechanized. Unfortunately figures are not available on the destination of tractor imports during this period. The departments which suffered the wage declines in the nationwide average included, however, almost all, and there is no obvious difference in the behavior of now mechanized departments (like Valle and parts of the North Coast (Cundinimarca's Sabana de Bogota was not yet mechanized of any account, and possibly Tolima was not either), from other ones.[56]

[56]Presumably if either the mechanization hypothesis or the squatter displacement hypothesis had been key ones, the impact would have been more regionalized to the areas of direct concern--departments most characterized by the prevalence of renters of one type or another in 1960 were Antioquia, Atlantico, Caldas, Norte de Santander; the unweighted average decline for these departments was 28 percent, while departments at the other extreme like Cauca, Nariño and Valle had declines of about the same magnitude. A better test of the hypothesis involves attempting to relate the behavior of real wages in individual departments to changes in the number of people with little or no land. Unfortunately the timing of the population censuses (1938 and 1951) does not help much here.

The Upturn of The Real Wage: 1943-44 to 1963

Over the period from the early 1940's through about 1955, agricultural wages rose faster on average, than unskilled construction wages.[57]

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[57] One plausible hypothesis would have been the coffee price. With its brusque movements over the last twenty years, it would seem to provide, in general, a good laboratory for an analysis of the way the wage rate reflects changing profitability of output; one might have expected those changes to have affected the wage rate in the coffee regions substantially, and less so elsewhere. In fact this seems not to have been the case. The real price of coffee received by the farmer was high throughout the 1950's (until 1959) yet only Tolima out of the five most important coffee producing departments (Caldas, Antioquia, Cundinamarca, Valle and Tolima) showed a substantial increase in the real wage for the 1950-1954 period over the 1945-1949 period. And only Caldas had a lower real wage in 1960-1963 than in 1955-1959. These surprising results may be due to the disturbances created by the violence of the period or to the inappropriateness of the above test. A look at wage rates for coffee growing municipios would provide a better test.

The usual relation of the agricultural and construction wages (the latter higher) was reverse (at least in the Bogota region for which data are available) during this period, and given the close long period relationship, suggestive of good labor mobility, this reversal would seem most likely to be related to the rural violence of those years.[58]

After the violence became less severe the agriculture wage (Cundinamarca) fell to its usual differential below the Bogota unskilled construction wage,

Table II-8.1

Unskilled Construction Wages in Bogota, Compared to Agricultural Wages in Cundinamarca (all wages expressed in current pesos per day)

Years	Unskilled Construction Workers: Bogota (1)	Agricultural Workers, Cundinamarca (2)	Agricultural Workers, Cold Climate, Cundinamarca (3)
1935	(.80)		
1936	(.75)		
1937	(.93)		
1938	(.94)	.60	0.60
1939	(.96)	.60	0.60
1940	(.95)	.80	0.80
1941	(.94)	.80	0.90
1942	(.92)	0.65	0.60
1943		0.60	0.60
1944		0.90	0.80
1945		1.05	1.00
1946		1.50	1.50
1947		1.75	1.50
1948		1.85	1.70
1949		2.05	2.00
1950	2.24	2.50	2.30
1951	2.34	2.90	2.60
1952	2.45	2.70	2.40
1953	2.50	2.95	2.55
1954	2.74	3.42	2.90
1955	2.93	3.67	3.25
1956	3.98	3.92	3.35
1957	4.30	4.37	3.90
1958	5.01	5.05	4.50
1959	6.00	5.25	4.75
1960	6.50	5.90	5.25
1961	7.60	6.50	5.80
1962	8.50	7.10	6.55
1963	10.20	9.15	8.40
1964	12.55	10.10	9.75
1965	15.00	11.65	11.60
1966	16.00[a]	13.72	12.60
1967	17.00[a]	15.67	14.20
1968	18.00[a]	16.80	14.50
1969	19.00[a]	18.50	17.22
1970	20.00[a]		
1971*	21.57[b]		
	20.3[b]		

a. Interpolated by guessing.

b. First semester

Source: Albert Berry ""Changing Income Distribution under Development: Colombia", Review of Income and Wealth, Income and Wealth Series 20, No. 3, September 1974, pp. 289-316.

by around 1956-57.

[58] Which not only encouraged migration to the towns and cities but reduced the rural population and labor force by higher mortality.

Decreasing Labor Share and The Ties with Non Agriculture

The above discussion leaves little doubt that the factor markets of agriculture and non agriculture are now closely linked, and correspondingly, raises the question whether the decreasing labor share observed in agriculture has characterized the economy as a whole. In fact it has not, at least since 1950 (see Table II-8.2). Over 1950-60 while the paid labor share was rising by 10 percentage points in non-agriculture it was falling by 5 percentage points in agriculture; and while the pure labor share was about constant in non-agriculture it was falling 10 points in agriculture.[39] Why this

Table 11-8.2

FACTOR SHARES OF NET DOMESTIC INCOME: 1950–69[a]
(percentages)

Year	Pure Labour Share		Human Capital Share		Total Labour Share	Capital Share	Paid Labour Share	Pure Labour Share	
	Est. A	Est. B	Est. A	Est. B				Agriculture	Non-agriculture
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1945	38.2	≈42.05[b]							
1946	36.7								
1947	38.4								
1948	40.4								
1949	34.7								
1950	36.0	34.87	26.68	27.81	62.68	37.32	34.20	47.85	25.37
1951	36.8	34.53	25.75	28.02	62.55	37.45	34.69	47.77	24.52
1952	34.4	33.11	28.32	29.61	62.72	37.28	34.23	43.68	24.75
1953	32.8	31.36	30.37	31.81	63.17	36.83	35.05	41.91	23.28
1954	31.6	29.90	31.30	33.00	62.90	36.10	34.29	38.49	22.71
1955	31.8	31.52	31.99	32.27	63.79	36.21	36.39	42.38	23.38
1956	30.7	33.13	32.63	30.20	63.33	36.67	35.19	37.92	28.67
1957	29.2	31.69	33.65	31.13	62.82	37.18	35.14	34.10	28.49
1958	31.2	33.91	31.61	28.90	62.81	37.19	36.90	36.38	30.48
1959	30.2	34.51	32.72	28.41	62.92	37.08	36.97	36.88	31.29
1960	29.8	33.74	33.46	29.52	63.26	36.74	37.80	37.99	29.56
1961	30.1	34.71	33.92	29.31	64.02	35.98	38.84	39.50	30.26
1962	30.0	34.94	35.18	30.24	65.18	34.82	40.58	41.34	29.88
1963	31.4	35.12	34.63	29.91	65.03	34.97	41.36	44.03	28.89
1964	30.6	35.25	34.26	29.51	64.86	35.14	39.54	39.34	30.82
1965	29.8	36.90	34.29	27.59	64.49	35.51	39.84	39.91	33.04
1966	30.1	35.36	34.54	29.28	64.64	35.36	40.49	40.14	30.63
1967	29.1	34.21	36.52	31.21	65.42	34.58	41.52	38.75	29.58
1968	27.2	32.26	37.49	32.45	64.71	35.29	40.76	35.81	28.11
1969	27.9	31.47	37.20	33.63	65.10	34.90	42.42	36.90	26.45
1970									

Source: Berry, Albert "Changing Income Distribution Under Development: Colombia", Review of Income and Wealth, Income and Wealth Series 20, No. 3, September 1974, pp. 312-313.

Net domestic product (income) has been a decreasing share of gross domestic product (income) over time, according to the national accounts estimates; if that decrease has in reality not occurred, the total labour share would have risen less than indicated here, or possibly not at all.

[b] This is a rough estimate based on an interpolated figure for the unskilled construction wage in 1945. (See the methodology of Estimate B below.)

Sources and Methodology:

Estimate A is based on the assumption that pure labour income corresponded to the male agricultural wage, and that the days worked per year were 250 for everyone. This procedure has at least one upward biasing feature, the assumption that the male wage be applied to women and children (who have lower wages) and to family helpers (who probably work on average considerably less than 250 days). A downward biasing feature is the assumption of 250 days worked for everyone; the average in urban areas is higher.

For estimate B the above assumptions were applied only with respect to the agricultural labour force while the wage series for unskilled construction workers was applied to the non-agricultural labour force, with the assumption of 275 days worked. Col. (5), total labour share, is based on the summation of the paid labour income (Table 5) and imputed labour income, the latter calculated as 50 percent of total income of unpaid workers (employers and own-account workers). Col. (7), presented for purposes of comparison.

For Col. (8) it was assumed that net domestic income in agriculture was 0.95 times gross value added, and (different from Col. (1)) an adjustment was made (multiplication by the coefficient 0.92) to take account of the fact that unpaid family helpers work less than other members of the labour force and that women and children earn lower incomes (and hence presumably have lower inputs).

Col. (9) used the assumptions of Col. (2), applied to the non-agricultural sector.

different behavior. It is related, in part, to the fact that labor has remained fairly homogeneous in agriculture with little addition to human capital over time while non-agriculture has seen substantial improvement in the labor force; this should explain part of the extremely different developments in the paid labor share of the two sectors. But the differential evolution of the pure labor shares in the two sectors is not explainable

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[39]Where pure labor income is defined as the share of total income imputed to the labor force when everyone is assumed to receive an unskilled worker wage in payment for his pure labor; conceptually the idea is to exclude returns to human capital.

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in this way; it must be associated, in effect, with different types of aggregate production functions or of technological change. Along with other evidence, it would suggest that technological change has been pure labor saving in agriculture and roughly neutral in non-agriculture.[40] The factors

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[40]Assuming the production function in each sector has unit elasticity of substitution. If this is not the case the statement must be modified accordingly. Factor demands in non-agriculture may of course be affected importantly by changing sectoral composition of demand so the idea of an aggregate production function is a less satisfactory one in this context.

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cited above as probably impinging on the labor demand, while not necessarily being reflected in agricultural wages, have presumably shown themselves in this differential behavior of the pure labor share.

A useful way of classifying determinants of changing functional distribution is the following:[41]

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[41]Parts of the next few pages are taken with some modifications from the author's "Land Distribution, Income Distribution and the Productive Efficiency of Colombian Agriculture," Food Research Institute Studies, ...

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(1) Changes in Factor Proportions.

In general one may expect increases in land to be complementary with labor, i.e., to shift the demand curve for labor to the right, other things being equal. Capital might be either a complement or a substitute for labor, but is more likely to be competitive than is land; given the fairly low price elasticity of demand for agricultural products, an increase in capital could lower the equilibrium wage.

(2) The nature of technological change, in particular whether there is a labor-saving or a capital-saving bias.

(3) Changes in the Relative Importance of Different Types and Sizes of Farms. ... Since different farm sizes have widely varying labor/land ratios, the wage rate could be affected by a change in the relative importance of different farm sizes (a redistribution of land), all else remaining equal. This heterogeneity also implies that the effect of a given technological change on labor demand depends on its adaptation and implications on the different farm sizes; a particular technological change could be a complement to labor on one group of farms and a substitute on another group. Changes in

the share of the agricultural labor force which is landless (as may have happened in the late 30's) may be included in this category; an increase in that share implies a larger average farm than would otherwise have obtained.

(4) Changes in Product Composition of Demand.

Changes in product composition of demand may cause changes in the relative demand for the different factors. It is, for example, of interest to consider the implications of the increase and subsequent decrease in the importance of coffee; since it appears at first glance to be a labor intensive crop, its recent decline might be hypothesized to have contributed to the falling labor share. The other major change in crop composition has been associated with the "commercialization" of agriculture, beginning in the late 40s and early 50s with the expansion of cotton, rice, sesame, etc.; the general impression is that these are capital intensive crops.[42]

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[42] Changes in composition of crop output (as opposed to composition of demand) are in part a response to the nature of the new technolgies becoming available and to capital formation; to that extent they do not constitute a separate determinant of labor demand; but the changing importance of coffee, for example, is primarily a world demand phenomenon and should thus be treated as an exogenous factor separate from the others.

It is instructive to consider jointly the implications of the combination of land increase, capital increase, and technological change for income distribution. We have hypothesized that the growth of agricultural

output up to around 1950 was largely explained by the growth of the traditional inputs-increasing total factor productivity was not very important; it appears that from the late 1930s till around 1950 only 10-25 percent of output growth was due to increased factor productivity. Since 1950 it appears that technological change has become more important, accounting for say 30-50 percent of output growth.

If in fact there was little technological change before 1945 or 1950 and in fact land and labor tend to be complementary in use, then, unless other important factors were affecting the wage rate, the behavior of wages over the pre-1950 period as a whole might suggest that capital was competitive with labor. During this period both the rising agricultural real price index[43] and the jointly rising K/L, Land and Labor ratios would have been expected, in the absence of any technological change,[44] upward pressure on the wage rate; yet, taking the period of the mid-30s to the late 40s, wages did not rise, but rather fell. The main types of capital formation

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[43]Between 1934-36 and 1949-51 the ratio of agricultural to non-agricultural prices rose by almost 50% (See Table II-18). It is true, of course, that since the price of food was the major or only component of the deflator used to calculate over time changes in real wages, the changing relative price of agricultural products would not have been expected to have much (or any) effect.

[44]If technological change was not important, the decrease in wages was presumably not due to labor saving technological change--impressionistic evidence on the use of new techniques is consistent with relatively little change during the period.

were livestock, plantations, construction, and soil improvement, none of which would intuitively appear likely to be competitive with labor as would, for example, machinery. Investments in the latter direction, while not very important in absolute terms were beginning to be of note in the late 30's, before the war cut off the supplies.[45] (See the discussion above).

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[45]ECLA figures suggested that machines constituted 8.7% of total gross investment during 1930-35, about 6.4 percent during 1935-39 and a much smaller percent--3.7%--during 1940-44. The imported machinery series would not bear the same relationship to total investment, however.

Exogeneous factors like the violent civil disturbances may have been important determinants of the wage movements. It has frequently been argued that the land law of 1936 (which, among other things, required landlords to pay tenants for investments they effected while renting land) led to considerable dispossessing of the latter group; this would have increased the supply of labor and helped decrease the wage rate in the late 30s and early 40s. The depression may also have had something to do with the decline. The subsequent wage increase (1943-1950) could have been a result of the general expansion of the agricultural sector in the absence of important labor saving technological change;[46] this interpretation would

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[46]Had wages been measured here primarily in terms of non-agricultural goods, another source of increase would have been the rapid increase in rel-

Table II-8.3

Labor Income[1] and Labor Share,[2] by Products

	Value Added Per Hectare		Labor Income Per Hectare		Labor Share			
Perennials	1958 (1)	1966 (2)	1958 (3)	1966 (4)	1958 (5)	1966 (6)	"Future" (7)	Other Estimates (8)
Coffee	1950	3340	475	1380	24.5	40.0		
Cacao	n.a.	n.a.	270	790	n.a.	n.a.		
Bananas (Export)	3700-5500	7300-10900	290	840	≤8.0	≤11.5		
Platanos	n.a.	n.a.	250	730	n.a.	n.a.		
Sugar (for refining)	3100	10000	500	1100	16.1	11.0		
Sugar-Panela	1100	2650	530-810	1540	45-65	55		
Annuals--Relatively Commercialized								
Barley	870	1900	80	240	10	12		
Cotton	1340	2300	380	1100	28	48	15-30	
Rice	960	2425	215	625	22	26	12	
Sesame	550	1980	150	440	27	24	15-18	
Annuals--Less Commercialized								
Beans	600	1700	380	1100	60	60	12	
Corn	425	1030	200	580	47	50	13	
Potatoes	3200	7325	630	1830	20	25		45;54
Tobacco	2890	7630	1960	5700	63	68		
Wheat	510	1350	135	390	26	29		33;44
Yucca	950	3670	385	1120	40	30		
Animal Products								
Cattle					25 (1960 estimate)			

[1] Labor income of various products is calculated as man days times a daily wage rate, i.e., there is no attempt in this context to use a different labor cost for hired and family labor. Some attempt was made to take account of apparent differences among crops in the wages paid to hired labor; differences are based on differences in the type of work, the region in which the crops are grown, etc.

[2] Labor share is likely to be unstable, at least for commercial operations and crops whose yields and/or prices fluctuate considerably. (It is equally likely to be unstable if calculated for non-commercial operations on the assumption of a fixed payment per unit of labor with returns to capital calculated as a residual.) The most appropriate measure is a long run average labor share. Although we did not here take the desirable step of estimating the shares for a number of years, the use of both 1958 and 1966 is a step in this direction. The shares differ between the two years primarily because of changes in the relative price of labor and the products.

Sources and Methodology:

Figures on value added per hectare were based on value of output per hectare figures from U.S.D.A. Foreign Agricultural Report #52, Changes in Agricultural Production and Technology in Colombia, Washington, June 1969, and a variety of sources from which estimates of the share of value of output corresponding to purchased inputs could be drawn.

Major sources of information on labor inputs for various crops were:

(a) The estimates by Lauchlin Currie in his Accelerating Development: the Necessity and the Means, New York, McGraw-Hill, 19, pp. 174-178.

(b) Caja Agraria, Manual de Costos, Bogota 1967;

(c) INCORA, Informacion Sobre Costos de Produccion, August 1968;

(d) ILMA (Instituto Latinoamericano de Mercadeo Agricola), Supply Problems of Basic Agricultural Products in Colombia, Bogota, 1964.

A variety of other sources were used for specific crops.

None of the above sources could be accepted as definitive since most of them present figures referring clearly to commercial production. Currie's estimates are the most meaningful for our purposes but some were adjusted on the basis of more detailed studies than he had available at time of writing.

The data of Col. (7) are based on figures presented in INCORA, op. cit., and correspond to what the study refers to as "future" technologies and cost structures.

The estimates presented in Col. (8) come from crop studies and are of interest due to their differences with my estimates for these products, suggesting that, whether because 1958 and 1966 were atypical or for some other reason, mine may be downward biased.

The estimate for cattle is based on the author's estimate of the number of people engaged in cattle raising (about 380,000 in 1960) and Central Bank based estimates of value added. It is perhaps more likely to be biased up than down, as the Central Bank estimate of milk production appears low. On the other hand Currie estimated a higher number of people engaged in the cattle industry (440,000), so there may be a downward bias on this side.

Footnote 46 continued:

ative prices of agricultural output, but the workers consumption basket was primarily food products and our deflator for almost all regions was during this period, still exclusively food products, so this phenomenon would not show up in the calculated series. Probably it did account for some real wage increase in fact, but not much.

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suggest that capital was not sufficiently competitive with labor to have implied a decreasing wage rate in the face of output growth, had other things been equal.[47] The explanation of changes in labor share over the past 1950 period has the greatest current interest. The particularly rapid burst of mechanization of the late 40s to about 1956 was associated with a rapid decline in the labor share (whether the paid labor share or the pure labor share--see Table II-8.2); its association with the advance of such low labor share crops as rice, barley, sesame, sugar for refining (and corn and wheat when produced with machinery) suggests that this might have been expected. As noted elsewhere, however, the really rapid expansion

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[47]Summing the new out-migration figures for the departments with net out-migration up to the year in question, and assuming no cross-flows (i.e. no immigration at all of farmers to department which has net out-migration, and vice versa) we find that 163 thousand of a labor force of 2,216 thousand had migrated as of 1951 (7.3%) and that 155 thousand out of 2,500 thousand had done so as of 1964 (6.2%). Even if there had been considerably more cross-flows by 1964, the figure would not be much above the 1951 one.

in the share of commercial crops was a little later, 1958-62, so if mechanization, which does appear to have been faster in the earlier period, were a major factor in the declining labor share, its impact was not simply via increase in the relative importance of the commercial crops. The high coffee price in this period might be hypothesized as a factor, in which case one would have expected the labor share to rise again after about 1958; since in fact it did rise part way back to 1950 levels before falling again in the mid 60s, this explanation does have some plausibility.

Output Composition, Changing Factor Shares, and Changing Comparative Advantage of Small and Large Farms

It was noted earlier that an independent determinant of changes in factor shares over time would be changes in composition of demand among crops which (a) use different factor proportions and/or (b) have different adaptability to small vs. large farms.[60] In this section empirical evidence on factor proportions and factor shares[61] corresponding to various agricultural commodities is presented, along with data on the relationship between farm size and product composition of output. It is necessary to note carefully that factor proportions used to produce the same crop may vary tremendously across different types of farms, so the only fully satisfactory specification of the relationship among factor proportions, farm size and crop would refer to the factor proportions for "crop *i* grown on type of farm *j*"; this level of detail, unfortunately, is not available.

Despite the spotty and at times rather impressionistic nature of the information on factor shares of various crops and animal products, estimated

[60] Changes in output composition which simply reflect changing factor proportions and factor prices would of course not be an independent determinant.

[61] Shares of the value added gross of depreciation (value of product minus value of purchased inputs). Theoretically, of course, it would be better to use net income but depreciation estimates are not available. For this reason our figures imply an overestimate of the capital share.

shares differ so much across products that there is little danger in categorizing certain crops as labor intensive relative to certain others. Table II-8.3 summarizes my estimates of labor share and labor income per hectare, along with other available estimates, for the major crops and for cattle. It seems clear that the labor-intensive category (as defined by high labor share of income generated) consists of tobacco, cane for penela,[63] corn, beans, and

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[63]It is worth noting also in the case of panela that its processing is usually done in rural areas or small towns and as such offers considerable employment. The "trapiches" (presses) of which there were close to 60,000 in 1960-61 are scattered through much of the country. Many are small operations on small farms using family and other low cost labor. Consideration of this stage as well as the production of cane implies a very high labor income per hectare for panela. (See Asociacion Nacional de Cultivadores de Cana de Azucar, Cana, Trapiches y Panela en Cauca, Valle, Caldas, Colombia 1964).

The case of coffee is another for which inclusion of labor for on-farm processing implies that the figures presented in Table II-8.3 understate somewhat the farm-labor income associated with one hectare of the product. But the share of all coffee-related labor associated with processing seems to be small. ECLA-FAO estimated 15.2 man hours per 100 kilograms of unthreshed coffee (coffee is normally threshed in industrial mills). This is only about 2 percent of the field hours. Almost 90 percent of the coffee farms in the ECLA-FAO sample had their own processing (depulping) plants and 88 percent of these were small and hand operated.

yucca. Evidence is conflicting on potatoes but they also probably belong in this group of products with labor shares in the 40-70 percent range. In contrast are the relatively commercialized annuals (cotton, rice, barley, sesame, etc.) all of which typically have labor shares below 30 percent.[64]

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[64] The figure of 48 percent for cotton in 1966 does not seem to be typical.

The tree crops, including coffee during the period of high prices, generally have labor shares below 30 or 35 percent[65] (our estimate for 1966 was 40

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[65] Theory would suggest that the labor share fall, in the short run at least, when coffee prices rise in a context where labor is not in short supply. The much lower labor share for 1958 (the last year for which internal coffee prices were maintained at a high real level) than for 1966 is consistent with this. (The ECLA-FAO study estimated a labor share of value of product of about 24 percent for 1955-56, consistent with our 1958 estimate.)

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percent). The crops with high labor shares are also the ones with high labor income per hectare; coffee joins the ranks of the highest labor income crops and potatoes surpasses some of those with higher labor shares (these two are, of course, among the highest "value added per hectare" crops).

For cattle, (taking beef and dairy together) the labor share appears to be about one-quarter, making it lower than that of crops taken together

Table II-8.4

Tendency of Crops to be Grown on Small and Large Farms: 1960 and 1966

Crop	% of Harvested area on Farms of ≤ 5 Hectares: 1960	% of Harvested Area on Farms of ≤ 5 Hectares: 1st semester, 1966	% of Harvested area on Farms of ≥ 50 Hectares: 1960	% of Harvested Area on Farms of ≥50 Hectares: 1st semester, 1966	% of Harvested area in Plots of ≤5 ha: 1960	% of Harvested area in Plots of ≥50 ha 1960
Perennials:						
Coffee	21.6	18.7	20.8	22.0	48.4	8.0
Cacao	16.5	15.0	29.4	29.8	63.5	3.8
Bananas (Export)	13.6	13.8	43.8	40.6	52.8	25.6
Platanos	21.8	19.9	24.2	28.5	78.2	1.6
Sugar	18.4	15.7	40.0	40.7	51.9	25.6
Annuals--Relatively Modern Technology						
Barley	21.2	31.3	39.1	41.8	44.6	23.6
Cotton	8.3*	2.2	50.7*	85.3		
Rice	7.1	6.7	66.7	68.0	29.1	32.3
Sesame	22.2	22.5	36.3	44.0	35.1	16.6
Annuals--Traditional Technology						
Beans	24.2	25.5	29.3	31.7	64.8	9.5
Corn	26.6	24.6	31.2	36.9	61.7	7.6
Potatoes	31.8	39.9	19.9	20.1	67.4	4.2
Tobacco	41.0	37.8	10.2	21.8	84.8	1.6
Wheat	30.6	33.7	16.9	24.7	64.9	5.7
Yuca	24.7	19.8	24.2	35.2	87.7	.8

Source: For all crops but cotton the 1960 figures are from DANE Censo Agropecuario: Resumen General, Segunda Parte. For cotton, Instituto de Fomento Algodonero, Colombia, Su Desarrollo Agricola: Algodon y Oleaginosas 1961-1962, Bogota, 1963. For 1966 all figures are based on U.S.D.A., Agricultural ..., op. cit., pp. 24-6.

*The cotton information refers only to the interior of the country; probably large farms are somewhat more important on the coast. Because of the different base, the 1960 and 1966 figures cannot be compared in this case.

(for which the figure is probably about 35-40 percent).[66] The smaller live-

[66] Using Central Bank estimates of value added in crops and other products and a series of alternative estimates of the labor force in crops and in crops plus other.

stock (pigs and poultry) probably have a higher labor share, so the share for all livestock would be a little higher, though not much, since cattle is by far the most important subsector.

The average labor share for any given crop depends on what proportion of it is produced on large commercial farms; the commercial technologies for barley and wheat imply about the same shares and so do the traditional technologies, but the average share is lower for barley since it is a more commercialized crop. For many crops (e.g., wheat, barley, rice, corn, potatoes, sugar) the labor share is likely to vary by four or five fold between the commercial and the traditional technologies. The former is likely to produce a higher yield per hectare and often a higher value added per hectare, while using much less (though sometimes higher cost) labor.

Table II-8.4 contrasts crops according to whether they are typically produced on small farms, large farms, or both. The small farm crops are essentially the traditional technology annuals, especially tobacco, potatoes, and wheat;[67] with beans and corn also ranking high in share of area cultivated

[67] Note that since these since these figures refer to 1960, they may now be significantly different for some crops. The commercial share of total

Footnote 67 continued:

crop output has continued to grow over time. The shares of the farms of less than five hectares fell in most of the crops between 1960 and 1966, but the typical decrease was not so rapid as to suggest that, overall, the figures presented here would be seriously different from 1970 reality.

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on small units. The crops most characterized by being produced on large farms are cotton and rice.

It is clear from the data of Table II-8.4 that, at least as far as crops are concerned, changing composition of output would have been expected to exert a downward pressure on the labor share over time; most of the high labor share crops have had slow output growth over the last two decades or more; thus the average annual growth of output of panela, beans, tobacco, corn and yucca over 1950-67 was about 2.4 percent; that of all crops was about 3.6 percent over the same period. Commercial crop output (cotton, rice, barley, sorghum, sugar for refining, sesame, soybeans) grew at about 7.5 percent, as its share of total crop output rose from about 10 percent in 1950 to about 25 percent in 1967 This change in output composition must have contributed to the lowering average labor share.[68] And since the

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[68] If the labor share of each crop had remained constant over this period at the value observed in 1958, the labor share for the set of products mentioned here would have fallen from 41.3 in 1950 to 36.7 in 1967.

The relative stagnation of coffee output over the last 35 or 40 years (2.4 percent average growth from 1930 to 1965) has probably played some

Footnote 68 continued:

part in the secular decline of the labor share, but since its labor share appears to have been only marginally higher than that of agriculture as a whole (and it has been lower than that of agriculture as a whole when coffee prices were high) and its rate of growth has been only about 1 percent slower than total output, this cannot be proposed as a major explanatory factor.

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faster growing crops tend to be large farm crops, it has also presumably lowered the capital income of the small producers associated with a given output. Although there is no reliable over time data on factor proportions for given crops, it is plausible to assume that for many the labor share has fallen (holding size of farm on which it is grown constant); this might or might not explain a large part of the secular decline.[69] The case of live-

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[69] This is only a proximate or "mechanical" explanation, of course.

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stock is less clear. Poultry has shown rapid increase and presumably has a higher labor share than cattle; but no usable information on this is available, to my knowledge. Summary information pertainant to the labor share change is presented in Table II-9.

II. Preliminary Attempts to Disaggregate the Residual

The residual part of growth unaccounted for by measured increases of land, labor and capital can result from any of a series of very different factors, both those normally thought of as technological change (such as

Table II-9

Factors in the Changing Labor Share

	Estimated Pure Labor Share[a] (1)	Agricultural Output Growth[c] (2)	Cattle Output Growth[c] (3)	Crop Output Growth[c] (4)	Land/Man in Major Crops (5)	Capital/Man (6)	Stock of Machines/Man 1950 = 100 (7)	Real Coffee Price[e] (8)	Labor Supply Growth[c] (9)	Real Wage (10)
1930-34						5.274		101.0		
1935										
1935-9	66-84		11.73	16.67	0.89-0.97[b]	5.412		69.8	1.50	95.1
1940							≈25			
1940-44	56-79	11.36	7.47	13.85		5.828		60.2	1.08	80.1
1945							≈30			
1945-49	46-57	19.15	22.06	20.70	1.09[d]	6.636		75.1	0.64	79.5
1950							100			
1950-54	40-47	31.88	1.67	15.84	1.22	7.068		123.7	0.22	83.9
1955							193.7			
1955-59	34-42	17.07	23.89	12.70	1.26	7.220		141.7	0.86	85.0
1960							262.4			
1960-64	35-43	20.81			1.27	7.717		99.1	1.12	95.0
1965							307.4			
1965-69	33-41	15.43								

[a] Annual figures for 1950 and on are presented in Berry, "Some Determinants of Changing Income Distribution in Colombia, 1930-1970", Economic Growth Center Discussion Paper #137, March, 1972. The averages for 1955-59 and 1960-64 and 1968-69 were 37.5, 40.4 and 38.3 respectively.

[b] Refers to 1937-8.

[c] Expressed as percent growth over the previous five years.

[d] Refers to 1948 [e] Index with 1950 = 100.

Sources and Methodology: Stock of machinery figures are based on Table II-7 for 1950 and on, and on rough guesses with respect to 1940 and 1945, based on the same figures underlying those for the succeeding years. The figures in parentheses for 1935, 1940, and 1945 are based on ECLA, op. cit. statistical appendix, page 3 they presumably include not only imported machinery but also domestically produced small tools and equipment and so on; it appears impossible that they could have been based on imported machinery, since DANE's statistics seem to show very little importation before 1935 or thereabouts. It is interesting to note that these imports were rising over the period 1936-39 then fell sharply to bottom out in 1942, from which they began rising substantially in 44 to move up to their new high levels of the late 40s and the early 50s.

Col. (9) is from Table I-1. As noted, labor force figures are open to considerable error. Col. (1) is from Table II-8, Cols. (2), (3), (4) and (6) from Table II-1 and Col. (10) from Table A-10.

new plant and animal varieties) and others such as organizational improvements.[70]

[70] The failure of this breakdown to get at underlying causal relations must be borne in mind. For example, if land cropped increased this might have resulted from an increase in machinery, so the output increase should be attributed to the machinery if one is interested in cause and effect.

In the latter category fall improvements in the geographical distribution of labor or other factors, the marketing system, etc.[71] In this section we attempt

[71] Some improvements in marketing would result in and therefore show themselves in the form of increases in land or capital; others might increase output without changing the amount of these two factors. See the previous footnote.

to delve deeper into the nature of the growth process by estimating some possible components of that residual, and considering relationships, if any, between changes in some of these hypothesized components and the residual. Caution is warranted in attempts to relate annual movements since with the climatic uncertainty of agricultural production, a good deal of short term fluctuation may have nothing to do with inputs or technology.[72] Worse, inputs (e.g.

[72] The appearance of a "residual" in 1951 and 1952 is accounted for at least in part by the fact that 1950 was a "bad" year; thus is may be that no residual would have appeared until about 1958 had a different year been the base. 1962 was a "good" climate year, explaining position above the trend line (in Chart II-6).

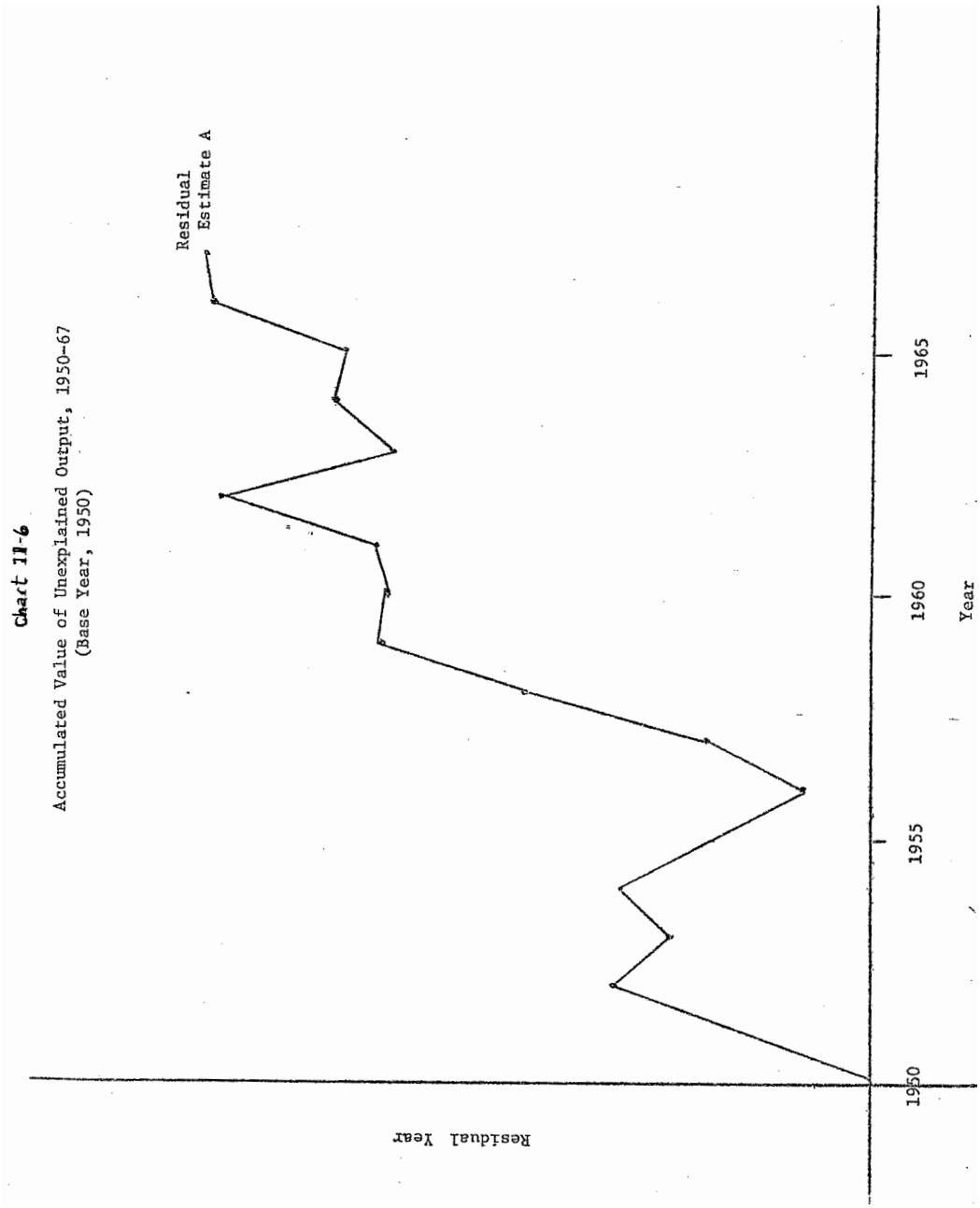
Chart II-6
Accumulated Value of Unexplained Output, 1950-67
(Base Year, 1950)
Residual
Estimate A
Residual Year
1950
1955
1960
1965
Year

land under certain crops) may be dependent on weather so its impact may be hidden. Changes in the residual are clearly positively related to the rate of growth of output; in any case, about the only fairly clear implication of the patterns shown in Chart II-6 is that factor productivity was higher for the period 1958 and on than before; annual movements are too erratic to be suggestive and there are no systematic short period trends.

II. A. Mechanization as a Form of Technological Change.

Investment in machinery, as opposed to more traditional inputs such as plantations, pastures, etc., typically involves technological change. If this change was very strong, or tended to be part of a "package" of very productive technological change,[73] it would be expected to show up in the form of a higher measured residual during the years when the capital stock in machinery is rising rapidly.[74] In Colombia, mechanization is very frequently

[73] It is frequently argued that the use of modern inputs, such as fertilizers, and of good farming techniques in general is related to mechanization, either because the new techniques are more easily applied in conjunction with mechanized agriculture, or because the same sort of "modern" person is likely to use both.

[74] Attempts at deducing the effects of increases in machinery, credit, fertilizer, etc. are less likely to be fruitful than in the case of the more general categories dealt with so far. Only when a very large increase or decrease in such factors occurs would one expect to be able to pick up the effect on total output.

associated with the change in use of land from cattle to crops, one which usually raised factor productivity substantially in itself; so one might expect particularly high residuals when the stock of machinery increases.[75]

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[75]As will become clearer later, this does not mean that the machinery could not be substituted by labor; its positive impact could correspond to the more efficient use of land whose most efficient use (with labor intensive techniques) is prevented by the land tenure situation. [76]The change in use of land from cattle to crops is one which usually raises factor productivity substantially in itself; so on this count one might expect high residuals when the stock of machinery increases.

It would be simplistic, however to anticipate a no lag relation, in view of the need to learn how to run machinery properly, but it is hard to guage how long this lag might be.[76] A particularly rapid increase did occur in

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[76]Many examples of the difficulties involved in introducing the machine culture can be adduced in Colombia. Thus Lauchlin Currie, in discussing the early development of the Sinu Valley area (Fundacion

in the period 1954-56 [77] (see Table II-7), but the stock especially of tractor horsepower, continued to grow rapidly throughout the rest of the period, and its growth did not vary enough to permit an interesting test of its relation to changing total factor productivity. It is true

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[77] The machinery and equipment capital stock series are dubious since, except in the case of tractors, it is necessary to make somewhat arbitrary length of life assumptions, but regardless of these, the unusually high imports of the years 1954 to 1956 imply a rapid increase in the capital stock in this period, whether we consider depreciated value of machinery or number of machines to be the better measure of current contribution to production.

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that machinery per worker was higher during the period of rising factor productivity than before, but the lack of any short run relation between the machinery stock and the residual makes it just one of a number of candidates as sources of the residual.

B. Labor Migration and Reallocation

If factors are all optimally distributed with respect to each other at a given point in time, output per man can increase only as a result of an increase in land or capital, or an improvement in technology. But if the marginal productivity of a factor is not the same in all pursuits or regions, part of any increase increase in productivity per person observed in subsequent periods could be due to an improved allocation of that factor among these different pursuits or regions. Very different

Footnote 76 (cont'd)

para el Progeso de Colombia, Estudio Agroeconómico Preliminar del Valle Aluvial del Sinu, Bogota, August 1962)

—where the top soil is good but poor drainage and long difficult winters have made cattle the major product —

notes that cotton, which came in fast, brought with it a change from rudimentary to semi-mechanized systems of agriculture. There was, at least at first, a great lack of knowledge about agriculture, since most of the cotton producers were previously in cattle. They got help from cotton technicians, but were plagued with many problems and losses were often heavy at first. But things improved with the passage of time. The area also illustrated some possible longer run problems of mechanization —this time in the case of rice. Such mechanization was a failure because of inability to control weeds (spray resistant varieties developed too fast), drainage problems and birds. As a result production mostly reverted to manual methods again. More luck was had in the case of corn although it was still picked by hand as of 1962.

wage rates in different areas of Colombia suggest strongly that the marginal productivity of labor is not uniform; the sizable migratory movements which have occurred bear this out. Table II-10 presents data on the number of farmers who had migrated between departments before 1951, those who migrated between 1951 and 1964, and wage scales by department in 1938, 1951, and 1964. These data indicate in general a flow from the low to high wage departments. The only department with a high recorded wage level and out-migration was North Santander, but the 1938 and 1964 wage figures tend to suggest that the 1951 data were either incorrect in some way or transitory. Presumably migratory readjustments also occur within departments, with the same positive effect on total output as the interdepartmental ones.

Our information on which groups of farmers are most likely to migrate (either remaining in agriculture or leaving it) is still largely speculative; while people with little land (to whom the above figures largely refer) might be expected to be more mobile precisely because they had little or no land, it is known that there is a substantial turnover of farms, especially relatively small ones. In view of this, it seems possible that a more apt measure of relative attractiveness of agriculture by region might be average output per man. (Average output per man in crops might be best but is hard to calculate for lack of information on the departmental distribution of the labor force in crops.) An improved distribution of labor can occur either through migration or simply because of different rates of growth of the agricultural labor force (due to differences in "natural growth rates - minus rates shifting to other occupations."); Since the rate of immigration is positively associated with total labor force growth in agriculture, a similar relation is observed between the wage rate and this latter variable. Table II-10 suggests a

Table II-10

Department	Estimated Net Number of Immigrants Resident in 1951 (thousands) (1)	% Net Immigration (2)	Male Daily Wages 1938 (3)	Rank in 1938 (4)	Male Daily Wages in 1951 (5)	Rank in 1951 (6)	Average Value of Product per Male Worker in 1953 (7)	Rank (8)	Estimated Net Numbers of Immigrants Resident in 1964 who migrated during 1951-64 (thousands) (9)	% Net Immigration 1951-1964 (10)	Male Daily Wages in 1964 (11)	Rank (12)	Value of Product per Male Worker in 1965 (13)	Rank (14)
Antioquia	-56.5	-22.7	0.70	7	2.80	8	1543	(7)	18.1	5.95	9.54	10	5059	(10)
Atlantico	- 2.7	- 9,9	0.70	7	2.50	11	1171	(11)	-0.2	-0.62	9.70	8	3116	(14)
Bolivar & Cordoba	- 7.9	- 4.4	0.80	3	2.60	10	2202	(3)	-20.5	-7.86	9.01	12	8993	(3)
Bolivar											(9.90)		7854	
Cordoba											(7.80)		10,512	
Boyaca & Casanare	-37.8	-20.3	0.50	12	2.40	12	1060	(13)	-4.4	-2.08	9.75	8	5902[f]	(7)
Caldas	20.2	9.7	0.80	3	3.20	5	2160	(4)	-7.0	-3.16	11.82	3	7438	(6)
Cauca	-13.2	-13.3	0.50	12	2.15	13	1769	(5)	+6.1	+4.39	7.80	13	5162	(9)
Cundinamarca	-26.9	-11.5	0.60	10	2.90	7	1525	(8)	+8.8	3.70	10.70	7	4821	(11)
Huila	0.2	0.3	0.70	7	3.40	3	1493	(9)	+1.0	1.29	12.08	1	8409	(4)
Magdalena (& Guajira)	16.6	16.8	0.80	3	3.20	5	2473	(1)	18.4	11.48	11.72	4	14,895[g]	(1)
Nariño	-14.8	-11.1	0.30	14	1.35	14	1097	(12)	-6.5	-4.44	5.53	14	4160	(13)
Norte de Santander	- 2.9	- 3.6	0.60	10	3.45	2	1385	(10)	-2.5	-3.13	9.35	11	4393	(12)
Santander	3.4	1.9	0.80	3	2.65	9	909	(14)	-8.0	-4.91	11.00	6	5414	(8)
Tolima	6.7	4.6	1.00	1	3.75	1	2315	(2)	-22.2	-14.11	12.05	2	8326	(5)
Valle	93.8	48.3	1.00	1	3.30	4	1657	(6)	-18.1	-10.23	11.18	5	9046	(2)
Total Regions Included	-23.6	- 1.1							-37.0					
Rest of Country (Implicit)	28.4[a]	≈59.7[c]							36.4[d]	41.1[e]				
Foreigners	3.8[b]								0.6					

Footnotes to Table II-10

[a]Deduced as the sum of that immigration from the departments listed above + foreigners + "no information" group. Due to problems in the methodology, the residual character of the calculation implies a high probable error; no attempt has been made to correct for this, since the estimation of the degree of underenumeration in the intendencias and comisarias is in any case much more open to question than that in the departments.

[b]These figures were taken directly from the census and not adjusted upward for underenumeration, given their small size in the first place.

[c]This figure was based on the implicit assumption that underenumeration of immigrants and people born in these areas was proportional. The net immigration from other departments implicit in the census (assuming no foreigners or "no information" people were in these areas) was 24.9 thousand of a working population of 41.7. No attempt has been made here to effect a perfect reconciliation of the census data with the implicit in the net emigration from the departments, since, as just noted, the intendencia and comisaria figures are weak in any case. In terms of rough estimates, the figures presented here do correctly suggest that this is an area of important absolute immigration and very high immigrant/total population ratio.

[d]As in the case of 1951, this figure is calculated as a residual, the sum of the negative migration from the departments and a number of additional foreigners, after assuming that about 10 percent of those foreigners registered in 1951 were no longer in the labor force.

[e]The reported agricultural labor force in these zones was 88.815 thousand and if one assumed a 3 percent underreporting ratio here, the actual labor force would be 91.479. This would imply a net immigration ratio of 41.09. It would also imply a total population in 1951 of 53.9 thousand plus people who died or retired in the interim, a figure which does seem more or less consistent with plausible assumptions with respect to the working population in 1951; as noted above the reported figure in the 1951 census was 41.7, but a plausible underenumeration ratio would probably call for an upward adjustment of at least 50 percent of that figure. Hence we do no further adjustments to this figure.

[f]Casanare not included.

[g]Guajira not included.

Sources and Methodology: The estimates in Cols. 1 and 9 were made as follows. The basic data, presented for each department in the 1951 and 1964 census results, are the number of farmers working in a given department at the census time, and their distribution by place of birth. If there were no underenumeration in the census, the net immigration to a department would therefore be "number working in it minus number of farmers anywhere in the country born in this department." Col. 1 is a slightly modified version of such a calculation for 1951, the modification being based on assumed underreporting of that year (which was quite serious--see Table A-101). The estimating procedure involved assuming that

Sources and Methodology to Table II-10 continued:

underenumeration in a given department was not selective by place of origin of the farmer, so net immigration would be adjusted upward in this calculation if a department had a greater underenumeration ratio than those departments to which its emigrants went. The adjustments for underenumeration tended not to be dramatic (except in Meta and such sparsely populated regions). Note that the overall "net immigration" figure is positive since foreigners and people not giving information on their place of birth are counted as working some place but are not counted as emigrants from any zone within the country.

Col. 9 involved estimation in 1964 of net migration flows for previous years and subtraction from this figure, with allowance made for probable mortality and retirement in the interim of people recorded as migrants in 1951 but no longer alive or in the labor force in 1964. Mortality-retirement estimates were based on the age distribution of people in the various departments in 1951; arbitrary assumptions with respect to the age structure of these migrants in 51 was made, with the assumption that they were concentrated more towards the younger age groups than the agricultural labor force as a whole. Since no postcensal check was available in 1964 comparable to that of Lemieux in 1951, a uniform 3 percent underenumeration assumption was made; this, broadly speaking implies intercensal consistency, although it cannot be said with assurance that the relative underenumeration of agricultural populations used here is valid, since consistency checks between the censuses are a precise tool only in comparisons of the total population.

An alternative methodology which might be argued to be superior involved assuming the same relative enumeration in the various departments in 1964 as in 1951, though this led to somewhat different results, no signs were changed nor were the figures so different as to affect any of the conclusions drawn in the text.

Cols. 2 and 10 involve the division of Cols. 1 and 9 respectively by the agricultural population in the departments; in 1964 it was assumed that the true agricultural population was 3 percent higher than the registered one.

Cols. 3, 5, and 11 come from the Anuario General de Estatistica of the years in question; for a given department cold and hot regions wages are weighted by the relative populations.

Cols. (7) and (13) are from Table II-11 .

tendency for the agricultural labor force to grow faster, during the 1938-51 period, in the departments with higher output per man. But the tendency is not overwhelming; Tolima is an exception to the rule, perhaps in part because of the violence scourging there towards the end of this period; and other departments do not fit the pattern well. A number of speculations could be advanced as to why the rate of labor force growth/average labor production tie is loose. It's being less close than the labor force growth/wage rate tie would be predicted on theoretical grounds.

The relationship shows up much better when growth rates for 1938-64 are compared with average labor productivities; the rank correlation between the two variables is high. Possibly another major determinant of relative growth is proximity to a large and growing city. The agricultural populations of Atlantico and Cundinamarca both grew more slowly than would have been predicted by their labor productivities in, say, 1953. Where rural population

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[1] A possible explanation for certain anomalies appeared over the period 1938-51 but not over 1938-64 is the apparent weakness of the 1951 population census. It appears to have involved heavy underenumeration, only part of which is corrected for in the figures used here, e.g. those of table II-10. It seems unlikely that the rural labor force grew faster in 1951-64 than in 1938-51.

grew noticeably faster than would be predicted, no dynamic city was nearby, as especially in the case of Nariño and perhaps Huila.[1] Tolima's slow growth

[1] Most studies giving hints as to the nature of migration of farmers indicate that the average move is not a long one, except when it is to a frontier, as in the Llanos.

rate would seem less satisfactorily explained in that way, but since the violence hit with particular fury there, it seems a likely explanation.[2]

[2] Especially since the male labor force rose again in 1951-64 after falling over 1938-51.

The relevance of a growing city nearby is suggested further by a comparison of labor force growth rankings and migration rankings (Col (3) and Col 17, Table II-10.8). Those departments whose agricultural labor force grew above the predicted rate tend to have high emigration, and vice versa. Thus Nariño and Boyaca, with labor force growing faster than might be expected, were the two departments of greatest relative out migration of farmers prior to 1964. Cauca fits more or less in this category. Meanwhile Atlantico, Cundinamarca, Caldas and Santander were no doubt able to rely more on rural to urban migration to keep their relative labor force rates at levels consistent with or below those suggested by their relative labor productivity.[3]

[3] No attempt is made here to disentangle cause and effect, or to take account simultaneously of other probably relevant factors such as the rate and form of technological change, changes in relative product prices, and so on.

TABLE II - 10.8

MALE LABOR FORCE GROWTH, COMPARED TO WAGES AND AVERAGE PRODUCTIVITY

	Male Labor Force Growth 1938-64			Male Wage: Rank in				Labor Productivity: Rank in				Average Product of the Three Years, 1958 Pesos		Net Migration of All Farmers Up To 1964			Net Immigrants 1964 Labor Force
	Total	Annual	Rank	1938	1951	1964	Average of The Three Years	1953	1959	1965	Average of The Three Years		Rank	Immigrants	Emigrants	Net Immigrants	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Antioquia	20.92	.73	(8)	7	8	10	8.3	7	8	10	8.3	2670	(9)	24903	55159	-30256	-10.24
Atlantico	-11.43	-.47	(14)	7	11	8	8.7	11	14	14	13.0	1594	(14)	3059	6183	- 3124	-10.03
Bolivar & Cordoba	56.50	1.74	(2)	3	10	12	8.3	3	6	5	4.67	3760	(4)	20819	47816	-26387	-10.42
Boyaca	2.91	.11	(10)	12	12	8	10.7	13	10	7	10.0	2481	(10)	12325	39805	-27480	-13.41
Caldas	23.04	.90	(6)	3	5	3	3.7	4	5	6	5.0	3530	(5)	56020	46183	9837	4.572
Cauca	41.04	1.33	(3)	12	13	13	12.7	5	4	9	6.0	3072	(7)	13100	18254	- 5154	- 3.82
Cundinamarca (incl. Bogota)	.46	.02	(12)	10	7	7	8.0	8	7	11	8.67	2697	(8)	33340	47347	-14007	- 6.06
Huila	42.86	1.38	(4)	7	3	1	3.7	9	11	3	8.67	3088	(6)	16167	15042	11125	+ 1.53
Magdalena & Guajira	80.65	2.30	(1)	3	5	4	4.0	1	1	1	1.0	5363	(1)	36649	5327	31322	23.83
Narino	22.26	.78	(7)	14	14	14	14.0	12	12	13	12.67	2080	(13)	2300	21097	-18796	-13.22
N. de Santander	1.96	.07	(11)	10	2	11	7.7	10	9	12	10.67	2464	(11)	7078	12013	- 4935	- 6.29
Santander	-.06	.00	(13)	3	9	6	6.0	14	13	8	11.67	2113	(12)	12814	17743	- 4929	- 3.11
Tolima	4.37	.16	(9)	1	1	2	1.3	2	2	4	2.67	4129	(2)	25538	41543	-16005	-10.47
Valle	27.77	.95	(5)	1	4	5	3.3	6	3	2	3.67	3763	(3)	79597	18930	60667	+35.32
Others	70.21	2.07															
Total	23.09	.81										3125					
Meta														27859	1904	25955	+69.75

Sources and Methodology: Col. (1) is based on Table A-130. Cols. (4) - (6) are from Table A-135.
Cols. (14) - (16) are unadjusted figures from the 1964 population census, and the base populations assumed for the calculations of Cols. (17), (19) and (21) are also unadjusted population census figures (referring to agriculture, silviculture and fishing).

Wage rates seem less related to relative labor force growth than does labor productivity. This might suggest a greater propensity to migrate on the part of farm operators than workers. Little direct evidence is available to support or negate this proposition. Occupational position structure (See Table A-105) differs rather considerably by department; richer ones are more proletarianized, ie. they have higher ratios of workers to operators (employers and independent workers); Valle has the highest ratio of all; Antioquia (perhaps related to coffee) Caldas, Magdalena, and Tolima also rank high. The poorer departments have high shares in the independent worker category. Some important sources of net emigration are thus primarily small farm oriented, e.g. Narino and Boyaca. But in general the gross emigration ratios are lower for the more "small farmer" type departments, possibly suggesting that people with relatively little land are more mobile; but an answer to this question must await direct evidence.[1]

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[1]A problem of isolating direction of causation is present when occupational position structure is related to migration. One could argue that the high proletarization ratios in Valle and Magdalena have been produced by the migration. Evidence from 1938 does show an increased worker/operator ratio in Valle (52% to 70%) though in none of Magdalena, Narino or Boyaca did a change of more than a few percentage points occur in this ratio. (See Table A-134).

How much have changes in labor distribution by regions contributed to output increases. If it were assumed that wages measure marginal product, then output was higher by something above 1.8% in 1951 and 0.8% in 1964 than it would have been with the same percent distribution of the agricultural labor force as existed

in 1938.[1,2]

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[1]Assuming for the purposes of calculation, that the extent of reallocation involved did not alter the marginal product of labor in the various departments. This leads to a downward bias, hence, the "greater than."

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[2]Introduction of the possibility of labor surplus further complicates the calculations, since it could imply either higher or lower labor reallocation effects, the former result would emerge when reallocation is from regions where marginal productivity is zero or very low to regions where it is, say, equal to the wage rate. This would imply that a considerably higher percent of 1951 output could have been due to the reallocation if, say Boyaca, Nariño and Cauca-departments with a lower share of labor force in 1951 than in 1938 - were all assumed to have zero marginal productivity. This is obviously a rather extreme assumption.

A comparable estimate for 1951-1964 would be lower and possibly negative as, for example, high wage (in 1951) Valle,[3] Tolima and Caldas had decreases

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[3]Given that mechanization may be responsible at the same time for relatively high wages for semi-skilled workers such as tractor drivers in areas like Valle and Tolima, and for pushing other workers out of the area, it must be concluded that wages are not a good indicator of the marginal product of labor, whether or not they were before. The people deprived of jobs by the mechanization almost certainly have incomes (perhaps from their own subsistence plots) well below these wages. In short, there is disequilibrium in the labor market.

in their share of total labor force and Boyaca and Narino had increases. For the period 1938-64 as a whole the exercise is of less interest than for subperiods, since exogenous conditions change, and probably cause greater changes in the relative marginal productivities of labor than in average productivities. The wage rate of any one period is not, therefore, likely to be a good indicator of marginal productivity throughout the period. The evidence, for what it is worth, would not suggest that reallocation had contributed importantly to output. It should be borne in mind, here and later, that the exclusion of Meta and other frontier zones, for lack of statistics covering the period, creates a downward bias in any estimate of gains through migration, since these are clearly areas whose whole output may almost be attributed to immigration.

As noted above, the relation of labor force growth is tighter with average labor productivity than with the wage rate. Applying a department's 1953 average labor productivity to each worker would indicate that output was 1.2% higher in 1951 than it would have been with the 1938 labor force distribution, i.e. that it would have accounted for 4.9% of the growth between those two years. For 1938-64; the same calculation(using 1965 departmental average labor product) implies that 4.4% of 1964 output could be so explained, i.e. that 8.5% of output growth was related to the reallocation. This does not seem unreasonable, and is probably an underestimate of the total positive effect of reallocation, since much intradepartmental reallocation has occurred as well.

Of the estimated contribution of redistribution of the labor force to output gains, a part may be attributed to migration within the sector. Since the relation between this migration and migration out of agriculture to other jobs is unknown, it is not possible to effect a general equilibrium quantification of the impact of propensity to migrate within the sector. At one extreme, (if the two types of migration are perfect substitutes) it might have no effect on output at all;[1] for the other extreme (where the flows are unrelated) it

[1] i.e. if when a farmer migrates from one region to another, one less person in his region of origin moves from agriculture to another sector and one more person does in his region of destination.

is possible to make an estimate. Since there is little information on whether the migrants were primarily agricultural workers with little or no land or were land owners, it is unclear, as indicated above, whether a more accurate calculation of the gain from migration results from using agricultural wage statistics or average labor productivities.

If all of the migrants prior to 1951 were landless agricultural workers who received the average wage paid in their department, then the difference between their actual wage bill in 1951 and the wage bill they would have received if they had not migrated, is 12.26 million pesos (assuming 250 days worked per year). This is less than 0.5 per cent of value added in 1951.[2]

[2] There are many rather dubious assumptions underlying this calculation, some of them implying an upward bias and some a downward bias. In particular,

[2] continued

the assumption of 250 days worked per year may not be accurate, but it is obvious that any reasonable variation in this figure would not make the contribution of this migration to total value added significant. It is also possible that there is a downward bias due to the assumption that the wage rages of the vaious departments have not been affected by the migration, whereas in fact there is some empirical evidence to suggest that they have; our assumption implies the omission from the gain estimate of a sort of "surplus" - it could increase the total gain somewhat, but almost certainly not enough to make it significant. Another source of underestimation is the implicit assumption that the migrants are men who have received a wage rate typical of their department before migration and one typical of their new department after migration. If any thing, this may constitute a downward bias. But perhaps the major source of downward bias is simply the fact of assuming that all the migrants are workers of the type receiving the agricultural wages reported by DANE, rather than land owners receiving rents, etc. Theoretically, the migration even of land owners would only lead to a change in the amount due to the differential in their productivities as laborers in the two regions, unless they took capital with them. But since they by definition take their entrepreneurial skill (a form of capital) with them, and also much of other types of capital, it is necessary to make an alternative calculation on the assumption that some migrants are not agricultural workers to be sure the total gain was not important (see text).

If one assumed that the migration all occurred in the 1937-38 to 1951 period (as most of it probably did), then the same calculation would suggest that it accounted for about 1.5 percent of the increase in output occurring within that period.[1] (In the proportion that the migration occurred before 1937-38, the figure would be reduced below 1.5 percent.) If marginal product of labor in some of the regions of emigration were below the wage, the gain would be larger.

If the migrants were a representative group (rather than being all landless workers) i.e. they had the average output per man of their respective departments (figures are presented in Table II-10.9)[2], then the gain from the migration would be considerably larger, approximating 1 percent of the value added in agriculture in 1951 or 3 percent of the increase in output between 1938-39 and 1951. This excludes Meta, all of whose output might be chalked up as migration - related gain; as of 1965, it constituted 3.5 - 4.0 percent of total agricultural output.

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[1] Assuming a trend output figure for 1951 of 2,750 millions of 1950 pesos. The increase in output between 1937-1938 and 1951 was then about 810 millions of 1950 pesos.

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[2] The output per person by department figures are less reliable than the wage figures.

Table II-10.9

Growth of Output and OUtput per Man, By Departments: Crops and Livestock

Department	1953 Value of Product (1)	Output/Male Labor Force (2)	Value of Product 1959 (3)	Output/Male Labor Force (4)	Output 1965 (5)	Output 65 Male Labor Force 64 (6)
Antioquia	386.16	1543	908.50	3344	1482.24	5059
Atlantico	32.55	1171	44.03	1498	96.60	3116
Bolivar	192.97	1901	442.00	3544	1162.67	7854
Bolivar & Cordoba	(386.43)	(2202)		(2034)	(2329.22)	(8993)
Boyaca	176.57	1060	565.06	3160	1127.19	5902
Caldas	452.39	2160	804.71	3819	1576.80	7438
Cauca	154.44	1769	439.25	4195	629.75	5162
Cordoba	193.46	2614	355.82	3347	1166.55	10,512
Cundinamarca	323.25	1525	774.21	3584	1060.62	4821
Huila	92.27	1493	208.68	3073	622.28	8409
Magdalena	207.00	2473	528.26	5407	2085.32	14,895
Nariño	123.84	1097	330.87	2679	557.46	4160
Norte de Santander	108.83	1385	258.26	3298	342.66	4393
Santander	154.84	909	404.95	2481	844.64	5414
Tolima	324.08	2315	725.42	5038	1232.27	8326
Valle	313.13	1657	829.49	4660	1510.71	9046
Total	3,235.87	1647	7619.51	3661	15497.76	6965

Sources and Methodology: Output figures for 1965 are based primarily on DANE's Encuesta Agricola of that year, which provides breakdowns by departments for crop output and stock for livestock, as well as output in the case of milk and eggs. Where total production figures differed between this source and the Banco and USDA, Changes in ... one of the latter two was normally assumed to be correct; they differed only in the case of coffee and sugar, and in those cases there was reason to believe that the Banco figures were superior. To estimate the value added in the case of livestock figures on change in price by age were used.

Similar methodologies were used for the other two years. The basic source for 1959 was the agricultural census for that year, though again considerable adjustment was done on the bases of Banco and other data. For 1953 a broader and less satisfactory range of sources were used.

This is still small. As of 1951, migration flows between departments amounted to 7 percent of the rural population with the resulting average increase in income being about 15 percent under the last assumption made. Unless the migrants tended to come from areas where productivity was much below the average for their department of origin and go to areas with above average productivity for the new department or they brought with them factors whose productivity increased considerably as a result of the move, it seems unlikely that more than 2 or 4 percent of the total output in 1951 could have been due to this inter-departmental migration. And it seems unlikely that intra-departmental migrations would be responsible for more than another 1 or 2 percent of total output. The proportion of the output increase between 1937-38 and 1951 accounted for by population movements could then be as high as 10 or 12 percent, or as low as 3 or 4 percent.[1]

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[1]There were some definite changes in labor force growth and migratory patterns as between the pre-1951 period and the 1951-64 period. The departments of fastest agricultural population growth between 1938 and 1951 (and greatest immigration before 1951) were Valle (well ahead of other regions), Caldas, and Magdalena. The regions of largest out-migration were Antioquia, Boyaca, and Cundinamarca. Antioquia's 1938-51 labor force growth rate was still above average, partly because of a higher than average birthrate and partly because a considerable part of the Antioquia to Caldas migration had presumably occurred before 1938 and thus did not affect Antioquia's intercensal growth rate. Huila showed a relatively fast population growth though there was only a little net immigration.

[1] continued

The most dramatic changes in migration in the 1951-64 intercensal period were the following (see Table II-10):

a) Valle turned from a region of heavy net immigration to one of considerable net out-migration; Tolima changed from mild immigration to heavy out-migration; Caldas turned from considerable immigration to considerable out-migration. (All migration estimates are net).

b) Antioquia turned from "heavy out-migration" to substantial immigration.

c) Boyaca turned from heavy out-migration to small out-migration (or possibly no net flow in either direction).

Departments whose patterns did not vary substantially were Magdalena and Meta (continued net immigration), Bolivar and Narino (continued net out-migration).

In some cases the dramatic change in a department's migration pattern does not suggest a change in the underlying nature of the process, e.g. as when new frontiers were opened up in departments previously without them. Migration out of highland regions to lowland ones continued, by and large, though with some new complications.

The Antioquia, Magdalena and Meta phenomena are all explained by the opening up of new regions. The reversal of the typical out-migration of farmers from Antioquia appears to be related to the development of banana production in the Uraba region, and in general to a fast growth of agricultural population all along the Pacific side of Antioquia. Eight municipios running down the western side of Antioquia registered a net increase in population in "otras localidades" from 55,000 to 131,000 between 1951 and 1964. Narino and Caldas are very heavily populated regions. The really interesting (and

[i]continued

somewhat confusing) cases are Valle and Tolima, two high producing departments which are not heavily populated and most of which are in tierra caliente. (warm climate).

The analysis of some of these shifts (especially Valle and Tolima) will detain us at greater length in Chapter VIII, where the welfare implications of mechanization in agriculture are discussed. The emigration from Valle, for example, raises the question of whether new "push" factors are now determining some of the migration.

Overall labor force redistribution (via migration and other avenues mentioned above) presumably had a greater impact, perhaps as much as 15-20% overall, though the possible range is wide. Applying the averageof the 1953, 1959 and 1965 labor productivities of each department to the change in labor force distribution over 1951-1964 suggests an output 3.5% higher in 1964 than in the absence of said reallocation, i.e. it suggests that 13.4% of the growth could have been associated with this factor.

The labor force redistribution has probably been one factor in the observable trend towards equalization of agricultural wages among departments. Some of the important gainers of labor over the longer period, in particular Valle and Caldas, showed relatively slow increases or actual decreases in the real wage (according to the period chosen), while Antioquia and Boyaca, the biggest losers, showed quite rapid gains. This narrowing of wage differentials suggests that the labor market is working with at least some efficiency. Chapter VI discusses these matters in greater detail.

Given our estimate that for the 1938-51 period, migration may not have been responsible for more than 10% of total output growth, a smaller figure would be expected in this latter period. Using average productivity figures suggests no gain due to migration among the older departments. Gain associated with migration to newer departments might be up 3-5% of output growth. Intradepartmental movement (some of it eventually helping to produce the new departments of Cesar and Sucre) was important at this time however. Total gain associated with opening up of new areas was probably at least 10-20% of output growth, but not all of this could be attributed to labor movements. Again a 10% share of total output growth would seem a pleasable upper limit.

III An alternative Decomposition of the Sources of Growth of Output Per Man

We have thus far considered the contributuon to aggregate output growth of capital, labor, and and "other factors", as well as two types of effects which should show up under "other factors", i.e. technological change related to increasing mechanization, and improved geographical distribution of labor. Two other ways of cutting into the issue are also revealing.

(i) Given the amount of land, value of output can increase either via yield increases or changed crop composition (to higher value added/hectare crops). Which happens can provide clues as to the underlying mechanism of change.[1]

(ii) According to a widely held view, efficiency increase is associated with an increase in the share of total output coming from modern or commercial agriculture as opposed to traditional agriculture. It is useful to quantity this shift and delve further into its implications. But first we turn to point (i).

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[1]No decomposition of factors in the growth process provides a complete picture of the mechanism. The traditional breakdown already discussed would be satisfactory were there not serious measurement problems for each factor and were it not so difficult to decompose the "residual". In fact it is not obvious that more is learned with in that structure than within certain other ones.

In Table II-II, increases in the output of non-coffee crops are divided into components associated with (a) increases in land, (b) increases in average yields and (c) crop shifting.[1] Taking the period 1948-50 to 1965-67 as a whole, output rose by 91%, acreage by 42%, and the yield index by 21% (i.e. an anual rate of about 1% per year). The rest of the output increase, a

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[2]This division must not be "over-interpreted"; clearly the ratio of

Table II-11

Breakdown of Output Increases due to Acreage Increase, Yield Increase, and Crop Shifting, for Crops Excluding Coffee, 1948-50 to 1965-67*

	% Acreage Increase / % Output Increase (A)	% Yield Increase / % Output Increase (B)	% Crop Shifting / % Output Increase (1 - A - B)
1948-50 to 1954-56	0.70	0.21	0.09
1954-56 to 1959-61	0.10	0.53	0.37
1959-61 to 1965-67	0.75	0.06	0.19
1948 to 1966	0.42	0.18	0.40
1950 to 1966	0.51		
1948-50 to 1965-67	0.46	0.24	0.30

* Base year 1958

Sources: Atkinson, op. cit.

[2]continued

land increase to output increase is not the same as the percent of the actual output increase to be expected if land only had increased (and other factors been held constant). There is no necessary relation between this particular breakdown of output growth and the more traditional one used so far. Using the latter, the share of output increase not"explained" by increased acreage would be greater than here. In the present division, the output growth "associated" with land increase would only occur when the increased acreage was accompanied by corresponding increases in capital and labor, technology held constant. Capital or labor increases beyond those required to maintain constant capital/land and labor/land ratios plus technological change are the sources of yield increases in the present categorization; they may also be causes of crop-shift -- or that may be an independent phenomenon. The "residual" of the earlier categorization is likely to be related to both yield increases and crop shifting, but the tie is not a necessary one.

It is necessary to note, further, that the concept of an output increase associated with crop shifting (or region shifting) as opposed to an improvement in a specific micro-economic production function, is really meaningful only when distinctions can be made according to total factor productivity. Since land productivity is not perfectly correlated with total factor productivity, the gain not due to micro improvement is not correctly measured here.

substantial 30% of the total was associated therefore with crop shifting[42, 42.1], i.e. switches from crops of low value added per hectare to ones with higher value added per hectare. Not all of it, however, is necessarily connected with the shift to commercial type crops; some may be associated with shifting among traditional crops. The striking features of these calculations are

[42] Considerable caution is in order with this concept since what constitutes a shifting to a crop with higher value added per hectare depends on relative prices, which can change rapidly. The figures of Table II-11 would be different if a different base year were used; 1958 is probably as good a year as any since relative prices were relatively representative of the whole period. But the appearance, for example, of negative crop shifting could easily occur in a period with prices different from those of 1958.

42.1 In a study done by the U.S. Department of Agriculture (Changes in Agriculture in Twenty-six Developing Nations, 1948 to 1963), but using statistics whose sources are unknown to this author and are not stated in the study, the conclusion was reached that virtually all of the increases in output between 1948 and 1961 were accounted for by increases in yields and not by increases in land used. Apparently quite different yield series were used.

a) the conclusion that crop shifting has been relatively important over the last two decades, (consistent with the hypothesis that a good proportion of output gain has been associated with the shift to commercial crops), and b) the relatively small portion of output growth associated with yield increases.

Although yield increases and technological change are not necessarily related (the former can result from increased application of labor or capital or both per unit of land) there seems a reasonable expectation that they are related in Colombian agriculture, and that yield changes are likely to reflect the extent of technical change. Note that the analysis of the previous section which pointed to faster technological change over 1956-62 than other periods is consistent, under this premise, which the evidence of Table II-11 that yield increases were concentrated in 1954-6 to 1959-61,[1] being quite small in other sub-periods.

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[1] The calculations are not quite comparable since the estimate of Table II-11 exclude coffee; but this would not affect the results greatly.

The theory that technological change occurs more easily for the group of modern or commercial crops should be visible in different behaviour of yield

over time for this group as opposed to the traditional group; this is discussed in the next section, in the context of a discussion of the nature and determinants of yield changes by groups of crops (a grouping related to the commercial-traditional distinction.

IV Commercial and Traditional Agriculture: Development Over Time

As mentioned above, many observers think of the development process in

general - that in agriculture included - as involving and in part being defined by an increasing share of output coming from a modern subsector.[1] Students of Colombia's agricultural sector have employed this framework, especially Atkinson, whose analysis is discussed below. The extent of the shift in question (certainly a real one) is estimated roughly by the figures in Table II-12. Whereas in 1951 only a little over 10% of crop output (in 1958 prices) came from commercial farming, by 1966 this ratio was approaching 25%.[2] If coffee is excluded the ratio changed from about 20% to close to 40. The rate of output growth of this subsector over 1950-2 to 1965-70 (7%) was far above that of traditional crops (about 2%) - see Table II-13.

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[1] For the first statement of this point of view see Arthur W. Lewis "Economic Development with Unlimited Supplies of Labour," The Manchester School; vol 22, May 1954, pp 139-93.

[2] Needless to say, no such clean distinction between two polar types of agriculture as may be implied by these figures can be made in the real world, even though the extent of differences in techniques from one extreme to the other is very impressive. As explained in Table II-13, we have tried to use a more or less consistent (but arbitrary) dividing line between the two sectors in the hope that ratios calculated on the basis of this dividing line would more or less represent the extent of a change which optimally would be expressed in terms of more than two classifications.

Table II-12

The Development of Commercial Agriculture

Year	Estimated Output (Millions of 1958 pesos)	Million of current pesos	Share of Total Agricultural Output		Share of Crop Output		Share of Crop Output (Coffee excluded)	
			Constant pesos	Current pesos	(Constant Pesos)	(Current Pesos)	(Constant Pesos)	(Current Pesos)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1948	(303.0)							
1949	(373.3							
1950	390.2	199.3	6.71	6.79	11.37	11.34	19.62	17.35
1951	460.5	278.8	7.04	7.52	10.38	10.61	19.97	15.67
1952	503.9	266.0	7.94	7.26	12.02	11.19	20.74	19.45
1953	509.1	297.8	8.04	7.53	12.15	11.62	21.08	19.85
1954	588.3	375.6	9.11	7.72	13.78	11.43	23.29	20.03
1955	587.2	363.5	8.98	7.77	14.28	12.81	23.27	21.19
1956	600.2	391.2	8.71	7.11	14.10	11.07	23.71	20.35
1957	583.7	474.7	7.93	6.93	12.72	10.63	22.95	20.31
1958	681.1	680.2	9.03	9.03	14.60	14.60	26.20	26.16
1959	936.8	973.6	11.53	11.42	18.10	19.45	31.17	29.61
1960	976.4	1,071.1	12.17	11.71	19.73	21.12	32.79	32.22
1961	1,041.9	1,227.1	12.41	12.14	19.78	20.67	33.60	31.42
1962	1,191.9	1.453.9	13.66	13.59	21.90	23.37	35.17	33.51
1963	1,104.5	1,612.2	12.60	12.24	21.01	20.65	34.56	29.46
1964	1,159.3	2,153.9	12.70	12.36	20.80	19.55	34.37	27.33
1965	1,233.9	2,629.4	13.49	14.29	22.27	24.27	35.66	33.44
1966	1,363.0	3,300.3	14.48	15.11	23.42	25.77	37.11	34.40
1967	1,423.1	3,281.3	14.81		24.21		27.23	

Table II-12 continued:

Sources and Methodology: Figures are based on Atkinson's output figures by crop (except for sugar and coffee), and on his livestock figures. The definition of "commercial agriculture" is arbitrary. Here we have assumed it includes the total output of cotton, rice, sugar for refining, sorghum, barley, sesame and soybeans, along with 10% of the output of corn and potatoes and 50% of that of wheat. It may seem to be biasing downward the rate of growth of the sector to assume constant ratios over time for these last three crops; but analysis of the agricultural census (1960) and samples for 1954 and 1966 did not indicate that an increasing share of these crops was being grown on large farms. In an alternative calculation we assumed the use of improved seed to define commercial agriculture, and the share of commercial crops in the total then rose from about 10% to 24% rather than 11 to 24. The series used does not seem important in getting a general magnitude maesure.

The discrepancy between Atkinson's figures for value of refined sugar production and those of the Central Bank (used here) is related to a difference in prices applied. Atkinson appears to have applied in 1958 a price corresponding to the market price of refined sugar in Cali (740 pesos per ton equivalent), and since this includes both commerce margin and cost of refining, it is well above the price at the producer level. In the same year the Central Bank was applying the price of 27.6 pesos per ton of cane; applying Contreras' conversion factor for 1958 (9.41) the price per ton of sugar at the producer level would be 293.3 pesos. This is even below Atkinson's price applied to panela (500 pesos). Though I have not seen other figures for price at the producer level, it seems clear that of these two the Central Bank one is more likely to be accurate. The ASOCAÑA estimates of cane production for refined sugar are somewhat above those of the Central Bank, but this difference is not dramatic. (Note that this is one of the differences between my estimate of commercial crop output and its share of total agricultural output in comparison with that of Wayne Thirsk (op. cit.; page 325); another difference in the share figures is that I include minor crops in the total.)

Atkinson's coffee values are systemically below those of the Banco; it seems he has applied the price for one stage of coffee to the quantity of another (e.g. green with pilado).

Since separate series for inputs of the commercial and traditional sectors[1] are available it is not possible to measure directly any relation between the traditional to modern shift and the measured residual in the post World War II or post 1950 period. But since one concomitant of the advance of commercial agriculture has been an increase in the share of total crop output coming from "new" or "commercial" crops, it is of interest to measure the extent to which output increases appear to have been associated with such crop shifting.

Atkinson's Analysis focusses on the modern - traditional break, so it is convenient to discuss it here.

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[1] Thirsk (op. cit, p. 75) estimates that the total labor input of the commercial sector around 1966 was 125 thousand; this would imply that its output labor ratio is about 6-7 times higher than that of the traditional sector. Since we do not have an estimate of the division of capital, it is not possible to make a total factor productivity comparison between the two. (See the table below).

		Output (thousands of 1958 pesos)	Labor (thousands)	Output/Labor (1958 pesos)
1. Crops	(a) mechanized	1602	125	12,816
	(b) non-mechanized	3972	1984	2,002
2. Livestock		3625	450	8,056
3. Crops and Livestock		9199	2559	3,595

(Data from Thirsk, op cit, p. 356; Atkinson, Changes ... op. cit, p.72).

Table II-13

Growth Rates of Crop-Output: Selected Groups

	All Crops	Excluding Coffee	"Commercial" Crops[1]	Traditional[2] Crops (excluding Coffee)
1950-58	3.37	3.17 (3.41)	6.44 (7.21)	2.24
1958-67	2.83	4.19 (4.38	7.84 (8.54)	2.05
1950-67	3.28	3.92 (3.92)	7.57 (7.91)	2.14
1952-2 to 1965-7	3.00	3.16 (3.30)	7.02 (7.52)	1.93*

Source: Alternative figures are presented in parentheses, corresponding to the most recently revised series.

1. Defined here as including cotton, rice, barley, sorghum, sugar (for refining), sesame, soybean, as well as 50% of wheat output and 10% each of corn and potatoes.

   Since commercial agriculture uses more purchased inputs than more traditional modes, one might expect the ratio of purchased inputs to value of output to be a good indicator of its advance. Unfortunately figures on input use are sparse. As of 1967, the Banco de La Republica estimated the above ratio at only about 12%--marginally above the average of the preceding 15 years or so. Scattered figures suggest that the ratio for "commercial" agriculture is in the neighborhood of 20-20%.[1]

2. Defined here as including all the crops not listed in the preceding footnote (or share of crops not included there) with the exception of coffee, bananas for export and cocao (these latter two being better thought of as plantation crops); note that minor crops are by implication included.

* 1948-52 to 1965-7.

[1] See Thirsk, op. cit., p. 26.

Atkinson's Analysis of Crop Groups

Atkinson divides agricultural crops into five groups according to several characteristics which place the crops along a sort of traditional-modern spectrum[1]; his analysis thus provides a more refined tool for appraisal of the modernity → growth relationship than the two group distinction used above.

Atkinson feels that in general the increasing importance of commercial agriculture has been due, not to individual farmers "making the shift" but rather to an increase over time in the share of production by the "commercial" farmers, who use non-agricultural inputs. This form of transition is occurring

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[1] U.S.D.A., Agricultural Productivity... op. cit.

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especially in the production of his "group 3" crops, namely corn, potatoes, tobacco and wheat. His group 5 includes three important crops: cotton, rice, and sugar cane as well as some less important ones including sesame, soya, sorghum and barley. All of these are grown primarily or entirely by commercial farmers who use tractors and other non-traditional inputs. Soya, sorghum and ajonjoli have never been cultivated in any volume by traditional methods; cotton is now almost strictly commercial with the traditional plantations having disappeared; some rice is still grown with traditional technology and even more barley, so that it barely fits the designation of this group. This group differs essentially from the "corn, potatoes, tobacco, wheat" group in that most of the products have always or for a long time been largely or exclusively modern, so that modern sector expansion occurs automatically when the output of the group rises - something not true for corn, et. al.

The third group of major interest ("Group 2") includes the traditional crops, beans, yucca, plantanos, and sugar cane for panela, along with some minor crops. Yucca and platanos are generally grown for subsistence but beans are usually grown to sell in the market. Panela belongs to both categories, being produced for sale especially in Valle. For the group, production is predominantly by traditional technology so that relative expansion could be assumed to decrease the modern share in agriculture. In fact, growth has been slow.[1] Atkinson relates this partly to the technology and speculates that another factor may be the tendency for farmers who migrate to urban areas to switch from the consumption of yucca and platanos to rice and wheat bread.[2]

[1] This group is included in, though is not the same as, the group labelled "traditional" in the two category breakdown used in Table II-13.

[2] Atkinson treats the remaining products, coffee and the plantation crops (cocoa and bananas) as special cases. Coffee uses a traditional technology in many respects to the conditions of its production differ from the group 2 items in a number of respects, not the least being its exportability. Technology is changing in coffee; Atkinson interprets the higher coffee yields of the last ten years as a result of the recent adoption of more modern practices. The distinguishing characteristic of the improved technology is the use of the new variety "caturra", which is grown in the sun; it can have several times as many plants per hectare as the shade-grown coffee and the yield per plant is reported to be almost comparable.

Plantation crops involve a still different set of conditions, usually. In the case of cacao, (whose area stayed constant between 1948 and 1961 but has expanded gradually in the last few years), there has been a general increase in yields over time and the Federacion Nacional de Cacaoteros feels that with modern techniques and plantations of commercial size the production could be very profitable. Bananas are produced traditionally for home consumption

and with non-traditional inputs for exports. The banana market has changed radically in recent years with the price difference between first and second class bananas in the European market such that if the Uraba region could not achieve the better rating for most of the bananas it would fail. This thus requires a technical level much higher than that for most other agricultural products in Colombia. Though production in the Uraba region is carried out by the farmer rather than the United Fruit Company, the interrelation is necessarily tight, justifying Atkinson's separate category treatment.

More than one half of the increase in output of major crops between 1948-50 and 1967 was in the "group 5" crops, whose output (valued in 1958 prices) rose from330 million in 1948-50 to 1,600 million in 1967. (Using Atkinson's figures). An initial fast advance occurred in 1948-54; there were then periods of relative constancy sandwiching another burst of growth during 1958-1962. Most of the increase in output reflected an increase in area cultivated, as area was more than tripled (1948-50 to 1965-67) while production was quintupled. Yields, which increased a total of about 60% over the period, rose rapidly during the fifties then fluctuated around a constant level until the mid sixties when a new upward trend may have appeared . The location of major cotton production has shifted a good deal, moving recently to the Valledupar area. Fertilizers are still used relativly little for cotton. Average yields fell over a period in rice as non-irrigated areas expanded more rapidly than in irrigated ones; use of fertilizers is becoming significant for this crop. Sugar cane yields are not high in comparison with those in other countries but they have shown a substantial increase (doubling) in the last 20 years.

The figures of Table II-16, from Atkinson, support his conclusions on a stagnant (at least as far as yields are concerned) traditional agriculture and a changing modern one. None of the four "traditional" products in group 2 has

Table II-16

Crop Yield Indices, by Groups of Crops; 1958 = 100

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 5a	All Groups (excluding coffee)	All Crops
1950	91.4	112.9	75.4	84.1	81.0	100.0	90.4	90.8
1951	81.3	117.7	83.8	79.5	85.0	90.0	94.8	89.2
1952	106.0	115.6	83.2	88.6	89.5	75.0	95.3	99.8
1953	82.0	119.3	88.2	95.4	83.6	75.0	97.1	90.8
1954	82.0	109.1	86.0	97.7	91.5	85.0	95.7	90.0
1955	82.0	110.2	81.5	100.0	90.8	95.0	95.0	89.6
1956	82.0	103.2	85.5	100.0	96.7	90.0	95.3	89.8
1957	82.0	101.1	89.4	102.2	92.1	110.0	95.5	89.9
1958	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1959	95.4	107.0	99.4	109.0	114.4	110.0	106.8	102.1
1960	95.4	103.2	98.9	109.0	110.4	105.0	104.3	100.6
1961	96.1	118.3	94.4	111.3	118.9	105.0	110.1	104.3
1962	103.8	114.0	98.3	106.8	122.2	110.0	110.6	107.8
1963	98.5	107.5	87.1	109.0	121.6	115.0	105.3	102.5
1964	102.1	102.1	98.9	100.0	115.7	115.0	105.0	103.8
1965	103.6	108.0	89.9	113.6	110.4	110.0	104.1	103.9
1966	107.6	107.5	93.8	122.7	118.3	115.0	107.5	107.6
1967	102.4	111.8	96.6	127.2	134.0	110.0	114.1	109.2

Source and Methodology: Figures are from U.S.D.A., "Changes"...op. cit. p. 57. The different crops in a given group are weighted by the relative value of production in 1958.

(Table II-16 continued)

	Group 1	Group 2				Group 3			
	Coffee	Yucca	Beans	Plantains	Sugar for Panela	Corn	Potatoes	Wheat	Tobacco
1950	91.5	103.3	68.5	116.1	131.9	80.1	70.1	80.3	64.5
1951	81.3	103.3	124.6	116.5	125.1	92.5	74.6	85.2	65.5
1952	106.0	103.3	123.8	117.9	119.9	92.5	74.7	85.2	62.9
1953	82.1	107.3	126.7	121.2	123.9	92.5	79.8	94.7	76.1
1954	82.1	111.8	79.1	104.9	123.9	92.5	79.2	85.2	79.4
1955	82.1	107.9	93.8	100.0	129.0	74.6	78.4	92.3	98.8
1956	82.1	95.0	78.5	100.2	121.1	76.0	85.7	94.2	105.1
1957	82.1	95.0	112.2	96.2	109.2	96.8	85.3	70.6	103.2
1958	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1959	95.5	109.4	124.2	100.0	108.5	100.2	95.3	100.0	104.3
1960	95.5	107.7	95.2	100.0	109.5	100.0	91.5	101.5	106.2
1961	96.1	107.4	111.6	100.3	146.2	89.7	86.2	101.5	122.8
1962	103.9	107.4	113.2	100.7	133.8	91.0	88.2	123.4	120.1
1963	98.7	107.4	120.9	100.7	112.9	95.5	63.1	91.0	113.4
1964	102.3	106.4	114.5	100.8	99.8	105.6	86.8	97.1	113.4
1965	103.7	107.0	108.9	119.6	99.4	84.3	87.1	104.8	94.1
1966	107.6	112.4	113.2	93.3	120.5	84.3	86.1	129.8	97.7
1967	102.5	112.2	103.7	102.0	126.9	90.6	76.9	134.4	110.2

(Table II-16 continued)

	Group 4		Group 5				Group 5a		
	Bananas	Cocoa	Cotton fibre	Cotton seed	Rice	Sugar	Sesame	Barley	Soybeans
1950	91.8	72.4	68.4	38.6	93.7	74.1	145.0	74.6	100.0
1951	86.4	72.4	48.5	31.7	105.9	84.7	108.0	77.6	100.0
1952	89.2	94.8	51.1	38.0	113.3	82.9	58.8	77.6	100.0
1953	98.2	94.8	75.5	50.0	92.0	82.5	64.4	81.5	100.0
1954	101.6	93.7	94.9	71.2	87.2	100.4	90.7	79.6	100.0
1955	105.8	89.3	87.2	65.2	88.1	102.4	119.6	78.5	100.0
1956	103.2	91.8	97.6	76.8	93.3	105.8	118.8	74.0	100.0
1957	104.9	102.4	97.0	32.5	95.3	94.8	156.7	81.0	100.0
1958	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1959	113.2	102.4	149.4	118.7	106.1	108.8	115.4	108.4	101.8
1960	109.4	115.3	132.1	104.5	102.4	112.4	120.0	91.7	149.0
1961	110.1	118.3	151.7	122.3	103.3	124.3	120.4	100.0	118.4
1962	104.0	120.4	114.6	112.9	108.3	132.8	96.1	123.0	107.1
1963	101.8	133.6	152.9	120.9	112.0	121.9	130.4	98.6	129.6
1964	94.7	121.0	130.9	103.3	102.5	128.4	117.1	109.8	128.9
1965	110.5	124.9	131.8	81.2	92.7	129.5	132.5	113.6	134.8
1966	122.1	127.8	159.8	97.7	100.5	126.1	130.0	112.1	118.8
1967	129.4	125.4	172.3	105.8	117.6	143.2	124.6	101.4	133.3

shown real yield increases since 1950; of the crops in group 3 (partly grown with traditional methods and partly with modern ones) wheat and tobacco have shown considerable yield increases, and corn and potatoes have not. All the crops in group 4 (bananas and cacao) and groups 5 and 5a (clearly commercial crops) except sesame have shown considerable and in one or two cases dramatic yield increases. While this evidence does not prove that traditional agriculture has achieved no technological change (as measured by changes in total factor productivity)[1] it weighs rather heavily in that direction.

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[1]We know, for example, that technological change has occurred in the case of potatoes produced with mainly traditional methods - where virtually all producers in some regions use fertilizers and insecticides.

Some of the output increase in the modern sector relative to the traditional one has presumably resulted from the substantial price increases for some of the "new" crops. But overall the prices of modern and traditional crops rose by about the same percent from 1950-54 to 1965-7. When coffee is excluded from the traditional crop group its prices did fare less well than those of the commercial group. (see Table II-17). Certainly demand has risen faster for the commercial crops, so that a more rapid output was needed to maintain relative price stability; at the same time the price movements suggest that the increases in technical efficiency of the modern sector relative to the traditional one might be overestimated by simply looking at output increases.

Table II-17

Weighted Price Series for Traditional and Modern Crop Groups (Weighted by 1958 Values)

Year	Traditional (excluding coffee)	Traditional (including coffee)	Modern
1950	63.6	50.9	50.6
1951	67.5	57.7	58.3
1952	55.1 ⟩ 64.5	55.9 ⟩ 60.5	54.3 ⟩ 56.4
1953	60.5	59.7	57.0
1954	75.8	78.3	61.9
1955	70.1	70.1	61.3
1956	79.4	86.9	64.3
1957	94.4 ⟩ 90.3	99.5 ⟩ 89.8	83.4 ⟩ 83.5
1958	100.0	100.0	100.0
1959	107.6	92.4	108.3
1960	113.0	99.4	112.6
1961	141.3	114.1	122.1
1962	131.8 ⟩ 166.8	109.0 ⟩ 132.3	124.7 ⟩ 139.4
1963	181.7	143.0	148.7
1964	266.3	196.1	189.1
1965	237.9	184.0	218.7
1966	284.4 ⟩ 268.6	207.8 ⟩ 202.9	242.4 ⟩ 234.9
1967	283.4	216.9	243.6
1965/7	416.4	335.3	416.5

Sources and Methodology: For purposes of this calculation, the "modern" group was defined to include sesame, cotton, sugar for refining, 50% of rice, and wheat, 70% of barley and 10% of corn. The high share of rice excluded was undoubtally an error.

Laspeyres indices were used; the base year was 1958 and weights were proportional to area sown (a somewhat erroneous specification).

It is possible to some extent to decompose yield increases according to whether they are related to changes in region of production, changes in composition of output by farm size, or changes in yield for a given farm size in a given region. If Atkinson's conclusion that technical change in the narrow sense has been very limited over the last 20 years is valid, then such reallocations of production as these two would be expected to account for a considerable share of the yield increases. It is also his contention that the advance of commercial farming has usually involved a new group of farmers, not the acceptance of the modern techniques by "traditional farmers", either large sized or small.

In terms of our earlier discussions of potential small farm-large farm conflicts, much interest focusses on Atkinson's heterogeneous Group 3, those products produced by both traditional and non-traditional methods. Atkinson contends that the major increase in surface under these crops since 1959 has been in farms of more than 50 and especially of more than 100 hectares; this would support the conclusion that the real change is not a transition in these crops but the addition of a new type of farmer. The evidence remains shaky however, and only with the publication of the 1970 agricultural census is the issue likely to be settled.[1] Both wheat and tobacco have shown substantial

[1] Atkinson reached his conclusions by comparing farm size data from the 1959 agricultural census with data (unpublished) from DANE's 1966 agricultural sample. This indicates, for the four crops constituting Atkinson's Group 3, a median decrease in area harvested of 35% for farms 0-50 hectares, 13% for those of 50-200 and no change for those $\geq$ 200 hectares. This might lead one to suppose that the small farmers are retreating more to the production of his Group 2--traditional crops. For the three crops for which information are available in both years, the median decreases in hectares are 40%, 10% and 5%, i.e. a pattern quite similar to that for Group 3. Further examination reveals no clear trend in the share of farms below 5 hectares during this period. Part of the problem appears to lie in the nature of DANE's sampling procedure for years after 1959; most likely the sample frame is substantially out of date for the smaller farms.

increases in yields, reaching their maxima between 1960 and 1962--almost double the yields of the start of the period. Those of tobacco have slipped back in the succeeding years. There has been much research into corn production; the commercial farms which use improved seeds and practices (except fertilizers) are found principally in the Cauca Valley where the average yield is twice the national average, but still well inferior to that expected by agronomists. The national average of around one thousand kilograms per hectare is extremely low in absolute terms; a Rockefeller Foundation specialist has said that it would be feasible to produce twelve tons per hectare per semester in the Cauca Valley and thus 24 tons per year.[43]

[43]Of course this might not be a profit maximizing strategy under the conditions prevailing.

Potatoes constitute a really mixed crop in that while each of three quite different technologies--cultivation by hand (with hoe), with oxen, and with tractor--is important. Practitioners of all those use modern inputs, including chemical fertilizers and fumigation to control insects and diseases; with this crop it is impossible to get good yields without such inputs, especially the sprayings; financing can be obtained from the Caja Agraria more readily than for most other traditional or transitional crops, since potatoes are a marketed crop. Yields have apparently not increased in the most recent years (though potato information is notoriously weak).

Wheat is another mixed crop in this sense. A study in 1958 indicated that a third of the area was mechanized (24% in Narino, 34% in Boyaca, and 56% in Cundinamarca). The usefulness of fertilizers is widely recognized and they are widely used, although in quantities below the recommended ones, by both mechanized and unmechanized producers. Wheat presents a real problem whether the country should make stronger efforts to get it off the ground, or conclude that she cannot develop a comparative advantage. The future of this product is uncertain; it is unclear whether a significant output can be produced at competitive costs. A

vigorous price support program has never existed historically, so prices have never been secure and conceivably this would lead to a pessimistic assessment of potential. A new program to expand production was begun in 1968 with more favorable support prices than the previous ones and with other incentives including priority in credit, improved seeds and technical assistance. But then the real price was allowed to fall even further than before, and by 1971 output was down to only about ___% of the 1950-54 average, despite higher yields.[2] From the standpoint of price competitiveness, wheat is the only really marginal crop in this "transitional technology" group.

V. The Demand Side: The Effects of Price Changes

The previous sections considered the direct sources of output growth--the increases in broad categories of inputs (land, labor, capital and other) which made the output increase possible--and certain other disaggregations of the output increase designed to give hints as to the mechanisms underlying it. Such classifications do not indicate whether quantity produced rose primarily because of an outward shift of the demand curve or of the supply curve (the latter of which would be a result of downward shifts in the cost curves of the various inputs or of technological change). If the relative price of agricultural goods had not changed, it could be deduced that the two curves shifted by the same amount. Since price did increase in the present case, the shift of the demand curve must have been the greater of the two; the increase in price was related to and possibly necessary to bring about the full increase in output which occurred.[1] It is therefore of interest to know the movements of

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[1] In the long run variations in the rate of rural to urban migration would be expected to affect relative outputs of agricultural and non-agricultural products so as to dampen any relative price fluctuations, though if technological change occurred at different rates in the two sectors, some relative price change would be expected.

[2] See Leonard Dudley and Roger Sandilands, op. cit.

the relative price of agricultural as opposed to non-agricultural products, both to know whether the actual increase in output required a price increase to bring it forth (this tells something of the relative changes in productivity between the two sectors), and to know how quickly output responded to such relative price increases as did occur.[45] A related issue, the implications of price fluctuations, will be dealt with in Chapter V.

Since 1925 there has been a sizeable upward shiftof agricultural prices relative to other price series, judging from the crude series assembled in Table II-18.[45a] Over the forty

[45] Various theories of structural disequilibrium, most often applied to the Latin American scene, are based on the alleged inelasticity of supply of agricultural output.

[45a] The first four series in Table II-18 are all based on prices to the farmer (as accurately as these could be determined). The other two relate prices of food products to non-food products in the cities; the first of these is basedon a sevencity sample since 1954, and on Bogota before that point; its movement is fairly closely related to the non-coffee crop price series, a reasonable result; both show an upward trend, although with very marked fluctuations. This trend is least clear with respect to the rural prices of non-coffee crops. Since the two series are, I believe, estimated for the most part independently, they give mutual support.

The second urban food price series is based on an "apparent consumption" approach for the economy as a whole; a price series for food products was constructed on the basis of "apparent consumption" weights. Such an estimate, for 1953-63, and based on the consumer market basket of 1957, suggests that, if anything, the DANE cost of living series for blue and white collar workers overestimated price increases for the population as a whole (this is also suggested by figures recently worked up by Miguel Urrutia on the basis of Banco de la Republica data and referring to the 1960's).

It is interesting to note that, in at least one respect, these figures support the conclusion that average incomes did not grow over 1956-1965, say. Consumption per capita of income sensitive products like yuca and beef, (according to data from CEDE, Demand Projections for Agricultural Products in Colombia, Monograph 20, November 1966, yuca has a negative income elasticity in urban Colombia and beef is relatively income elastic although perhaps surprisingly low in absolute terms [0.46]) were consistent with this . . . Beef consumption per capita seems not to have risen, holding price constant, while that of yuca (which fell rapidly during 1951-55, eased down only quite gradually during 1955-66, and this due in part to a price increase.

year period the ratio has about doubled, the increase being concentrated in the period since 1940 and clearly related to the dramatic increase of coffee prices. Nevertheless, a similar, if not so rapid movement, has occurred for both non-coffee crops and for livestock.[1] More recently, the agricultural

[1] In relation to the long advance prior to the 1950's, it is interesting to note that the period including WW II and several years thereafter was one during which farm prices throughout the world rose more rapidly than non-farm prices; in the U.S. this relative increase was considerably greater than in Colombia. Atkinson, Agricultural Productivity..., op. cit., p. 51. Though the coincidence suggests the possibility of similar causes being at work in different countries, it would hardly be argued that Colombia's relative price change was imported from the rest of the world since her trade in agricultural products was so concentrated on coffee.

price series hit peaks in 1954 (associated in part with the high coffee prices) and in 1964 (following a severe drought in 1963). After each of these years there was a relative decline, with the series ending in 1969 at about the 1958 level though above the 1950 level.[48] Excluding coffee, the prices of both crops

[48] Use of one price deflator may indicate a slight rise (e.g. implicit price of value added in agriculture over implicit price of gross domestic product, both at market prices, showed about a 2% increase) and another a slight decline.

and all agricultural products rose slightly between 1950 and 1967. In the case of livestock the main feature of the movements is their cyclical nature; the higher price in 1967 than in 1950 is thus not necessarily an indication of a trend (although over the longer period there has indeed been a considerable upward trend). The major peak in the livestock series was around 1959.

In the context of the traditional crop-commercial crop discussion it is useful to consider the price movements of the different crops and crop groups. Among crop groups, the largest advance in the post 1950 period (though it occurred entirely after 1960) was for the traditional crops (yuca, beans,

TABLE II-18

Relative Prices of Agricultural and Non-Agricultural Products

	Agricultural Prices: All Other Prices (GDP)[1] (1)	Coffee Prices: Prices of Non-Agricultural Goods (2)	Prices of Crops Excluding Coffee: Prices of Non-Agricultural Goods (3)	Livestock Prices: Prices of Non-Agricultural Goods (4)	Agricultural prices (including coffee)/ Non-agricultural prices	Food Prices: Other Prices for Goods Entering the Cost of Living Index: Obrero (5)	Food Prices: Other Prices for Goods Entering the Cost of Living Index: Empleado (6)
1925	50.1 - 53.2	34.2 - 45.7			60.6		
1926	46.8 - 49.4	27.0 - 36.3			57.3		
1927	46.8 - 49.1	26.4 - 35.5			61.0		
1928	41.3 - 43.4	21.8 - 29.2			50.2		
1929	51.9 - 54.1	24.9 - 33.5			62.8		
1930	51.7	30.2 - 39.7			61.4		
1931	64.4	60.4			72.7		
1932	56.5	69.4			63.6		
1933	58.6	64.8			64.8		
1934	55.1	49.1			75.2		
1935	59.0	48.9			69.0		
1936	61.4	47.8			72.0		
1937	60.6	37.8			72.3		
1938	57.3	33.2	74.9	55.8	65.1	70.6	
1939	62.9	35.7	87.3	56.8	72.3	71.4	74.3
1940	51.2	23.7	71.1	51.7	61.6	77.2	
1941	54.7	37.3	66.4	55.3	60.9	72.8	
1942	59.7	36.4	84.0	49.4	66.7	68.5	
1943	65.1	34.7	95.8	51.7	74.0	72.6	75.6
1944	73.9	38.4	77.6	67.8	86.5	75.0	
1945	66.4	34.3	89.5	64.5		89.3	
1946	68.9	44.5	88.8	64.8	77.0	91.4	
1947	77.9	51.4	91.5	83.3	76.8	87.5	
1948	69.5	44.6	85.3	70.1	88.7	90.8	87.4
1949	76.1	--	81.3	88.8	77.8	87.8	
1950	91.0	75.8	103.2	88.0	81.1	79.3	
1951	95.0	89.3	102.7	89.5	96.7	90.4	
1952	94.8	94.1	89.5	98.8	95.8	90.3	
1953	99.2	92.9	96.0 ~~77.4~~	101.2	93.6	82.1	89.0
1954	112.9	122.0	107.1	112.0	100.0	87.2	
1955	104.7	103.5	97.1	110.3	108.3	94.9	
1956	109.6	142.3	100.0	103.0	102.5	91.0	103.0
1957	107.4	120.1	104.5	99.9	101.5	94.0	97.0
1958	100.0	100.0	100.0	100.0	102.7	101.7	96.9
1959	96.8	75.4	101.9	110.7	100.0	100.0	97.0
1960	96.5	75.8	95.6	113.3	105.6	98.7	100.0
1961	94.8	73.7	100.8	104.8	103.5	97.2	93.8
1962	90.1	66.7	103.8	98.9	102.9	101.2	93.0
1963	90.0	67.0	103.1	90.2	98.2	94.9	97.1
1964	100.7	77.3	124.6	94.2	97.8	102.4	91.4
1965	96.6	67.7	109.6	102.5	109.7	114.9	97.1
1966	95.6	61.5	109.3	104.9	105.8	108.6	
1967	(93.4)				97.4	111.6	
1968	(92.1)					104.8	
1969						104.4	

plantains, and non-centrifugal sugar). The deflated prices began to advance after 1960 with very sharp rises in 1963 and 1964, followed by smaller declines; in 1967 the index was still well above the average for the entire period. The increases usually resulted from reduced production, but they did not generate significant expansion of acreage or yield.[47]

[47] Actually one would not have expected a quick output reaction to price changes since the two crops which dominate the group, plantano and non-centrifugal sugar are both perennials.

As Atkinson notes, these crops use little of the non-traditional inputs, and since they are frequently sold at quite thin local markets, a substantial expansion runs the risk of lowering prices abruptly.[49] Changes in real income per hectare reflected the price changes quite closely. Production per capita (of the population) for this group of items has fallen over the period as a whole; all appear to have low income elasticity of demand, yuca often being alleged to be an inferior good.

[49] The extent of price increase in 1963-4 seemed surprisingly great in relation to the production decrease. It is not clear whether this reflects highly price-inelastic demand, thin markets, or bad data. The issue is an important one in terms of the instability which small farmers may face in the future.

For Group 3, the mixed-technology crops, prices have shown if anything a small negative trend, with substantial fluctuations. A decline until 1962, was followed by rapid increases in 1963 and 1964, then by decreases. In the case of wheat, Atkinson notes that the prices were determined principally by changes in imports and the pricing policies of INA rather than by changes in domestic production. After three poor crops of corn between 1961-63 the government, in an effort to encourage production, mounted "operacion maiz" but the output increase of about 25% in 1964 constituted a record crop which led to a market glut and a sharp drop in prices.

Commercial crops as a group have registered an upward price trend along with their strong increase in production. For the more important products (rice, cotton, refined sugar--Atkinson's Group 5) prices were considerably higher during the late 50's than prior to 1957 but there has been little change since 1957-8.[51] The markets for those crops better organized and

[51] It was noted above that the years of very rapid increase in both prices (see Diagram II-9) and output of these crops (1956-62) are the years during which a large residual ("unexplained" output increase) showed up (Section II). Table II-11 picks this up as a period where increases in value added per hectare were considerably influenced by crop shifting.

less subject to risk than for more traditional crops,[50] either an organization

[50] Rice is produced basically for the domestic market, with occasional imports required. The domestic price is a little above the world export price and the export market has not yet been tried on an extensive scale. In the case of cotton, a considerable proportion is now exported with the subsidy available for all minor exports. The sugar market is more complex. Expansion in the Cauca Valley, undertaken during the period of high prices resulting from Castro's regime in Cuba, now finds itself facing unusually low world prices. But the price received for cane sugar in Colombia declined only moderately and remains above the average for the period. This is a result of a price policy which provides a price for sugar cane based upon both (1) a protected domestic price, somewhat similar to that of the United States, (2) a price for the sugar sold to the U.S.

of the producers with government assistance or an agency of the government with strong backing of producers has lent stability and support to prices in each case.

For the small commercial crops (Atkinson's Group 5a) prices did not show any upward trend during the period, but real income per hectare did. Barley prices had a downward trend so the expansion in acreage was limited. The other crops are primarily rotation crops with cotton and rice (at least in Tolima) produced by the same producers with much the same mechanical equipment and with no traditional inputs.

The extent to which price increases would be expected to bring forth output increases depends on factor supplies and the nature of the product. In situations where land is very scarce (i.e. supply inelastic) and labor's productivity is low, (both conditions of an important part of Colombian agriculture) not much price elasticity can be expected,[52] unless there is

[52] Note that the question of price elasticity of supply of total agricultural output may have little to do with the price elasticity of supply of one product.

an elastic supply of capital and an elastic marginal productivity of capital curve. It seems rather unlikely that the supply of capital was elastic in the short run for the agricultural sector as a whole, but a distinction must be made here between commercial type and traditional type farming. Since many commercial sector operators are renters and are part-time in agriculture (illustrating elasticity of supply of management), some have capital to be used either in agriculture or elsewhere; they also have good access to bank credit (demonstrating elasticity of supply of this factor) and adequate access to land, as yet not used as intensively as it might be; one would guess, then, that elasticity of supply could be high for this sector.[53] But none of these

[53] No study has to my knowledge been done on this specific question as yet. Note that the elasticity of supply of land to this group over time has been a result of the availability of relatively underutilized land on large farms; this was not available to small renters in general due to the administrative problems which would accompany such renting for the large owner--hence the asymmetry in land supply elasticities to the commercial and traditional sectors.

characteristics hold for the traditional sector, so the overall elasticity is harder to guess.[54]

[54] There is definite evidence of high supply elasticity of various individual crops in both sectors, perhaps somewhat moreso in the commercial sector. But high supply elasticities of individual crops usually only means that resources are being shifted agilely from one crop to another, and may be consistent with very low overall supply elasticity.

If output responded quickly to rising prices the relationship might be seen (although muddied by random effect of natural conditions) in a simple lag regression;[55] in fact, no simple connection of this type is apparent be-

[55]The failure of a relationship to show itself this way would, of course, not imply its absence, since a longer or more complex (distributed) lag relationship might exist, or bad data might be concealing the tie.

tween the price and quantity series either for livestock, or for non-coffee crops. In the case of livestock, a quite sizeable increase in relative price accompanied the average output growth of about 2.5% in the 1925 to 1962 period, but the year to year price and output pattern is too complicated to yield useful evidence on the short-run price elasticity of supply without a very detailed analysis. In the short run supply fluctuations determine the price movements (i.e. the supply curve fluctuates more than the demand curve) generating a clear negative correlation between quantity and price; there is a rather clearly marked cycle of about 7 years, at least in the post 1950 period.[1] The presence of this relationship tends to make it more difficult to

[1](See Alfredo Garcia Samper, Perspectivas de Colombia en el Mercado Internacional de Carne de Res, Centro de Investigaciones Para el Desarrollo, Universidad Nacional de Colombia, Bogota, 1970.)

ascertain any relation between present price (or expected future price) and future output, a relationship which is in the best of cases complicated by the long gestation period of the product. Non-coffee crops display a lack of short-run relationship, but again no clear interpretation of this is possible.[2]

[2]The relationship between price and quantity is complicated by the fact that most markets are not perfect or near-perfect; monopoly and oligopoly elements are present in some, government intervention in others, the latter being increasingly prevalent with the passage of time. But it seems unlikely that either influence has affected the observed relationships much. Government price intervention via either support prices above eqiilibrium (e.g. coffee) or price ceilings (e.g. milk, meat sometimes) would not generate different price-quantity sequences than would actual demand changes provided the policy was carried out efficiently; intervention as arbitrator in ologipolistic markets might do so, however. Changing degrees of monopoly power could confuse the relations but such changes have probably been gradual and perhaps not too great over the period in question.

V. Summary

Until some time in the post World War II years the change in Colombian agriculture could be best described as an increase in output due to an expansion of all the traditional, measurable inputs, (land, labor and capital), with relatively little increase in factor productivity. Neither the aggregate figures nor direct impressions suggest that technological change was substantial. Increases in output per man were thus due primarily to increases in the land/man and capital/man ratios. Research had not been begun on a serious level, and the extension services were even less serious. Some organizational improvements were carried out, and the transport system was extended, but it seems doubtful that a great deal of the increased output could be attributed to these changes either (two of the major items traded, coffee and cattle, still moved without the aid of modern techniques, the former by mule the latter on foot). Changes in the distribution of labor among departments contributed somewhat to growth, but one deduces from the aggregate figures that its contribution was likewise relatively small.

Both mechanization and opening up of new land[57] are characteristics of the post-World War II era in Colombia, and total factor productivity has grown more rapidly in the last fifteen or twenty years than earlier, judging both from crude production function analysis and from direct observation. The "unexplained" growth of these years was probably in the range of one to two percent per year. The temporal coincidence of the overall increase in factor productivity with the rapid expansion of the commercial crops (sugar, rice, cotton, sesame, barley, etc.) in the late 50's and early 60's strongly suggests a causal tie, i.e. a positive effect of the mechanization-technification-commercialization complex of factors on total factor productivity. Since the main result of mechanization in Colombia appears to have been (at least during the period under discussion) the conversion from cattle to crops, this result is quite consistent

[57] See page 94.

with our information on the relative factor productivities in those two activities. Imports of agricultural machinery had begun on a relatively small scale in the late 30's and expanded after the Second World War to reach a peak in the early 50's. It is little exaggeration to say that the sector was completely unmechanized until after the Second World War; but the change was rapid in the next 10 years.

Migration between departments again contributed to growth but not more than 5 or 10 percent of the total--probably less.

Agricultural prices (including and excluding coffee) have shown a secular rise during the post-1925 period for which figures are available, but have levelled off in the last fifteen years. The output growth which can be attributed to these rises is unclear; the macro data give no grounds for suggesting a close relationship, although impressionistic evidence would suggest that commercial farmers might have a fairly high price elasticity of supply; for small-scale farmers the elasticity could be low, or the supply curve could even be backward bending depending on the case.

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[57]Some of the increases in cropped land over time in Colombia represent more intensive use of land already incorporated into the sector and used for extensive cattle grazing (usually). This form of increase may have been more prevalent during the pre-mechanization period but it has continued to be important more recently as well. Often there is a complementarity between mechanization and opening up of new lands. Mechanization means large scale operations on flat lands, and the fact that production can be on a large scale, and therefore decisions can be made by only a few people, implies that they can assure the availability of the various inputs they need; a group of small farmers could not, and therefore would not be able to open up the new region in the same way.

CHAPTER III

Process of Growth of Specific Inputs: Evidence on Their Contribution to Growth of Output and to Changing Income Distribution

In Chapter II the increase in agricultural output over the period under study was decomposed in ways designed to suggest broad features of the growth process and to prepare the way for a more detailed analysis. Decomposition by products highlighted the fact that the new "commercially produced" crops have clearly had the outstanding growth record, while more traditionally produced crops and livestock have had relatively slow growth despite rising prices. A second decomposition of growth was according to whether the increases in value added were associated with expansion of land area, switching of production from crops with low value added per hectare to ones with high value added per hectare,[1]

[1] As noted in the previous chapter, we would ideally ask whether there had been shifting from crops of low value added per bundle of inputs to high value added; but the data are not available to permit such an analysis.

or increases in average yields for particular regions. Such a decomposition helps to give us some feel for how much output growth has resulted from what might be called changes in organization or structure of production in the sector as a whole (the second component mentioned above), and how much from increased yields on individual farms, more likely to result from a more narrowly defined technical change. Finally, guesses were made as to the relative contributions to increasing output of increasing quantities of land, fixed capital and

labor as compared to other factors--the residual which results from improved organization, technological change, etc. The residual was estimated at one to two percent for the post 1950 period and less than one percent for 1925-50.

These disaggregations of the output increase are only the first step, more descriptive than analytical, in the consideration of agricultural change. Other necessary steps involve: (a) analysis of the way these factors interact[1] and (b) analysis of the mechanisms bringing about the observed changes in land under cultivation, investment, technology, choice of crops, migration of factors, and so on. This chapter attempts to decompose somewhat the broad input classifications (land, labor, capital) to bring to bear the small amount of evidence (usually of a micro nature) on th e productivities of these more narrowly defined inputs, and to discuss the mechanisms by which the stock of the inputs grew. It also refers to changes in regional, crop, and farm size composition of output. Since few studies have been done in these areas, many comments will be somewhat speculative.

[1] Which could be studied in the production function framework if the data were adequate.

Were the agricultural sector sufficiently homogeneous, it would suffice to discuss such things as the savings-investment process for the sector as a whole. But, as noted in the previous chapters, a striking characteristic of the sector is its lack of homogeneity. Distinctions by size[2] and by the

[2] As in the rest of this study, size is not defined in terms of hectares but rather "effective hectares," a concept allowing for land quality, location, etc.

modern-traditional variable[1] are clearly relevant ones, in view of the wide range of different farm types and the high proportions found near the extremes, especially of size. Studying the capital formation and technical diffusion processes somewhat separately for different groups is useful, first since it aids understanding the overall relationship of investment and technological change to other variables and secondly since it permits a better understanding of groups of special interest, e.g. the relatively small farmer, whose future seems to be dubious and to whom, on grounds of social equity, considerable attention must be directed.

[1] No single definition of modernity or traditional is satisfactory, so the precise specification of what is meant will be presented when the concepts are applied.

A. Capital Formation: The Savings-Investment Process

A.I. Overall Savings and Investment Rates

As in the case of any sector of the economy, one would expect investment (especially private investment) to be a positive function of the profitability of agricultural enterprise (high profitability leading to greater availability of own funds for investment), relatively accessible credit, a high savings function, a relative ease of transfer of funds (either directly or indirectly in the form of bonds and other financial assets) to the agricultural sector from other sectors and relative difficulty of transfer in the other direction, and a high possibility of producing investment goods in the rural area with resources otherwise not readily utilizable--e.g. labor on small farms. These factors determine the supply of investment funds or effort; demand depends presumably on the perceived profitability of possible enterprises in the sector relative to feasible alternatives.

Ideally a separate investment function would be isolated for each relevant subsector of agriculture.[1] Are traditional latifundistas really "consumption oriented?" Is the small scale farmer so close to subsistence that he cannot generate much savings? Are differences in the investment/income ratios for different sized farms a result of differential credit availability?

The factors actually determining savings and investment rates are among the least studied and least understood aspects of Colombian agriculture,[1] so only a little light can be thrown on a few of the relevant hypotheses.

Overall net investment rates[2] in agriculture appear to have been low--typically in the neighborhood of 5 percent; this might imply gross rates as high as 10 percent or more.[3] The rate appears to have been especially low in the early 1950's, after which it gradually increased through the mid '60s and then fell again. Using the output and fixed capital stock figures of Table II-1, the implicit net investment rate figures are:[4]

[1] Or at the least, the impact of variables like farm size would be introduced into the overall analysis.

[1] Part of the problem, of course, lies in measurement difficulties. The only form of investment which can be fairly accurately measured is that in machinery and equipment (these can be traced from imports and domestic production); planting of perennial crops, improvement of pasture, building of fences, etc., are quite difficult to measure, and, as we saw in Chapter II, few serious attempts have been made. While investment in livestock is somewhat easier to guess at, estimates are still imprecise.

[2] Defined as the ratio between current net investment and the value added of the sector.

[3] The figures of Table III-1 suggest a gross investment rate of more than twice the net rate. These figures are, however, open to question.

[4] Note that since the capital stock and investment figures used for these calculations excluded working capital, the investment rates are downward biased. ECLA's 1953 estimate was that working capital was about 15% of total capital stock; this would make it a little less than one half the value of output at that time (about one half of value added). The working/fixed capital ratio may have risen since then in view of the importance of purchased inputs in the commercial crop sector. On the other hand, hired labor is a

Table III-1[1]

(Figures in Millions of Current Pesos)

Year	Total Net Investment (1)	Net Investment Value Added in Agriculture (2)	Total Gross Investment (3)	New Loans from Official Sources (4)	Loans Outstanding/ Agricultural Capita (Excluding Land) (5)
1955	31	0.68	608	890	.064
56	248	4.76	830	933	0.70
57	182	2.83	869	936	0.62
58	227	3.18	1049	1104	0.63
59	374	4.77	1386	1382	0.63
1960	595	7.01	1766	1332	0.62
61	836	8.87	2072	1660	0.71
62	869	8.68	2174	1800	0.77
63	1147	9.27	2676	2273	0.85
64	1541	9.35	3378	2629	0.79

Sources: Cols. 1 and 2 are from calculations by the author, based largely on Planeacion's estimated capital stock series, (which was presented in CEPAL, El Uso de la Maquinaria Agricole en Colombia, E/CN 12/790, Agosto, 1967. The high ratio of gross to net investment in the earlier years presented in this table reflects the relatively low growth rate of the capital stock over the preceding years, and the contemporary ones, and the slow growth of capital in the livestock subsector, where for livestock total gross investment is presumably assumed to equal net investment and "what share of the increase in his capital stock at a given moment is matched by an increase in credit." Short term investment (e.g., salaries paid during a cropping period) do not enter fixed capital estimates.

[1]The comparison of gross investment and new loans is not a particularly instructive one, but the figures needed for the relevant comparison are not available. The fact that most agricultural credit is short term (e.g., the 6 months between sowing and harvest) suggests that the gross investment figure (new fixed investment plus increase in stocks of livestock) is not the relevant one. The questions we really want to ask are "what share of the capital a man has invested in his enterprise in a given moment is supported by credit."

for agriculture and livestock		for agriculture alone		for livestock alone	
1925-35:	5.22	1950-58:	2.02	1950-58:	1.32
1935-45:	6.12	1958-64:	2.24	1958-64:	7.57
1945-55:	3.51				
1955-65:	4.86				

It is natural, of course, that a sector with slow output growth and a falling capital/output ratio should have a low investment rate.

Most of the capital formation (probably to percent) is done by the private sector.[1] In the early 1950's ECLA estimated that 10 to 20 percent of all investment in agriculture was done by the public sector, though it was not indicated how broad their definition of public investment was (e.g. whether it included some roads and which ones). In recent years investments of INCORA have begun to bulk large in the overall picture.

[1] Public sector investment in agriculture is both hard to measure and hard to define conceptually. Highways, for example, may be important in determining agricultural output; but this depends on the individual case so it is difficult to draw a line between investment which should be included and that which should not.

No broad studies have been done on the savings function of the agricultural population, and it is difficult to deduce much from the investment data due to lack of information on the extent of private transfers of savings to and from agriculture. (Official credit figures are available, though of uncertain interpretation, primarily because the ultimate use of these funds is unclear.) If one assumed that the net private transfer of savings to agriculture was zero, (i.e. if one assumed savings in agriculture equals investment in agriculture minus increase in credit outstanding to agriculture) this would imply average gross and net savings rates of about 15 percent and 3 percent respectively over the 1953-1964 period, with an upward trend present in each rate. The net savings rate in the early post 1953 period was, by this

assumption, very low, but it was not particularly low later. The implicit gross rates are perhaps surprisingly high. Possibly this assumption leads to an underestimate of savings in the sector, since apart from the flow of credit it seems likely that the net (private) flow is out. This may be less or not at all true since the early 50's and the advent of commercial agriculture.

Investment in agriculture from private savings not generated in the sector is probably an important phenomenon in the case of modern commercial farming where the producer rents the land and invests capital earned elsewhere. Cattle are frequently owned by non-land owners who live and work in the city. But the extent of these phenomena has not yet been measured.[1] For the earlier years it seems unlikely (even if there was a net outflow of savings from the sector) that the net savings rate was above 10 percent. But such a rate would not be "low"--the corresponding gross rate might be 15 percent; meanwhile the gross domestic savings rate in Colombia has been between 15 and 20 percent during the 1950-1964 period, with the net domestic savings rate between 5 and 10 percent. In short, the savings rate from income in agriculture could have been either below or above the economy wide averages.

[1] In any case it is not conceptually possible to distinguish the savings generated from agricultural income when many high income earners are both in this sector and in another one.

A.2. Investment and savings propensities by size and type of farm

The relative long run (private and social) efficiencies of different types of farms is determined partly by their savings and investment ratios; theories abound to suggest how and why savings rates and the savings-investment process may differ by size, tenure, or type of farm, with differences being

partly the result of income differences associated with size, etc. and partly due to other factors. Probably the most general expectation is that the savings rate will be high for larger farms,[1] for owned farms rather than

[1]Though a priori, such a proposition is open to a variety of doubts. Savings is determined by income level (in general the higher a person's income, the higher his savings ratio) and consumption needs and habits. Most small-scale farmers, whether they own or rent their land, receive little institutional credit and probably little from individuals or other sources, so almost all the investment they undertake must be financed from their own (or their family's) savings. While their low productive capacity and income restricts their savings and investment potential, this factor may imply high incentive. In some studies of the agricultural sectors of poor countries, surprisingly high savings ratios have been found, as in India. (See, for example, Panikar, P.G.K., "Rural Savings in India," Economic Development and Cultural Change, October, 1961.) While such savings studies are difficult to carry out, and therefore open to doubt, the result is not particularly implausible. Apart from the incentive related to credit inaccessibility, it may be that the marginal cost of savings is low, e.g. when a farm family has excess labor more easily useable to produce investment goods, than saleable goods. The extent to which this may increase small farm savings above levels they might otherwise have achieved can be guessed at in part by the structure of capital stock by farm size and the relation between value of improvements and value of land by farm size. Some evidence on this for the Colombian case is presented in the text.

There is an excess demand for credit in the small farm range in Colombia and some evidence that the marginal productivity is fairly high if investment is well directed. The excess demand in itself is not solid evidence of high productivity as some small farmers may not be good managers or may use loans for current (possibly emergency) consumption; in parts of Colombia small farmers are not anxious to receive institutional credit. In a number of countries, however, small-scale agriculture is quite capital intensive. T. Schultz (Transforming Traditional Agriculture, Yale University Press, 1965, p. 88) points out that in the irrigated agriculture of India, this is the case. A low savings capacity does not prevent a high capital stock if enough time has elapsed for it to be built up gradually (or if, before population became so dense, savings and capital formation were easier).

The fact that share-croppers, whose "credit received/value of output produced" ratio is the lowest of all the tenure forms in Colombia & Table A-121.5 appear to engage in this institution partly (and perhaps mainly) to ease their credit shortage; a need for working capital, is also consistent with a higher marginal product of capital on small farms.

Evidence of savings potential is implicit in the finding, for most countries, that at a given income level, farmers tend to save a higher share of their income than city dwellers, (e.g. for the Japanese case, see Shinohara, Miyohei, "The Structure of Savings and the Consumption Function in Postwar Japan," Journal of Political Economy, December 1959).

rented or share cropped ones, for capital-intensive than labor intensive types of production. The investment ratio would be expected to follow the same pattern, while not being identical to the savings ratio.[1]

[1]Since high consumption levels and/or little interest in agriculture (possibly leading to investment of agricultural earnings in other sectors) are frequently attributed to the latifundista, it is less obvious that the investment to income ratio (as opposed to the savings rate) will be higher on large than on small farms.

The limited empirical evidence available suggests that over the long run investment to output ratios have been higher on larger farms than on smaller ones; pre-1953 data implied a higher ratio on cattle than on crop farms, and among the latter, on coffee than on non-coffee farms. At the same time, there is evidence that investment per unit of land or effective land has been higher on small farms. The first conclusion is suggested by the higher existing capital output ratios on the larger farms, which indicate that, unless their output growth has been considerably slower, the investment rates must have been higher on these.[2] (See Table III-4) The

[2]This ratio is of limited interest; less, for example, than the savings rate. Transfers to and from the sector affect it; labor income on large farms can lead to investment in smaller ones. A high capital output ratio can result simply from a high degree of inefficiency. Nor does the ratio relate current investment to income-generated but rather past "investment" to current income generated. To estimate historical investment to income ratios one would need to know the past income stream of farmers by current size category; but output figures by farm size are available only for very recent years.

capital output ratio seems to be at its lowest for farms around 5-20 hectares (middle size)--definitely higher for larger farms and probably higher for smaller ones.

Distinguishing subsectors, the net investment coefficients for the decade or two before the early 50s appear to have ranged from about 2 or 3

TABLE III-4

Capital Stock and Capital Output Ratios by Farm Size

(Value figures in millions of 1960 pesos)

Farm Size	Value of Production (Total Crops & Animals) (1)	Total Value Added (2)	Value of Land and Capital (3)	Output/Value of Land & Capital (4)
< 1/2	161.7	148.8	548.5	.2712
1/2-1	158.4	145.8	417.3	.3493
1-2	370.7	337.4	912.9	.3695
2-3	328.5	295.7	749.6	.3944
3-4	325.5	286.4	780.5	.3669
4-5	228.3	198.6	552.3	.3595
5-10	982.0	844.5	2,560.8	.3297
10-20	1,053.7	895.7	3,058.9	.2928
20-30	514.7	452.3	1,860.8	.2323
30-40	382.5	613.6	1,492.3	.2101
40-50	282.9	226.3	1,147.8	.1971
50-100	919.6	735.8	4,093.1	.1797
100-200	861.1	786.1	4,422.2	.1596
200-500	1,027.1	821.7	5,658.4	.1452
500-1000	620.1	533.3	3,684.9	.1447
1000-2500	501.9	441.6	3,448.9	.1280
> 2500	474.7	427.2	2,893.3	.1476
Total	9,265.6	7,790.9	(38,230.0)	.2035

Sources and Methodology: Berry, "Land Distribution...." op. cit., Tables A3, A-5, A-6.

percent for non-coffee crops through about 5 percent for coffee to as high as 12 percent for livestock.[1] (We noted above that the average rate over

[1]These figures are based on estimates of the past output growth rates for livestock, coffee and non-coffee, an estimate of capital stock for each subsector by ECLA in 1953, and the assumption that the capital output ratio in each subsector was constant over time and that the relative price of agricultural capital goods and agricultural products was also constant. The ECLA calculations (see Table III-6) indicated an overall capital output ratio in 1953 of about 2.5 (2.14 for fixed capital alone), about 5 in the livestock sector and only a little over one in the crop sector. ECLA's serious misestimation of the number of people working in the livestock sector throws more than the usual doubts on the other figures of the study. It is true, however, that the methodology of the capital stock estimates was not unreasonable, and that at the time there were few statistics available to aid in dividing labor into the crop and livestock categories.

Given all the assumptions just cited the (constant) investment/output ratio leading to the present capital/output ratio is that K/O ratio times the rate of output growth: thus

investment coefficient--	agriculture	2.60 x 2.889	= 7.51
	livestock	2.15 x 5.526	= 11.88
	crops	2.87 x 1.439	= 4.13
	coffee	3.26 x 1.541	= 5.02
	non-coffee	1.71 x 1.373	= 2.35

The livestock themselves are by far the major form of capital in that industry. With improved practice over time the capital output ratio could have fallen; in fact it probably remained about constant. Presumably some savings from this sector went elsewhere in the economy; the savings potential must have been high.

In the case of crops there is the possibility that the capital output ratio gradually rose; (ECLA estimated an output/capital ratio of only 0.774 in 1953), which would imply an average investment coefficient of less than the one calculated above.

ECLA indicates (p. 153) a gross investment coefficient of between 12 and 13 percent, something apparently almost twice as high as the net investment coefficient, which would be about 7.5 based on a capital output ratio of 3 (and the fall in it which occurred) and about 6.5 based on the 2.9 capital output ratio.

Data permit no adjustments to allow for changes in relative price of agricultural products vis a vis agricultural capital goods If at some earlier period the price of agricultural capital goods had been twice as high relative to that of agricultural output as it was in the base year, twice as high a proportion of income would have had to be invested to effect the same amount of real investment as at present. The only capital goods for which a series is available is machinery and its importance was till recently minor.

(footnote 1 continued from page 10)

Most of the investment would involve the use of the agricultural labor force (as in the case of coffee plantations); in such cases an important consideration would be whether labor productivity increases were the same in the capital formation activity as in other agricultural activities; if so, one might expect the relative price to be constant. If capital formation involved the use of surplus labor, its opportunity cost in terms of agricultural output foregone would rise or fall with the extent of labor surplus; the concept of an investment to income ratio then becomes hazy since the valuation of a non-marketable good produced by surplus labor presents problems. In the case of livestock investment simply involves non-sale of some of the product. A change in the relative price of the capital compared to the output could only occur if the future price of animal products was expected to be different from the current price.

1925-55 was probably about 5 percent.)

Evidence on current savings rates in different types of agriculture is of more direct interest than capital-output ratios or capital/land ratios, but is probably subject to greater error. Several studies of individual municipios in Colombia have produced evidence along these lines. At least three studies were carried out in the 1950's, respectively in Nariño (municipios of Pasto and Pupiales), Caldas (7 municipios) and Santander (the tobacco zone). More recently studies in municipios of Cundinamarca (Rio Suarez area) and Valle have been done. Table III-7 presents and Diagram III-1 summarizes in a scatter diagram, observations from the first three surveys mentioned above.[2] Each observation refers to a group of farmers. Despite many possible

[2]The data from the Rio Suarez area were not presented in such a way as to facilitate the estimation of a savings function or comparisons with the data from the other regions. Comparison of median savings and median incomes for different income categories did suggest that the relationship was similar to that for the other regions.

data problems, it seems fairly safe to conclude (a) that high absolute gross savings rates are often achieved,[3] (b) that the marginal propensity to save

[3]Actually the savings rates are neither clearly gross nor net; but most of them appear to be closer to the former concept.

Table III-5

Investment in Improvements/Value of Land, By Plot Size

Plot Size[1]	Investment in Improvement/ Land Value Sasaima, (Cundinamarca) (1)	Plot Size[1]	Fixed Investment (Excluding Cattle) /Ha. (Pesos) Ospina Perez (Cundinamarca) (2)	Fusugasuga (Cundinamarca) (3)
<1 ha	55.1	<1 ha	1,726	1,297
1-10	38.8	1-5	898	1,057
10-50	25.0	5-15	421	685
50-500	17.0	15-30	101	216
		>-30	23	141
		Total		

[1]Since these figures are based on the catastral surveys the unit is the taxed plot rather than the economic unit. Nevertheless there appears to be a reasonably close relation between the two.

Source: Col. (1) is the author's calculation based on data made available by the geographic institute Agustin Codazzi. Cols. 2 and 3 are from Table A-127.5.

Capital, Output and Investment in Various Sectors of Colombian Agriculture

Sector	Total Capital 1953 Millions of 1953 pesos	Total Fixed Capital 1953 Millions of 1953 pesos	Active Population (thousands)	Value Added	Value of Output 1953 Millions	Fixed Capital Output Ratio	Total Capital Output Ratio	Growth Rate of Output: 1925-9 to 1950-3
Coffee	1,300	1,092	335.9	843.3	1,063.2[b]	1.295	1.541	3.26
Other Crops	1,798	1,334	822.3	1,310.0	1,441.9	1.018	1.373	1.71
All Crops	3,098	2,426	1,158.2	2,153.3	2,505.1	1.127	1.439	2.87
Livestock	6,546	5,810	1,056.4[a]	1,184.6	1,285.4	4.905	5.526	2.15
All Agriculture	9,644	8,236	2,214.6	3,337.9	3,847.4	2.467	2.889	2.60

[a]The figure for active population engaged in livestock raising appears much too high; recent estimates have set the labor force in cattle at less than 400,000. (See Chapter 4, p.). By implication one or both of the other categories is too low.

[b]Coffee was an unusually high proportion of all value of crop output in 1953, so the capital/output ratio was presumably unusually low.

SOURCE: ECLA, op. cit., Tables on pp. 203-204.

Table III-7

Savings rates as a Function of Income (in 1955 pesos) in Several Colombian Municipios[a]

	Pupiales, Nariño[c] 1957			Pasto, Nariño 1957			Caldas (7 municipios), (1955) Owners				Share croppers		
Farm Category	Sample Size	Average Income of Category	Savings Rate	Sample Size	Average Income	Savings Rate	Farm Size	Sample Size	Average Income	Savings Rate	Sample Size	Average Income	Savings Rate
Minifundio	( )	1,510 (2,210)	5.7 (4.0)		2,340 (3,120)	11.4 (8.6)	0-3	12	3,129	0.28	5	1,877	.19
Small Farm	( )	5,780 (7,460)	29.5 (22.8)		11,900 (13,000)	53 (48)	4-9	20	5,438	0.32	12	3,420	.17
Medium Farm	( )	11,900(14,600)	48.4 (39.3)		19,900 (21,500)	64 (60)	10-30	22	7,216	0.31	17[a]	4,534[a]	.321[a]
Large Farm	( )	15,600(22,800)	51.2 (35.0)		34,100 (47,600)	-41 (-32)	30-100	3[b]	3,613	.45			
							≥ 100	1[b]	8,150	.55			

Figures in parenthesis are alternative estimates--see discussion below.

[a]Includes all farms of above 10 hectares.

[b]Small samples and the fact that all observations in these categories come from one municipio make these results subject to high error.

[c]Estimates here are based on figures presented in Ministerio de Trubajo, Division de Seguridad Social, Estudio Socio-Economico de Mariño, (Caldas)

Income includes the value of products listed as being consumed on the farm--The difference between the two income estimates arises from the fact that the first made no allowance for income from animals kept on the farm and the second (in parestheses) used a set of (rather arbitrary) assumptions to estimate income from this source. (The number of each type of animal was presented in the original figures). The savings rate estimates may be biased down as the income figure does not include investment carried out on the farm. (?). And that in parenthesis may be especially biased down as we did not assume net investment in animals either. Of course, there are many other possible sources of error too, including the possibility of unrecorded expenditures which may have biased the savings rate up, a rather persasive interpretation given the very high ratios estimated here.

Table III-7 (cont'd)

	Santander Tobacco Zone		
	Sample Size	Average Income	Savings Rate
Munifundistas	(11)	4,035	13.9
Sharecroppers	(12)	2,975	-8.5
Mixed tenure	(7)	2,626	2.7

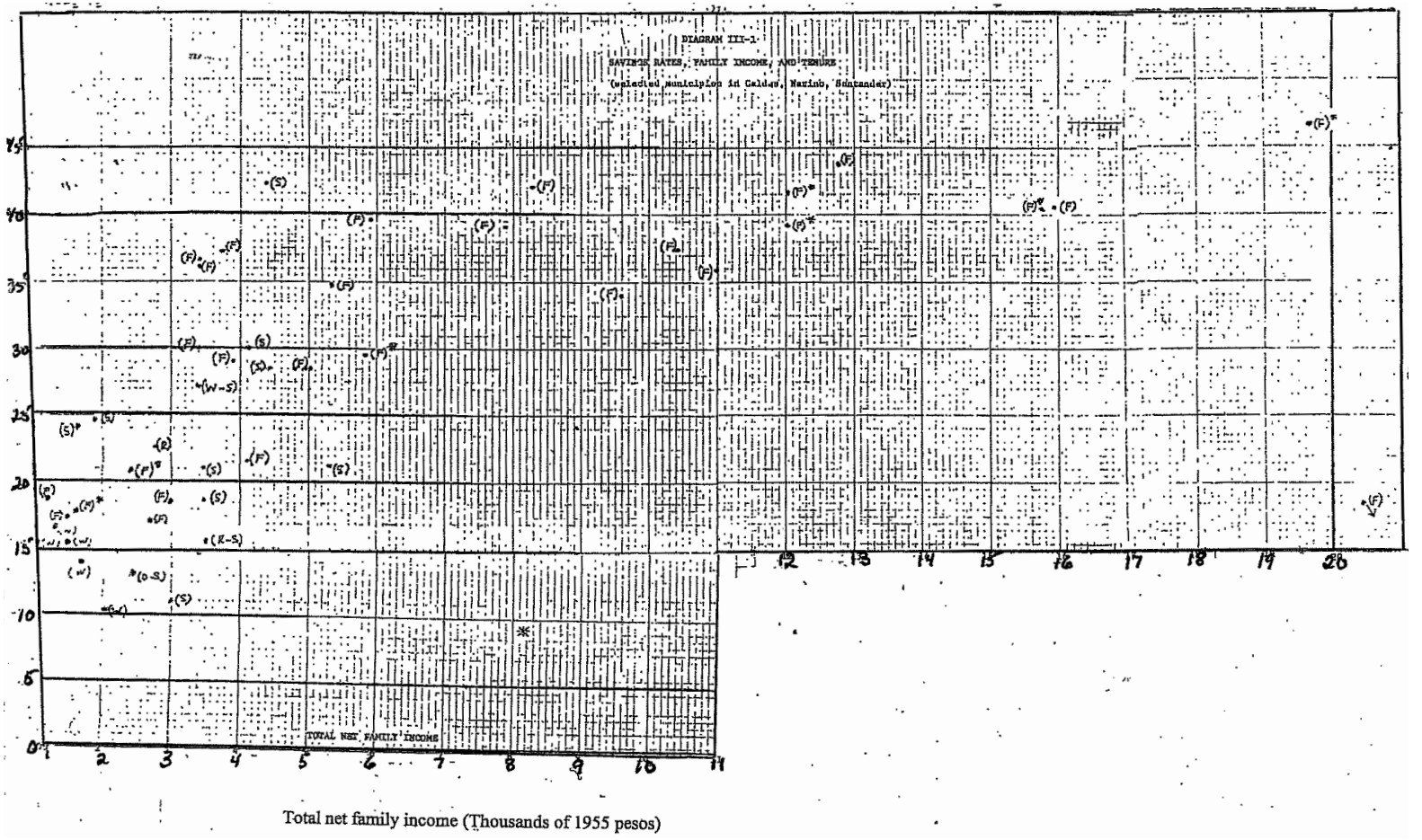
DIAGRAM III-1
SAVINGS RATES, FAMILY INCOME, AND TENURE
(Selected municipios in Caldas, Nariño, Santander)
TOTAL NET FAMILY INCOME
Total net family income (Thousands of 1955 pesos)

Sources and Methodology for Diagram III-1

Each observation corresponds to a particular group of farmers in one of the regions. In two of the surveys from which data come (for municipios in Nariño and Caldas) the original data was presented at the farm level and individual observations were aggregated according to size of farm and, in the case of Caldas, also tenure. The data for Santander was already grouped by tenure and could not be reorganized according to income or farm size categories.

Since the samples were taken in different years, it was necessary to normalize the monetary income figures; all were converted to 1955 pesos. The possibility that the purchasing power of the peso varies from region to region could not be taken into account.

The following problems are worth noting here: first, since these studies were all carried out in the 1950's and since the sampling methodology and definition of terms was not presented in detail, uncertainty attaches to the figures themselves and their meaning. The exercise presented here can therefore by best thought of as illustrative. Still, the results were sufficiently plausible and consistent across regions as to warrant presentation.

Second, it should be noted that the use of averages may make the relationship between income and the savings rate look closer than it really is. There was substantial dispersion in the calculated savings rate for the different farms which were aggregated to the observations of this chart. It is true, of course, that if there were no overall relationship between income and savings (with the observation defined as the farm unit) no relation would show up when groups of farms were used as the unit.

A particular worry in some of the studies is related to the fact that preconceptions on the part of the samplers as to what expenditures farmers were likely to make and a failure to ask general or specific questions with respect to certain (perhaps unexpected) types of expenditures may have led to an underestimation of expenditures, especially for the high income farmers. This is not necessarily the case since if, as seems to be the case, only families living on the farms were sampled, the high-income families may well not have the consumption patterns of the cities and may therefore tend to have quite high savings rates (as the figures show). A very crude application of the savings rates in Diagram III-1 to our income distribution data for 1960 (Albert Berry and Alfonso Podilla, The Distribution of Agriculturally Based Income in Colombia--1960, mimeo, 1969) indicates that such rates would imply an overall gross savings rate for the agricultural sector between 25 and 30 percent probably. Although it is impossible to

prove that the rate is not this high, it seems unlikely. Note, however, that the nature of the calculations underlying these savings figures is that they are closer to gross savings rates than to net ones; so the latter would be somewhat lower. Sufficient non-representativeness of the large farms in these samples (vis a vis the country) could imply the plausibility of the figures, especially if resident farmers have higher savings rates than non-residents ones.

It is logical to assume that the strong relationship between income and savings rate which appears to hold in the income range 1000-6000 pesos per family is an overestimate of a longer run marginal propensity to save. It is well known that, partly due to the high over time variability of agricultural incomes, savings in above-average years tend to be high with dissavings occurring in below average years. (Dissavings may take the form of repayment of debts accumulated during bad years.) The dissavings observed for whole groups of farmers (especially the tobacco share croppers in Santander.) suggest that something like this must be happening, since individuals cannot continue to dissave permanently; (alternately the data may be biased in that survey).

The relationship between the short run cross section marginal propensity to save implicit in our data here and long run marginal propensity (either cross sectional or over time for the individual) takes on particular interest in the light of the diminishing marginal propensity to save indicated by the data of Chart III-1. One issue connected with the growth implications of the distribution of land and income is whether inequality leads to high average savings rate; this is the case if the (long-run or "normal") marginal propensity to save is an increasing function of income. In the chart it appears to be a decreasing function above the income level of 5 or 6 thousand pesos per year. There is the possibility, however, that the difference between the short and long run relationship is particularly marked in the lower income groups, especially since the variety of sources of income could be smaller for this group than for the larger farmers. If this effect were sufficiently strong, the non-linearity suggested by the chart might be erased or even reversed if savings and income data for, say, a five year period were related.

may well be rather high at least over some ranges of income, and (c) that there is no evidence to suggest increasing marginal propensity with income (the diagram tends to suggest the opposite--but see the appended discussion of methodology).

It is interesting to observe the dispersion of savings rates for farms of given size, and for given income levels. At given income levels, the sharecroppers tend to have lower savings rates than the owners; this comes out clearly in the Caldas data and in the Santander data. A crude eye estimate would suggest for the Caldas data a savings rate 8 to 10 points higher (i.e. about half again as high) for the owners. The difference is more marked in Santander. Although landless workers tended to have lower incomes, thus providing less evidence on savings rates at a broad range of income levels, their rates were clearly lowest of all the groups in Caldas.[1] Overall, both the high savings levels recorded for some groups and the wide dispersion tend to indicate that there is plenty of savings potential even in the relatively small farmer if it is well tapped.

[1]The eleven workers had essentially zero savings; this coupled with the high savings for all the groups of sharecroppers and family farmers (not lower than 15% for any group) supports the hypothesis that the savings rate has a good deal to do with the potential to invest. The smallest sized group of sharecroppers (one to 2.5 hectares) had an average income only about 20 or 25% above that of the jornaleros but had a 20% savings rate ratio.

Although the data (for the few areas with studies) definitely suggest marginally (average) higher savings rates on the larger farms along with higher investment/output ratios (but lower investment/value of land ratios), there may be some situations in which the investment/income ratio is not an increasing function of size, e.g. where a high share of investment is undertaken via

the use of family labor. Coffee farms seem to be a case in point; investment takes primarily the form of plantations, and in lesser degree fairly simple machinery for pulping, small tools, etc., and the sector includes many small farmers (either owners or renters), most of whom earn an income well above the subsistence level and thus provide a perhaps more interesting test of desire to save than the poorest farmers. The rapid increases in coffee prices and incomes in the early fifties provide a framework in which to ascertain the behavior of savings and reinvestment in a hopefully relevant setting,[1] the

[1]Evidence in a variety of contexts (including Colombia) has suggested that marginal savings rates may be high at a point of time, but there may be a negative time trend in the savings function. Thus if income rises very rapidly, the savings rate will rise quickly; if income rises slowly, the savings rate may not rise at all. The early 50's in coffee provide a partial test, although a problem arises in that an increase in investment (the measureable variable) might be explained either by the higher incomes which made savings easier or the higher expected rate of return which increased the incentive to save or to borrow. Since the formation of a coffee plantation involves almost exclusively labor, monetary savings would only be relevant for its being undertaken on farms which would hire the labor (but such farms would be fairly likely to have some accumulated wealth or be able to borrow) or whose owner would have to decrease his current off-farm earnings in order to apply his own time to this activity. The apparently quicker reaction of small farmers to the price increase of the 1950's might reflect the smaller need for monetary savings availability; more likely, however, the main determinant of investment is expected return, and small farmer's simply react faster for other reasons.

overall reaction speed of the sector (a test of the "inflexible compesino" hypothesis) and the differences in investment behavior and in reaction times for different size farmers.

Crude estimates of annual new plantings and net increases in total planted area reveal a definite responsiveness to the relative price of coffee.[2, 3] As a proportion of gross or net income

[2]The relative price was especially high for the years 1952 to 1958, hitting its peak in 1956. The evidence that new plantings speeded up in 1953 and 1954 is quite clear; the evidence that they were high during 1957-1959 is based on a comparison of area between two different sources and is less trustworthy.

[3]In Chapter VII it is observed that, over the century, coffee area does not seem to have been particularly closely related to price. We conclude there that over a long period the price was such that coffee area was below equilibrium and growth depended mainly on the speed with which certain barriers could be broken. But this situation had altered by the 50's and 60's, explaining the closer tie between price and area.

from coffee production, however, the investment does not loom large. The survey done by FAO-ECLA in 1955-1956 indicated that 5.7 percent of the gross value of coffee production was reinvested in that year to expand or improve the farm.[3] Of this, 3.4 percent was invested in coffee operations and 2.3

[3]United Nations, Economic Commission for Latin America and Food and Agricultural Organization, Coffee in Latin America: Colombia and El Salvador, United Nations, New York, 1958, p. 69.

percent in other agricultural activities. Investment as a proportion of net income on the farms in question was between 5 and 7 percent.[4] The share of

[4]Net coffee income was below gross income by the amount of purchased inputs. But income was also derived from other sources. These two adjustments just about balance each other if it is assumed that no labor is purchased. If all of it is purchased, the income of the coffee farmer is less by the wage bill and the investment to income ratio is 7 percent. Note that this figure differs little from the long run investment to income ratio estimates on the basis of ECLA figures (see p.). Actually, in constant 1950 prices, the ratio was higher in 1955 than in the pre-1953 period as a whole, but the rapid increase in the price of coffee meant that the same real investment/physical output ratio could be obtained by a smaller rate with both investment and output expressed in current pesos. Thus more rapid coffee plantings would not necessarily imply a higher investment to income ratio using current pesos throughout.

reported investment going to non-coffee activities (40 percent) indicates that coffee (which at the time produced over 80 percent of the income of the farms studied) was providing capital for other forms of agricultural production. Note that the average savings rate for the sample of farms in seven Caldas minicipios in 1955 was over 20 percent, i.e. well above this 5 to 7 percent investment rate estimate.[5] Thus it seems probable that a flow of

[5]Those savings figures were probably upward biased, but the bias would have had to be very great to reverse this conclusion.

funds was moving to the non-agricultural sectors of the economy at least during this high income period; whether such a flow characterized periods of more normal coffee prices is of course not clear.[1]

[1]Note that some of the sort of large farms with very high savings rates in the Ministry of Labor's Caldas survey, just cited may not have been included in the FAO-ECLA study, though probably most were. If the savings rates characterizing various income levels in the former study were correct and representative for the whole coffee sector, not only would the total outflow of funds be large but also rather small farmers would be contributing to it. The flow could be a transitory result of the especially high coffee prices, and could take the form of repayment of past debts, purchase of land, etc. so it does not demonstrate unequivocally the functioning of a significant savings transfer mechanism picking up small amounts of savings. But it does raise this possibility.

Farmers with small coffee plots (whether they had small farms is another question) responded much more vigorously than large-scale operators to the high prices in the period up to 1956. ECLA-FAO notes that the percentage of new plantings to adult plantings was closely related to size of adult planting, as follows.[2] A tendency for farmers with small coffee plots

[2]See ECLA-FAO, op. cit., p. 25. An alternative explanation might be that small plots renew more often. But, since the average rate of replanting was only 1.5% over 1953-55, any difference associated with differential replanting rates could hardly lead to such a pronunced difference

Size of adult coffee planting	Percentage of new plantings to adult plantings
≤ 1 hectare	30
1 - 10 hectares	10
10 - 50 hectares	7
50 - 100 hectares	3

to expand more rapidly in numbers and area than larger operators may also have characterized the 1955-6 to 1960 period.[3]

[3]This is indicated by a literal reading of the table below. But, since it is probable that the 1960 census had more complete coverage of farms with only a small amount of coffee than did the ECLA-FAO survey in

1955-6, the figures are inconclusive. One possible test of whether this is the explanation is to effect the same comparisons as below but only for Caldas--the most coffee oriented department in Colombia, and therefore one in which the 1955-6 study might be expected to have missed fewer farms. The result is about the same as for the national figures, lending some weight to the conclusion that the increase was a real one.

Size of Coffee Plantation (Adult and New)	1955-6		1960	
	Estimated Number	Estimated Area	Number	Area (thousands of of hectares)
<1 ha		31.1	195,083	86.8
1 - 10		368.9	208,522	573.9
10 - 50		220.2	13,405	230.5
50 - 100	582	32.9	652	42.3
100 - 200	145	33.2	205	34.9
>200				

SOURCES: 1960 census, Part II, p. 52 and ECLA-FAO, op. cit.. The latter source provided only information on number of farms by size of adult plantation (p. 27) so the numbers shown here were estimated from those data.

ECLA-FAO presents the plausible explanation that investment for the small farmer involves essentially his own labor (with little cash outlay) while that on the large farm (which must hire) labor is much more expensive in terms of cash. Carrying the argument one step further, one might predict that the large-scale farmer would wait longer to see if the new price would remain high before committing himself to a costly investment. ECLA-FAO assume implicitly that small plots of coffee corresponded to small farms. While there are many such plots, there are also a substantial number of medium and large sized farms with small plots of coffee. The high elasticity of area to price could have come from these farms. Data does not permit the negation of either hypothesis during the period of rising coffee prices.[1] Evidence

[1]Table A-154 shows the relation between farm size and average area in coffee in 1960. The large number of farms above 10 hectares and producing some coffee (116,000) could account for a fair share of the plots showing rapid expansion of coffee acreage in 1955-6. (198,000 in the 0-10 ha. of coffee range). But the fact that a good number of small farms (211,333 thousand of <5 ha in 1960)produced coffee in 1960 implies that quite a few must have been in 1955-6, and probably must have contributed to the observed rapid planting. (One hypothesis is that many existing coffee farms, characterized by small coffee plots, were missed in the 1955-6 sample; it seems

in the smaller producing departments, and that the 1954 agricultural sample suggested more coffee plots in several such departments than appeared in the FAO-ECLA study (see Table A-155). Finally it may be noted that the number of farms producing coffee and having >10 ha.s was about 103,000 in 1954 and was 110 thousand in 1960, suggesting that the new small plots did not correspond to those farms. (The 1954 sample had its problems, of course, so this is not powerful evidence.) For the period of decreasing numbers of small farms producing (1960-1966) it is relevant that average percent of land in coffee also fell (Table A-153).

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from the subsequent period of lower prices does suggest a greater elasticity on the part of the small farmers.

Table III-8

Size of Farms	Number of Farms Producing (thousands) 1960	1966	Area Under Coffee (thousands of hectares) 1960	1966
0 - 2	129.2	95.8	71.1	39.4
2 - 10	178.7	199.5	317.0	309.2
10 - 50	89.4	90.5	379.0	371.2
>50	20.5	25.5	201.4	210.5

Area planted in farms of less than two hectares was almost halved during the six-year period, 1960-66, primarily due to the fact that many farms went out of coffee altogether. Farms in all size groups tended to diversify (i.e., a smaller share of their total area was planted to coffee) but the number of larger farms with some coffee rose so that their coffee area tended to change little.[1]

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[1] A number of statistical difficulties connected with the 1966 sample survey used here as a basis for comparison with the figures of the agricultural census of 1960 throw some doubt on these conclusions, though it seems unlikely that the problems are so serious as to reverse them. One issue on which I am not clear is the treatment of small farmers who have moved since 1960.

Since small farms producing coffee were more specialized than larger ones in 1960 (and in 1966), it would be difficult to argue that when the coffee price rise began in the early fifties, they had more room to substitute

coffee for other products.[1] As of 1955-56 the relative importante of other

[1]The Agricultural Census of 1960 indicated that of the farms producing coffee, the smaller the farm the more specialized in coffee (i.e., the greater the percent of its total cultivated land in coffee) it tended to be. So the expansion of coffee would have been in some sense more difficult for these farms unless a greater share of all their land was suitable for coffee (and assuming that the higher share of small farms used for coffee in 1955-56 and 1960 was not simply the result of the differential reaction after prices rose, in which case it would not imply that the smaller farms were previously less diversified. But the greater specialization on the small farms in 1960 was such as to cast both these hypotheses in doubt. The relationship between farm size and percent of all area in coffee was, for selected farm sizes:

< 1/2 hectare,	58.8
1 - 2 hectare	43.7
5 - 10 hectare	31.0
40 - 50 hectare	13.2
100 - 200 hectare	7.0

prodúcts as compared to coffee decreased very rapidly with the size of coffee planting (see Table III-9).[2] Whatever the reason for the high responsiveness of

[2]It might not be wise to conclude from the very high share of total income derived from coffee on the farms with large coffee plantations that their potential for shifting further into coffee was low in an absolute sense. If, as has been alleged by CIDA (Centro Interamericano de Desarrollo Agricola, Tenencia de la Tierra y Desarrollo Socio-Economico: Colombia, Union Panamericana, 1966) many large farms are not serious profit maximizers, their failure to increase coffee production might be due simply to lethargy. Certainly examples of such farms can be cited; whether any generalizations are warranted is another question.

farmers with small coffee plots, it seems likely that this phenomenon continued during the late fifties and the sixties.[3]

[3]This could indicate that the 1959 agricultural census area figures are not inconsistent with those of the ECLA-FAO study, and that the overall price elasticity of supply of coffee is quite high.

Outside the coffee sector, figures on current investment/output or current investment/area differentials by size are almost non-existent. Evidence on the ratio of capital (accumulated investment) in improvements to

TABLE III-9

Relative Importance of Principal Products Besides Coffee Produced on Farms with Coffee Plantations of Various Sizes, 1955-6

Size of Adult Coffee Planting	Percent of Value of Coffee Produced: Most Important Other Product	Second Most Important Other Product	First and Second Products Together
Up to 1 hectare	210.2	40.2	250.4
1.1 - 10.0 hectares	33.4	8.3	41.7
10.1 - 50.0 hectares	11.6	2.5	14.1
Over 50.0 hectares	11.7	0.1	11.8

SOURCE: Adapted from Table 29 of ECLA-FAO, op. cit., p. 35.

value of land (a more interesting datum) is available for only a few municipios. In Sasaima (Cundinamarca) characterized by production of coffee and fairly small farms, it bore a clear negative relations with farm size.[1] (See Table III-5). Although this is due in part to non-productive investments on small recreational farms, it seems highly unlikely that this could account for all of the negative relations. More detailed information is available for two other municipios, Ospira Perez and Fusugasaga. Again the investment per hectare ratio falls sharply with size of plot; even when housing is excluded it is many times higher on small than on larger plots. The difference, is in "elementos permanentes," i.e. plantations, artificial pastures (not irrigation). Cattle are excluded from investment here.[2]

[1]Though there were some fluctuations in the ratio (it was high for the category 100-200 hectares--but the sample was very small) there is no doubt about the overall tendency. There are, however, two problems in interpreting the relationship. First, underassessing of land values is more serious on larger farms, and it is not clear whether the same bias is present in the case of improvements or not; if relative underassessing on large farms were greater for improvements than for land value, the result could be reversed. Second, improvements include housing, whose share in the category is probably greater for small farms. Since some of the small farms are fincas de recreo, with expensive houses, this bias could be serious. Yet the downward trend could hardly be due to this factor alone.

[2]The data from the Instituto Geográfico Agustin Codazzi break investments into four categories, i.e. "elementos Permanentes" which includes such things as plantations, artificial pastures, etc., construction (which apparently includes only housing), installations and machines, and "anexos y servidumbres" which includes stables, irrigation units, and so on. Cattle are not included in the evaluation. See Carlos Ossa, "Municipios de Fusagasugá y Ospina Perez: Relación entre Inversiones de Various Tipos y el Tamaño de las Fincas," Universidad de Los Andes, mimeo, August 1969).

Ossa found results somewhat different between the municipios of Ospina Perez and Fusagasugá in terms of the relationship between various forms of investment and size of farms. Invariably the total investment per hectare fell rapidly with farm size, but some types of investment performed differently from the overall pattern (dominated by the "elementos permanentes" category); machinery and installation investment was low for all small size farms in Ospina Perez (near Sumapaz) but reached its maximum in Fusagasugá between one and two hectares. The latter is a coffee growing area and possibly the small farmers had higher earnings and invested in coffee processing equipment.

Investment Patterns on Large Farms

Large farms, whether crop or livestock, are potentially (and often in fact) profitable, so that frequently sufficient funds for investment purposes should be generated by the enterprise.[1] It is true, further, that credit is much more accessible to these farms than smaller ones; these two factors would suggest, jointly, that over time the investment patterns is more or less determined by preference that is by a demand or a desire to invest -- which would be less the case for the smaller farms. Yet large-scale Colombian agriculture is by no means highly capital-intensive, if this term is used with reference to the capital-land ratio. Under the conditions in which it works, including the entrepreneurial behavior patterns--with high propensity to absenteeism and so on--it clearly has not paid for these farms to be highly capital-intensive.[2]

[1] It should always be borne in mind that since the category "large farms" is very heteregenous there are inevitably many acceptions to any given generalizations.

[2] An interesting example of this fact is cited by Grunig in his comparative study of the different types of latifundistas in Colombia. (See James E. Grunig, "Economic Decision Making and Entrepreneurship Among Colombian Latifundistas," The Land Tenure Center, CIRA, Bogota, mimeo, August 1968.

Of three entrepreneurial types operating in Meta, the traditional resident farmers who produce both livestock and crops on inexpensive land, do not adopt many new practices, but do make efficient use of capital, moderate amounts of credit and little labor, achieve a higher return to total investment (total fixed capital and commercial land value) than do the "new entrepreneurs," the large-scale crop growers with high total productivity,

high total costs, high quality inputs including farm manager, and so on. Most of these latter individuals produced rice, were highly information-seeking, well educated in general and with respect to agriculture; they were part time resident farmers. A third type distinguished were part time livestock producers, a majority of whom were classified as modern; they were quite absentee (mostly living in Bogota) spent little time working in agriculture, but invested a considerable amount of capital there. (They receive a high amount of credit in relation to their costs, and tend to be the main beneficiaries, according to Grunig, of the large scale livestock loan funds available from foreign sources in livestock regions of Colombia.) Their income tends to be low.[1] Although more "entrepreneurial" (a bad term) than the traditional resident farmers, they are less profitable; they presumably spend less time selling carefully, and with the fragmented market structure Grunig feels this function is important and the traditional farmer tends to win out here.

[1] Grunig notes that the possibility should not be ruled out that this is due to their being still in the gestation period after making investments.

In Valle, where the highest profits clearly went to the successful modern farmers, it was still true that the worst off group, at least defined by percent return to commercial land value or total capital, were individuals with high fixed costs and high variable costs, related to a high adoption rate and a high use of labor. Their productivity is high but it does not pay off. This group is particularly absentee, assigning few management hours to agriculture and having a low percent of their capital there. For

members of this group, other interests are lucrative. The typical individual is a professional or a businessman, probably living in Cali. He has much less market control than that of the successful entrepreneur, although he receives much more credit and for longer terms. The successful entrepreneur averts high labor costs via mechanization. The traditional Valle farmer is also successful relative to this unsuccessful entrepreneur.

Large farms as a group have, as evidenced in Table III-4, relatively high capital output ratios; but these are consistent with low capital-land ratios given the low average land productivity on these farms.

We saw earlier that the investment to output ratio has been fairly high in livestock (around 12 percent over 1925-53, low in 1950-58, and 7 to 8 percent in 1958-64). The investment ratio for large-scale commercial crop farms, which are becoming more and more mechanized, has been fairly high also but, in the aggregate, has probably not exceeded 10 percent.[1]

[1]The ratio of estimated output of crops produced in the modern part of the crop sector to value of imported machinery, the ratio has, according to my figures, been generally above one. The ratio of value of machinery in 1967/value of commercial crops over 1957-67 was about 10 percent (with both values measured in 1958 pesos). Since not all machinery was used in commercial crops, the ratio would perhaps be 7.5 percent with this taken into account. In 1967, my estimate of value of machinery/commercial crop output is about 65 percent (using an average of two machinery stock value estimates- ; excluding machinery not used in commercial crops would give say 65 percent.

This figure is above a calculation by Wayne Thirsk (op. cit., p. 26) using Grunig's data for large crop farms in Valle and Meta; the ratio he arrives at is 38 percent for Valle and 33 percent in Meta. Part of the difference is my use of 1958 prices; since that year tractor prices (cost per horsepower) have risen only 1/1.3 times the national income deflator. Allowance for this (using 80 percent, since other machinery prices have risen faster than tractors) would convert my 65 percent to 52 percent. Compared to net income of the farms in question the ratio would probably be no higher (some machinery is used on livestock farms) and possibly lower.

The ratio in question is of course higher on larger crop farms than on smaller ones, up to some point. Table IV-12 presents figures on the estimated ratio of owned capital stock to value of product for different farm sizes.

Other forms of investment besides machinery are less likely if, as is often the case, the operator is only renting the land on a short-term basis. There is even disinvestment via running down of soil fertility in some such cases. Renting is probably not the norm for these farms, however.[2]

[2]The 1960 agricultural census, as published, did not make the valuable cross-classification between form of tenure and crop farms by size (nor between form of tenure and whether managed by the owner [or renter] or by an administrator). It seems likely, however, that few large farms are rented to raise livestock. With this assumption one can get some idea of the importance of rented land in large-scale crop production. The figures

of Table A-57 indicate that, for the country as a whole, even if all the rented farms were in crops, the percent rented would be less than 30 percent up to the upper two size categories (by which time the assumption is less likely to hold). And even if all farms held under more than one tenancy form could be thought of as rented (and still assuming that only crop farms are ever rented), only about 30 percent of farms in the category 100-200 hectares would be rented and about 40 percent in the category 500-1000 hectares. It may be that renting has increased in importance since 1960; as of the mid-60's one half of all cotton was grown on rented land.

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and the basic explanation for relatively low investment on them is the relatively low payoff, other things given. Machinery is easy to finance--see the next section--and livestock, which provides its own guarantee, has in the estimation of some observers received a surfeit of credit. Grunig's studies suggest a considerable flow of credit from non-agriculture to agriculture via the modern crop and livestock farmer.[1] Though these

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[1] Grunig notes ("Economic Decision Making and Entrepreneurship Among Colombian Latifundistas," op. cit.) that the unsuccessful entrepreneur in Valle, who tends to overadopt and have high fixed costs while dedicating few management hours to agriculture, has a low percent of his capital in agriculture. The successful entrepreneur, who is not a full time farmer and who has other business interests, does assign considerable management hours to agriculture; the fact that he is fairly capital-intensive suggests that he may be bringing capital from elsewhere. In Meta, the unsuccessful part time livestock producer, although he devotes little working time to agriculture, does have a fairly large percentage of his capital invested there, suggesting to Grunig that he holds a salaried position in Bogota which takes much of his time but not his capital, and forces him to be a distant absentee owner. (Grunig, op. cit., p. 22.)

It is of interest to note that a very sizeable number of all producers do not have agriculture as their major economic activity: DANE's 1968 sample survey (DANE, Encuesta Agropecuaria Nacional, 1968, op. cit., p. 31) indicates that of 1.5 million producers listed, 385,000 indicated that their principal occupation was not "agricultural producer." Unfortunately no size breakdown was available, though it is interesting to note that, with the average farm being 19.5 hectares (including much land barely worthy of the term), this group averaged 15.1 hectares, and the residual group averaged 21.0. As of 1960, 42.5 thousand farms were managed by an administrator, with 9.4 million hectares. Presumably some of the absentee farms do constitute a major source of income for the owners, but it is interesting that if all of these figures are valid, many smaller farms do not. The 1968 figures give no breakdown by size to permit comparisons with the 1960 figures.

farms may attract a good deal of investment it must be borne in mind that its social payoff is often mediocre at best. This reflects Colombia's ineffective capital market and the monopoly control over some of its more productive industries.

A.3. Credit to Agriculture

While not a physical input itself, credit, by making possible capital formation or technological change which might not otherwise occur, is an indirect source of increase in output. Being the source of investment funds on which public policy can have the most direct effect, its effects are of special interest. We return to an evaluation of the credit system after presenting an historical and quantitative background. First, a few general comments on the role of credit.

Theoretical Determinants of the Productivity of Credit

Ideally, credit makes possible an investment which would not otherwise occur, thereby increasing aggregate investment in the sector in question and the economy. Its maximum effect would be felt where investments were lumpy and the borrower, on obtaining a share of the needed funds in the form of credit, increased his own savings to make up the difference. Credit would then have a sort of multiplier effect on total investment; the next step in this successful sequence is, of course, an increase in the income of the recipient.

At the other extreme is the case where the availability of credit allows the recipient to invest without undertaking savings he would otherwise

have done, i.e., allows him to consume more than he otherwise would have.[1]

[1]Theoretically credits could even have a negative (as opposed to a zero) effect on investment if the consumption expenditure made possible by the credit is lumpy; or not being able to undertake any of it without the credit, the recipient might have used his free funds for investment. I know of no studies which attempt to quantify these coefficients of redistribution of expenditure between consumption and investment following from loans to different types of people or sectors of the economy.

Or the funds may be invested in other sectors, productively or unproductively. The extent of these various deviations from the desired effects depends in part on how credit is administered. Further the marginal productivity of investment probably varies a good deal from subsector to subsector within agriculture and from farm to farm. Overall credit efficiency therefore depends on its being allocated to farms with high marginal productivity of capital, as well as its being actually employed there.[2]

[2]The existence of a labor surplus situation might suggest a generally high marginal efficiency of capital (since the situation of the typical farm may be interpreted as one of a too high labor/capital ratio); but it has also been argued that the really scarce factor is land and that land and capital are so complementary that more capital cannot help much without more land. This is, of course, an empirical question.

Quantitative Development of Institutional Credit Over Time

Credit to agriculture comes primarily from institutional sources (the public Caja Agraria and the private commercial banks) and partly from other sources such as private businesses, friends, money lenders, etc. Only impressionistic evidence is available as to the importance of the latter channels, (it appears small in money terms) and there is considerable uncertainty about the amount of institutional credit formally directed to agriculture which actually gets used there. It is well known that some credit to people who are farmers is used in other sectors (such as urban construction)

and there is reason to believe that a substantial portion leads primarily to an increase in consumption rather than to investment.[1]

[1]It is not usually difficult for a borrower to obtain credit to "finance" an investment which in fact he would have made himself without outside funds; the effect of those funds may then be simply to let him increase short-run consumption.

The Caja de Credito Agrario is a government-established semi-public institution founded in 1931 for the specific purpose of making credit available to farmers whose size of operations and collateral were not sufficient to enable them to borrow from the commercial banks.[2] The existence of

[2]The government's contribution to the expansion of agricultural credit has come not only in the form of setting up the Caja Agraria, but also through decrees forcing the commercial banks to allocate a certain minimum percentage of their loans to agriculture. The net effect of these laws, after a good deal of avoidance occurs, is unknown.

this institution was an important factor in a rapid increase of the ratio of "agricultural credit/value of agricultural output" from the 1930's (when figures became available) to the early 60's. (See Table III-10) In 1937 the Caja distributed about two-thirds of the new loans recorded as having gone to agriculture (and this figure may have an underestimate of the true share);[3] the ratio fell to less than half during the forties and fifties,

[3]It must be remembered that some share of credit reported as going to agriculture leaks out to other sectors. The overall credit figures presented in the various tables tend therefore to be overestimates of "credit applied." Since the leakage is probably more severe from commercial bank loans, the figures probably underestimate the Caja Agraria's share of credit used in agriculture.

but recently approximated the 50 percent level again. (see Table III-11) In terms of credit outstanding, the Caja's share is a little higher (around 55 percent in 1969) due to the longer average period of its loans.

Table III-10

Institutional Credit to Agriculture, Absolute Terms and in Relation to Value Added: 1940-1967

(5-Year Averages)

	New Loans / Value added	Credit Outstanding / Value added	New Loans (Millions of 1958 pesos)	Credit Outstanding (Millions of 1958 pesos)
1940-4	8.57	5.58	277.7	182.2
1945-9	11.51	8.38	519.4	359.8
1950-4	14.83	11.24	878.0	663.3
1955-9	17.16	16.34	1,227.6	1,162.3
1960-4	17.46	20.12	1,457.6	1,690.8
1965-7				

Source: A-26.6

Table III-11

Distribution of New Loans and Credit Outstanding,

by Type of Credit Agency,

(5 year averages[1])

	Caja Agraria		Commercial banks		INCORA		Banco Ganadero	
	N.L.*	L.O.**	N.L.*	L.O.**	N.O.*	L.O.**	N.L.*	O.L**
1940-1	58.84	73.0	41.18	27.0				
1942-4	45.39	61.3	54.58	38.7				
1945-9	42.00	57.8	57.99	42.2				
1950-4	44.74	58.8	55.12	41.2			.14	
1955-9	41.11	57.7	56.51	41.7			2.38	0.62
1960-4	45.51	53.7	50.66	41.5	.26	.22	3.56	4.56
1965-9	48.68	51.4	42.05	34.1	3.76	5.4	5.50	9.07

* New Loans
**Loans Outstanding

[1]The figures presented here have small errors due to the fact that they were calculated by adding current price figures for the five year period to get the totals for same.

After more than doubling in the period 1940-1955, the ratio of reported new loans to agricultural output stabilized after about 1955. Table III-10 presents time series for new loans and loans outstanding to agriculture (including livestock) in current and in 1958 pesos, and for the relationship of new loans and credit outstanding to the value of agricultural output. Diagram III-2portrays the movements of real credit and output. The ratio of loans outstanding to value of output, which probably has more economic significance, continued to rise after 1959, to a peak of 23 percent in 1963 and has fluctuated around 20 percent since then.[1]

[1]Again, minor changes in these ratios do not necessarily mean much since leakages to other sectors may have varied over time. It appears, for example, that the now surveiliance of loan use associated with the Fondo Financiero Agrario may be decreasing such leakages, in which case the "credit applied/value of output" ratio may have increased further, although marginally, in recent years.

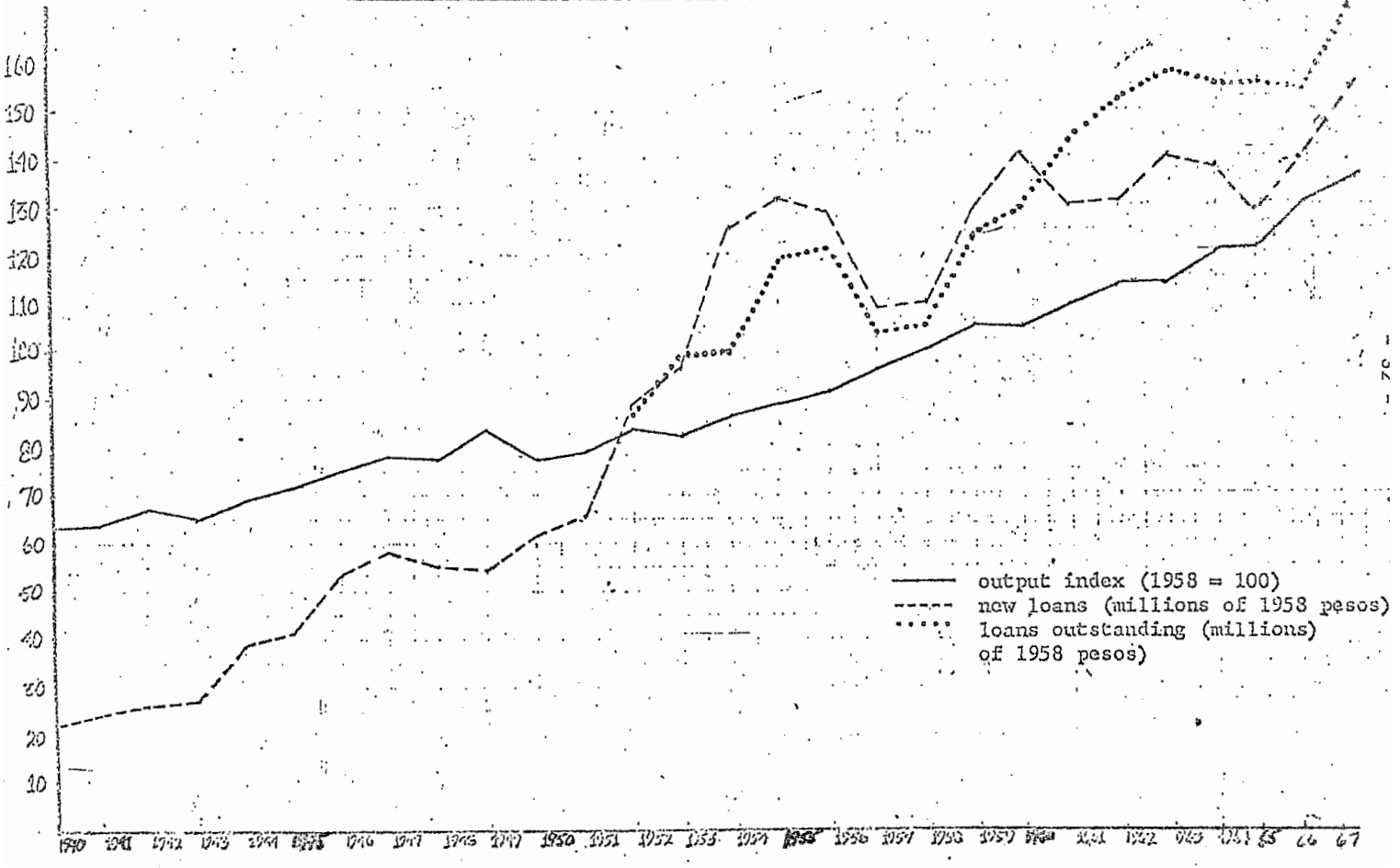
It may be that the level reached in the mid to late fifties was in some sense a "natural" one. But a more likely determinant of the leveling off was the overall state of the economy; both the "new loan/value added" and "credit outstanding/value added" ratios for the non-agricultural part of the economy peaked in the late 50's and fell substantially in the 60's, so the generally increased scarcity of credit may have prevented further increases in the ratios within agriculture.[2]

[2]One obvious possibility of explaining the different behavior of the ratios in agriculture and in non-agriculture is that the law of 1959 requiring commercial banks to direct a minimum of 15 percent of their credit to agriculture led them to either (a) give more credit to agriculture, (b) reclassify credit whose use was not clear or (c) misclassify credit really going to other sectors. Control over reporting of use has not been tight. But in fact the share of commercial bank credit reported to have gone to agriculture has fallen since 1959, so this cannot be the key factor (see text).

Agriculture did not suffer the same credit tightening as non-agriculture because the Caja, the Banco Ganadero and INCORA all had above average credit

DIAGRAM III-2

Real Credit and Output: Crops and Livestock, 1940-1964



expansion rates during the sixties; the share of all loans going to agriculture has risen since the mid-fifties. While the increase in the ratios from 1950 through 1955 (Table III-10) suggests a link with the coffee boom, this is not obvious since the upward trend goes back at least to the forties and very likely further. Disaggregating the developments of the mid-fifties and on, we observe a stagnation of the ratio for coffee (at least this appears to have occurred between 1954 and 1962) a more or less continuous increase in the ratio for crops other than offfee (although this ratio has fluctuated a great deal), and a decrease in the ratio for livestock. (See Table III-12)

Productivity and Adequacy of Credit

Like other tools of agricultural policy, credit should be judged by its effects on total output and on income distribution. To maximize the effect on output (a) the optimal amount must be conceded (so that its marginal productivity is the same as in other sectors of the economy), and (b) it must be allocated to the most productive investments, and not leaked into consumption or socially less productive sectors. The income distribution impact depends in particular on the relative amount of credit received by different groups of farmers, especially the small and large.

Lacking measures of the return to credit either in agriculture or in the other sectors, it is difficult to guess whether the quantity has been optimal or not. The credit/value added ratio in agriculture is still somewhat lower than in other credit receiving sectors, the loans outstanding/value added ratio for these sectors[1] in 1965-7 was 17.4 (vs. 14.9 in agriculture) and the new loans/value added ratio was 20.3 (vs. 17.5 in agriculture). (See Table III-13)

[1] i.e. the rest of the economy, excluding government, most personal services, and building rental incomes.

TABLE III-12

Ratio of New Loans to Value of Output by Sub-Sectors

	Coffee	Other Crops	All Crops	Livestock
1940-44	6.4	3.1	3.9	12.0
1945-49	7.8	5.6	7.9	16.8
1950-54	8.2	7.8	9.4	23.8
1955-59	9.8	9.6	11.8	26.1
1960-64	10.3	12.7	14.6	-
1965-67	12.4	15.4	16.1	

SOURCE: Table A -

Table III-13

Over-time Relation of Loans to Output; Agriculture and Total

	Loans Outstanding			Non-agriculture excluding government Services & rental income from houses	Agriculture Loans Outstanding / All loans Outstanding	New Loans/Value Added			Agricultural
	Agric.	Total	Non-Agriculture			Agric.	Non-Agric.	Total	New Loans/All New Loans
1940-44	5.6					8.6			.214
1945-9	8.4	10.5	11.7		25.2	11.5	16.5	14.8	.260
1950-54	11.2	12.3	14.0		30.7	14.8	20.3	18.4	.282
1955-9	16.3	16.8	16.8		33.6	17.2	22.6	20.8	.287
1960-64	20.4	17.1	15.5		35.8	17.9	18.6	18.8	.293
1965-7	20.1	14.9	12.9	17.4	37.8	17.5	15.0	20.3[a] 15.7	.303

Source: Table A-504 ?

[a]Non-agriculture, excluding government services and rental income from houses.

Despite the long period of growth of the credit/output ratio there remains substantial impressionistic evidence of scarcity. One might judge on the basis of the excess demand that the rate of return is at least above the rate of interest charged. But this is not too revealing, since the Caja's nominal rate of interest has traditionally been below 10 percent, and the real rate has thus usually been negative. Commercial banks charge a higher interest but even here the real rate has often been low.[1]

[1] Another possible indication of the yield on loans to agriculture might be the rates charged by the "prestamistas," who loan on less security than the Caja Agraria (or, none at all) and for short-term periods. Their interest rates are often in the neighborhood of 40 percent per year, or higher for very short periods. In the CAR study they were not this high, the average being 2.1 percent per month, or about three times as high as the short term rate charged by Caja. It is interesting to note that the average rate charged by individuals had apparently fallen between 1961 (2.4 percent) and 1964 (1.8 percent). (I am not sure, however, whether I am interpreting these annual figures correctly. It is possible that the investigators checked on all loans and that the rate of interest is higher for these conceded in 1961 because they were longer term loans.) In some regions most of the loans are by prestamistas rather than by institutional credit givers like the Caja Agraria and the commercial banks. But since a large proportion of these loans are probably not for productive purposes, the interest rate the borrower can afford to pay is not a measure of the productivity of any project.

A part of this could be due to the historically low interest rates. And credit scarcity certainly characterizes other sectors as well--what is relevant is relative scarcity. Judgments on whether the system has steered too much or too little credit to agriculture are, further, very difficult and of doubtful meaning since it is probable that its productivity has varied considerably by subsector--being for example low in the livestock subsector and high in certain crops.[2] Further, in view of the severely unequal

[2] The question of the optimal total amount is thus closely related to and in a sense subsumed under that of optimal distribution.

income distribution a strong argument could be made for subsidizing credit to smaller farms and distributing enough there to bring the marginal productivity below that for larger farmers. Quantitative data is thus hard to use; but some information is, nevertheless, of interest.

To my knowledge, no studies have attempted to estimate a social rate of return for credit.[1] The use of macro time series analysis is very difficult,[2] and no well controlled farm level studies have provided persuasive

[1] A number of studies have put forward some relevant information or judgments. According to comparisons by the U.S. Department of Agriculture, the measure "credit/tons of agricultural output" (the denominator measured in wheat equivalents) puts Colombia more or less in the middle of the underdeveloped countries in 1961, although strikingly below such Latin American countries as Mexico, Venezuela, and Chile. The methodology involved in these comparisons is not as sound as to warrant much faith.

In one study the American AID mission suggested that, of all the possibly limiting factors such as land tenure, market conditions, etc., which affect the farmer, Colombia compares most favorably to other countries in the realm of credit.

[2] Problems of two-way causation impede the use of time series data to test for the effect of credit on total output or on the output of the specific crops to which it is directed. The absence of any relationship might mean that credit tended not to be channelled flexibly toward the newly important crops at any given time, but would not prove that the rate of return was low. The presence of a relation with credit leading output might suggest that it was important but would be by no means conclusive evidence since credit could be simply "following" output plans, and it might be only affecting the crop composition of output rather than total output. And output (of crops especially) is, of course, effected a good deal by weather conditions, etc.

For the years 1940 to 1964 there is not a tight relation between agricultural output in constant pesos and agricultural credit in constant pesos, either in the aggregate or when the livestock and crop figures are separated. Credit does not show up as a key bottleneck, in other words, to ascertain whether it is important (but not so much so as to overwhelm the impacts of other variables) a multiple variable analysis would have to be performed.

Unfortunately, data on the "by crop" distribution of credit from the commercial banks is not readily available; only Caja Agraria figures are available at this level of disaggregation.

The generally fairly close relationship between real credit

and the output path of a crop is borne out by the figures. In a couple of cases there seems, if anything, to be a lag of credit behind output, although in general there is no evidence of either lead or lag. While neither the presence of a lead or a lag would answer the question of the credit's productivity, a lead would constitute a more persuasive case than a lag. In the case of coffee, credit seems to have followed (up to 1961) a reasonable pattern of what one would guess was the planting profits during these years; due to the gestation period required in coffee production, the output series naturally lags planting.

evidence. The continued importance of prestamistas (private money lenders) certainly reveals a demand[1]--though it is more open to doubt whether this

[1]The private money lender is important for certain groups of borrowers, as we see later. And large borrowers go to the prestamista in substantial numbers because of the speed with which their needs can be met in this way.

demand is usually for investment funds and whether it reflects a general lack of credit or a lack of the specific credit service desired.[2] The low

[2]Not surprisingly for a relatively profit conscious institution, the Caja Agraria has problems in supplying the credit service needed by small operators. (The commercial banks are, in effect, not in this market at all.) More on this later.

capital/labor ratio of the small producers could suggest that it still has high productivity for them; examples of small farmers unable to use land even for cattle grazing because of lack of capital are not infrequent. The profits of well run medium and large-scale farms usually leave ample margin for subsequent investment if such is desired, but the most ambitious among these large farmers--especially ones recently established in business--are are often unable to carry out improvements as rapidly as desired.

The private payoff may not equal the social one, so "demand to invest" does not demonstrate desirability. When credit leads to labor displacing capital formation it may decrease total output as well as worsen income distribution; this is most likely when a farmer has as serious possibilities

two technologies differing in labor intensity. Even fairly small farmers may engage in labor displacing capital formation based on the credit they receive. A social appraisal of credit requires careful attention to such general equilibrium effects.

Judging by the fact that the sector was formerly less dualistic than it is now and that less credit went to finance possibly labor displacing investments, it seems probable that the very rapid increase of the 1940's and the early 50's contributed significantly to the growth of that period. In the last two decades the credit directed to commercial agriculture has probably paid off well in output terms since, as discussed in more detail elsewhere, the commercialization has largely involved a conversion of cattle lands to crops and large attendant increase in value added per hectare. But livestock is a different story. Since so much depends on the type of agriculture, it is useful to focus the remainder of the discussion of credit productivity on the more disaggregated subsectors.

Distribution of Credit: Tenancy, Size Group, Type of Agriculture, Region

The credit/output ratio is positively related to each of livestock (vs. crop) production, farm size, security of tenure, and modernity of operations (at least in crops but probably also in livestock). Since most of these factors are quite interrelated, it is not possible to say in the absence of a multiple regression analysis which ones have *per se* positive impacts on the ratio in question. The low proportion of share croppers who, as of 1959, received Caja credit is evidenced in Table A-121.S1 A more

[1] CIDA, *op. cit.*, in criticizing the Caja Agraria notes that although all the activities are of a public type, the legal composition of its directive Junta and its sources of capital are more characteristic of a private banking entity. The annual reports concentrate on rates of profit achieved and the low level of defaulting and reveal a fear of excessive expenditures in the

programs of supervised credit. CIDA claimed that the real purchasing power of the Caja loans decreased by one-quarter between 1953 and 1961--a result completely inconsistent with my own figures.

Certain rules controlling operations of the Caja place limits which appear to exclude very large operations from receiving credit, although these limitations are liberal (see CIDA, p. 196). Control of the Caja loans is exercised through 650 evaluating inspectors whose principal task is to judge borrowers, which they do in a very limited degree, and to control the effective destination of the loan, which they essentially do not do.

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recent attempt has been made to relate Caja credit to size. For the second semester of 1970 and the first semester of 1971 the Caja's new loans were classified by the patrimony of the recipient making possible a rough idea of the relationship between loans, farm size, income of recipient, and ultimately a guess at the impact of the Caja loans on agricultural income distribution.[1] Despite serious statistical difficulties, the study provides

[1]The study was undertaken by Jorge Ardila and Tomas Villadiego, a paper written in the ICA development course, second semester, 1971.

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strong circumstantial evidence that the credit program of the Caja Agraria has little impact (it is not clear whether it is mildly positive or mildly negative) on the income distribution of agricultural producers[2] (excluding

2 - Unless the gain in terms of increased farmer income per peso of credit is substantially different across farm sizes and levels of patrimony, the above hold true. While there is no strong reason to assume a constant rate of return on this capital across farm sizes, it is not obvious that the rate of return should be either higher or lower at the lower farm size levels. If it is higher, the impact on income distribution among farm producers would be possible.

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those of less than, say, one hectare). The impact of the Cajas credit on overall agricultural income distribution would be negative since the producer incomes are on average, well above those of landless workers.[3] If the credit

[3]As mentioned elsewhere, the fact that the Caja's credit program may worsen agricultural income distribution is hardly a condemnation per se, since even if its credit were concentrated substantially more in the small producer sizes, the possible widening of the gap between the incomes of these people and landless workers could worsen distribution in any case.

leads to more labor intensive production and hence more hiring of landless workers, it may of course benefit that group; it could even theoretically benefit them more than the direct recipients. This seems rather unlikely, however since credit studies have not shown any general tendency for recipients to hire much more labor.

It is striking, given the official focus of the Caja on relatively small farmers, that one half of its new loans in the year in question went to individuals with patrimony above 400,000 pesos.[3] This cut off point appeared to correspond to a farm of around 25 hectares and, roughly, to the top ten percent of income earners in agriculture.[1] When the commercial banks

[1]Since in agriculture the top ten percent have about 50 percent of income, the fact that their income is raised by about the same percent as is that of the next three deciles or so is consistent with its not changing the distribution among producers substantially.

and the corporacionas financieras are taken into account, the overall impact of agricultural credit is almost certain to be negative with respect to the agricultural income distribution, unless the indirect effect via increased hiring resultant on receipt of credit is quite positive. Since credit is so frequently used to effect mechanization and other not obviously labor demand augmenting investments, this would be a difficult case to make. It might even be argued that most of the credit program has the impact of lowering absolute real wages. The

average value of new loans by institution are shown in Table III-11.

Commercial bank loans must go much more exclusively to the large-scale farmers than do the Caja's.[2] Loans of individuals go in greater proportion

[2]Some official and private entities furnish credit in the form of inputs for particular crops with a term of one crop--a third source of credit. Examples are the Cotton Growers' Federation, the Breweries, and the Tobacco

[3]Montero describes the problem of the semi-public credit agency like the Caja as follows: "...Their form of business organization has compelled them to assure the maximum monetary return possible, and in allocation of scarce resources preference is generally given to the low risk, low-cost situations... Credit funds are rarely allocated on the basis of potential increases in the level of income of the borrowers. The productivity of capital to be purchased

Institute. The furnishing of cattle on the part of the cattle funds also falls under this category. Most of this institutional credit goes to the modern commercial farmers who concentrate on commercial crops. I have not seen any attempted quantification of it. And a recent arrival in the credit field--The Corporaciones Financieras--focus on even larger borrowers. In 1970 whereas the Cajas average loans (new) was 9,400 pesos, and that of the commercial banks was 41,600, that of the corporaciones financieras was over one-half million pesos. (See Fernando Copeta, "Participacion de las Corporaciones Financieras en el Credito Agropecuario Comparado Con la Caja de Credito Agrario, Industrial y Minero of Los Bancos Comerciales," mimeo, 1971, paper presented in Los Andes University course in Colombian Agriculture.)

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to the smaller non-owners, thus acting as a backstop to the inability of the official system.[1]

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[1] Although no national samples have been done on credit sources, the results of studies in specific areas are probably fairly representative. In the Rio Suarez Valley, of the properties of less than three hectares during the year under consideration, 21 percent received credit; of these 54 percent received it from the Caja Agraria, only 8 percent (i.e. 2 percent of all the farmers) from the commercial banks, and about 34 percent from individuals. For farmers over three hectares 44 percent received credit, and here the Caja and the commercial banks were the source for 65 percent, individuals for 23 percent, and the rest mixed. (Hanneson, et al. op. cit., p. 96). Form of tenure was an important determinant of credit distribution with only 10 percent of renters getting credit and almost half of these getting it from private individuals (p. 95). Individual lenders usually required as a guarantee only a co-signer whereas the banks tended to require some physical guarantee. The Caja was giving many more loans without the use of "prenda" than it did a few years earlier, but this was presumably because it was loaning to the same person again--a person who previously did have to put up a guaranty.

The authors of this early 60's study felt the work of the Caja Agraria had been good but had not brought about the expected results due to the lack of technical assistance and supervision--these had been almost completely absent. Since the small farms in the Rio Suarez area are usually dispersed or forming small nucleae separated by the cattle farms, it is difficult for the credit entities to exercise control over the use of the loans; this permited some farmers to use the money to make up the difference between income and subsistence consumption. Often the true use of the loan has to be covered up since the repayment must be scheduled according to the timing of incomes. Presumably Caja loans used for consumption must fairly frequently be repaid by resource to private lenders.

Eighty-three percent of the illiterate farmers did not receive credit while 68 percent of the literate ones did not. Age of owners did not seem to play a particularly large role. About half of the farmers who did not solicit credit at the banking institutions explained this in terms of their scarce economic resources, (i.e. inability to supply a guarantee); about

one tenth did not want to get indebted, and about one-fifth were discouraged by such things as the excessive paper work, lack of consideration in the Caja, not knowing how to go about getting credit, and such reasons.

The monthly interest rate of the "prestamistas" ran around 2 percent during the period 1961-64. It was thus about three times that covered by the Caja Agraria for short term loans and twice that for medium term loans.

Montero's analysis of credit in four Tolima municipios is in many respects the most complete which has been undertaken to date.[1] He classified farms as subfamily, family and multifamily, with further subclassification by size.[2]

[1] Montero analysed 239 farms in Northeastern Tolima in the muncipios of Armero, Mariquita, Honda and Fresno. Extensive livestock and mechanized agriculture characterizes the flat terrains, with hired managers, day workers and absentee landlords. Subsistence agriculture is found in the mountains, where social unrest and violence have induced out migration over the last 20 years. Farm workers frequently own small farms but usually this does not provide enough income to support families. Armero and Honda are representive of the complex latifundista-minifundista situation prevailing in many parts of Colombia.

[2] A family unit was defined as one with enough land resources to provide work for the producer and the members of his family; "small" family units were those of up to 50 hectares, and medium units were more than 50 hectares. Multi-family units are those with one or more permanent workers (who may be sharecroppers.) Crop growing was much more concentrated on the sub-family farms, accounting for 58% of the area, 42% of them or small-family farms and 43% of that on small-multi-family farms (which averaged only 20.1 hectares) and 17% for the medium and large multi-family farms, which average over 200 and over 2,000 area respectively. Half of the large-scale multi-family units had access to public irrigation waters. Only the large multi-family farms systematically used tractors, less than half of the medium multi-family units had them.

At some time during the period 62-65 the majority of farms with all categories had used credit, although barely more than half of the sub-family units. Credit per hectare was lower for the two largest categories than for three of the smallest four (across which it was almost constant) but--if it were assumed that all of

their credit went for crops--credit per crop hectare would be highest in the two largest categories; since it did not, it is difficult to compare credit access via these figures; overall the suggestion may be that access is quite similar for all the groups except the sub-family unit.

Of the 461 loans received, 320 were from institutional sources, about half ofthe remaining 141 were from friends and relatives and about 50 from money lenders.[1] Two-thirds of the units studied had acquired at least one loan from the

[1]Average loan size was, needless to say, higher from the institutional lenders, the duration substantially longer and interest rate lower. The annual rate cited for money lenders was 41 percent, whereas friends and relatives, stores and so on did not quote interest rates; this cost was presumably part of the price of goods in the last case.

Caja during period 1962-65 but 60 percent of the sub-family units "had never used a Caja loan." The Caja appeared to be allocating the bulk of its funds among middle-sized-family operations and not financing the very small farm units. "Only farms with 5 or more hectares are being extended credit in the study area."[2] "In general the clientele of Banco Cafetero is formed by producers within the multi-family group of units."[2] ([1]Montero, op.cit., p. 62. [2]Montero, op.cit. p.63)

Non-institutional lenders as a group were second in importance to the Caja, but were more important in terms of credit to the family and sub-family categories.

Essentially all of the institutional loans were cited as being for productive purposes, and about 2/3rds of those from non-institutional lenders; personal use accounted for about half of the loans from friends and relatives and about a third of those from money lenders, but none of those from the other sources. This is, of course, the statement of the borrower; the most common use listed for the non-institutional loans was crop-operating expenses.

As with most institutional credit systems, the group least benefitted are those most seriously in need of credit, i.e., the small farmers who rent their land and hence have no security with which to guarantee loans. Some suggestion of the differential availability of credit by farm size can be deduced from loans by patrimony"information. Although no firm conclusions can be drawn without more precise data on the relationship between size of farm, patrimony, and output, a quick guesstimate suggests that the Caja credit/value of output ratio may be as high for farms over 50 hectares as for those under 50. This conclusion is supported by Montero's figures from Tolima, which suggest that only for what he calls the large multi-family unites, most of which are over 500 hectares, is the Caja Agraria an unimportant source of funds. And the figures suggest that Caja credit per crop hectare is probably almost constant up through the other size categories (see Table A-29.1).

National figures on the ratio of Caja Agraria loans to value of output by tenancy in 1959 reveal the low credit support to share croppers, who are usually small farmers (their average size in 1959 was 6.6 hectares, well below the average for all crop farms, 9.2 hectares), and to settlers, ~~who, presumably fare less well than owners and renters because of their~~ tenure status.[1]

[1] Figures suggests mild improvement in distribution during the decade 1955 to 1965, as settlers ans share-croppers both increased their shares a little, though hardly dramatically. The percent of all new loans going to owners fell from 82 percent in 1955 to 71 percent in 1965. A substantially increased share going to renters probably reflects the increased presence of the commercial renters; whether the small-scale renter is any better off remains to be discovered. A breakdown by tenancy of borrower is not available for the commercial banks, but probably over 90 percent of their loans are to owners and commercial farmers, some of whom rent.

(earlier sixties)

CIDA estimated that two-fifths of the Caja's new loans were made to persons who already received a loan during that year; hence, 11.3 percent of all farmers received Caja loans: 13.1 percent of owner-operators, 12.3 percent of renters, and 23.3 percent of all others. (Assuming the tendency for loans to the same person to be repeated is as great for one tenancy group as another. Estimates of the number of farmers in each tenancy category come from the Agricultural Census (Departmento Administrativo Nacional de Estadistica,). If no operator had received more than one commercial bank loan, then 4.2 percent of all farmers received loans from commercial banks in 1962; however, since commercial loans are primarily short term, and commercial growers generally plant more than one crop per year, one might expect between 30 and 50 percent of a year's loans to be duplicated. There is probably little overlap between recipients of commercial bank loans and recipients of Caja loans, so about 14 or 15 percent of farm operators probably received one or the other in 1959-1960.

Is the situation of the small poorly secured operator improving? Has the last 25 years' increase in the overall credit/output ratio filtered down to this group or do the changes in the overall ratio camouflage a stationary situation for some groups; the commercial farmers, increasingly important in the last 20 years, do have a high credit/output ratio, so even if it stayed constant the overall credit/output ratio would rise.[1]

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[1] The evidence does not argue strongly for the conclusion that the increased credit/output ratio in 1945-1955 resulted largely from the increase in relative importance of the commercial subsector. The credit to value of output ratio rose as much for livestock as for non-coffee crops. It did not rise in the coffee sector, although loans per quantum of coffee did. Unless the livestock sector was also becoming more commercial at this time (it may have been but impressionistic evidence would have suggested that this phenomenmen gained force a little later), this disaggregation suggests the presence of other factors. And, in fact, the period 1947-1957 was not marked by rapid growth of the commercial crops--this came after 1957 (see Table II-12). Of course, growth of the so-called commercial crops is not an exact measure of growth of commercial type of farming. If commercialization were more accurately indicated by the stock of machinery, the phyothesis would appear plausible, since this stock was rising rapidly and continuously (Table II-7); and it is well known that machinery purchases have been extremely easy to finance via credit.

Since the credit statistics have not historically been classified directly by size of recipient, there is no solid evidence as to whether the small-scale farmer is faring better or worse than before. The best

guess is that he is. It seems clear that the Caja Agraria has made an important positive contribution to the medium sized farms, say 5-50 hectares (of average land). Towards the bottom of this range it has usually been the sole institutional lender, so its development has been quite important for this group. Some feel as to how its lending pattern has evolved over time may be deduced from its average loan; this was fairly constant, at around (or a little over) 2000 1958 pesos (i.e. around 300 dollars) from 1940 to 1965[1]--since which time it has risen.[2] As the ratio Caja

[1]Compare this to the commercial loans, where average loan in 1959 pesos rose from in 1940 to 16,170 in 1965.

[2]The fact that a substantial part of all Caja credit is obtained by the larger farmers, is partly due to their greater asset backing, but also due to the increasing direction of credit towards the types of crops and the livestock in which the large-scale farmers specialize. The Caja concluded originally that supervised credit was too costly, but that other credit tended to be used to step up current consumption without improving production capacity.

A recent and interesting innovation of the Agrarian Reform Institute (INCORA) aimed largely at the smaller farmer is its "supervised credit" program. Recipients of credit undertake certain technological improvements as part of the bargain--e.g. they might be required to plant a better variety of some crop. While the program is relatively young, (it started in 1963) it has given promise, and despite predictable differences it seems to be helping to bring about some desired changes. (A fuller discussion of the program is presented in Chapter VIII.)

Despite such recent efforts by the Caja Agraria and INCORA to reach the small farmer, in many regions his main source of credit probably still lies elsewhere.

found that most farmers (53 percent) preferred to receive credit from private money-lenders (prestamistas) rather than either commercial or state banking institutions[2] . . . , (39 percent). About 40 percent indicated a preference

not to deal with the banks even when no alternative was presented to them in the question; such a result is consistent with the observed suspicion and distrust which many small farmers have of the banks (the above sample included farmers of all sizes, though most were in the smaller size brackets). In other areas reluctance to deal with banks seems based less on suspicion than on lack of guarantees. As noted earlier, the major reason why campesinos in the Rio Suarez area had not solicited credit from banking constitutions was a lack of economic resources to offer a guarantee for the loans.[3] Small farmers have usually had little knowledge

of the banking institutions, the same goes for prestamistas--they usually know only one.[1] Around 1960 Fernandez concluded that 50 percent of the demand

[1]The importance of professional money-lenders is, of course, not unique to Colombia. Nisbit notes that they supply 50 percent of agricultural credit in Ceylon, 70 percent in India, and 20 percent in Thailand. In Taiwan, where a strong governmental effort to increase agricultural credit has been made since World War II, the percent of loans from non-institutional sources fell from 83 percent in 1949 to 43 percent in 1960; in each year the share of credit from these sources was presumably much lower than the share of loans, since the average loan would be smaller; but this share must still have been substantial. (See H. Y. Chen and R. A. Bailey, "Agricultural Credit in Taiwan," Agricultural Finance Center, Department of Agricultural Economics and Rural Sociology, The Ohio State University, August 1955.)

Nisbit's more detailed study in Chile probably hints at the patterns in Colombia. (See Charles T. Nisbet, "Interest Rates and Imperfect Competition in the Informal Credit Market of Rural Chile," Economic Development and Cultural Change, Vol. 16, No. 1, October 1967.) In a country with average income equal to or a little above that in Colombia, he estimated that 70 percent of farmers were outside the formal credit market and that of these 45 to 50 percent participated in the informal credit market at least once a year, with 20 to 25 percent being outside both markets. (p. 74)

In about 50 percent of the cases of cash loans the lenders (with the exception of patrones) demand repayment in kind. (This presumably is related to the continuous inflation in Chile and would be less the case in Colombia.) Excluding village stores, commercial lenders have positive rates ranging from 27 to 360% percent with an annual mean of 82 percent. The village stores tended to have negative rates but it is likely that these are positive after hidden charges like requiring payment of a premium, overcharging, and so on could be taken into account.

While the size of loans is usually smaller in the informal market, the term was longer--being typically "until the harvest" (6-9 months). A little over half of the loans were used for consumption purposes and 25 percent for consumption and production; it was presumably not emergency consumption, but simply normal consumption requirements pending the next harvest.

A mean of two lenders operated within a rural credit market (range 0 to 7) with the village store being somewhat more widespread than the money lender. The lenders had detailed knowledge about the borrowers, and in general there were no written documents; the usual security was verbal promise of the borrower. The farm operators revealed great ignorance of alternative lenders and terms offered; partly this is due to the illegality of money lenders under Chilean law--transactions have considerable secrecy. Lenders have a considerable degree of market control through monopoly position, threat of future retaliation, and so on. There is no active competition between commercial and non-commercial lenders. Each money lender's share of the rural credit market area is nearly stationary; in no case had a borrower switched to another money

lender because of price competition. Illegality discourages competition. The lenders are principally farmers whose lending activities do not represent more than 50 percent of their annual gross income so they could not carry on large scale lending, (different from his observation in Colombia). Nisbet argues that oligopoly type arrangements are the rule; owners of village stores may even finance each other at low rates (well below what they charge their farmer clients); money lenders and village stores who buy crops before the harvest will offer farmers the same price.

for credit from the Caja was unsatisfied.[1] More recent

[1] Alfonso Fernandez Cordova, La Estructura del Credito Agricola en Colombia, Servicio Tecnico Agricola Colombiano América (STACA), Bogotá, November 1962, p. 10. This is, at least on the surface, consistent with Carter and Bailey's observation that in the areas they studied the ratio of volume of funds requested by Caja directors and the volume assigned to them was two to one. But these are crude indicators and can easily be upward biased.

studies with which I am familiar do not, unfortunately, provide a base for over time comparison.

The Caja Agraria's range of activity is limited by its requiring security which many farmers cannot provide. It is sometimes criticized for slowness in processing loans[2] and being demanding of the farmer. The Caja (see footnote 4)

[2] Though one study, by Carter and Bailey, observed that most loan applicants received their funds the same day if they had established credit earlier and almost one-half did even if they were new clients, i.e. this study suggests in general that the time required for loan processing is well within reason. Undoubtedly different offices vary in such respects so some degree of criticism is inevitable; overall performance is hard to guage.

Agraria gives considerably less freedom of decision to the manager than do commercial banks.[3] The prestamista, with the advantage of greater in-depth

[3] If the control exercised were a form of technical assistance, this would hardly be a criterion; but the Caja manager is not a professional so the net effect of this control is hard to judge.

knowledge of the farmers in his area, exercises little if any control.

Loaning in small quantities is undoubtedly costly. Carter and Bailey,[4]

[4] H. D. Carter and A. A. Bailey, An Analysis of Agricultural Credit Operations of Selected Branches of the Caja de Credito Agraria Industrial y Minero in Colombia, Agricultural Finance Center, Department of Agriculture, Economics and Rural Sociology, The Ohio State University, Research Publication 118, December 1967.

while suggesting that the Caja was, overall, a fairly efficient lender, observed that in four branches studied (Armero, Marigwita, Honda and Fresno) the "cost/peso loaned" ratio averaged between 3.6 and 5.2 percent, the cost per new loan (including only the cost of the individual branch) was between 111 and 695 pesos and that three of the four branches were losing money. These branches had many small savings accounts, some due to the requirement that loan recipients must have an account. The branches were too small to benefit from increasing returns to scale, as reflected by frequent under-employment of personnel.

Distribution by Region

Related to and providing additional evidence on the distribution by size, tenure, and type of agriculture, is the distribution of credit by region and by crop. Table III-16 presents data on the distribution by departments, but tells, unfortunately, little about the evenness of credit distribution, since not all the credit conceded in a given department is used in it. Cundinamarca and Atlantico certainly receive less credit than is handed out in their cities and some other departments must therefore be receiving more, with these latter departments probably being those close to Bogota and Barranquilla, respectively. It is probably safe to conclude that Nariño and Cauca were at this time the most credit-poor departments and Boyaca relatively so; Huila appears to be well off. Most of the rest are indeterminante due to the difficulty just cited.

Effects of Credit, By Recipients

The effects of credit being so hard to trace, there is legitimate question as to the social payoff of credit going to almost every group of recipients; to livestock growers because it may substitute for their own

Table III-16

Loan Distribution by Departments

Department	Agricultural Output, 1959	New Loans, 1960	Percent Distribution of New Loans	New Loans / Value of Agricultural Output in 1959	Loans Outstanding October, 1960	Percent Distribution of Loans Outstanding	Loans Outstanding / Value of Agricultural Output in 1959
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Antioquia	908.50	156.00	11.50	17.17	170.2	11.4	20.61
Atlantico	44.03	110.31	3.01	91.55	37.2	2.5	84.50
Bolivar	442.00	62.40	4.66	14.12	84.6	5.7	19.23
Boyaca	565.06	72.45	5.41	12.82	79.4	5.3	13.98
Caldas	804.71	124.54	9.30	15.47	141.7	9.5	17.60
Cauca	439.25	24.37	1.82	5.54	32.5	2.2	7.40
Cordoba	355.82	50.22	3.75	14.11	58.4	3.9	16.29
Cundinamarca	114.21	269.16	20.10	235.67	287.6	19.3	252.63
Huila	208.68	53.03	3.96	25.41	60.0	4.0	28.98
Magdalena	528.26	56.11	4.19	10.62	77.1	5.2	14.60
Narino	330.87	28.12	2.10	8.49	30.3	2.0	9.15
Norte de Santander	258.26	32.94	2.46	12.75	39.7	2.7	15.38
Santander	404.75	82.35	6.15	20.33	90.0	6.0	22.22
Tolima	725.42	96.68	7.22	13.32	124.2	8.3	17.73
Valle	829.49	155.34	11.60	18.72	176.1	11.8	21.22
Total	6,121.91	1,304.35	100.00	21.29	1,489.0	99.8	24.32

Sources and Methodology: Col. (1) based on calculations of the author; the major sources of data were the Agricultural Census and the agricultural statistics compiled by the Banco de la Republica. Figures on new loands and loans outstanding (Cols. (2) and (5) are from issues of the Boletin de la Superintendencia Bancaria.

funds,[1] to large scale crop producers because it may lead to labor displacement, and to small farmers, because it may lead to increased consumption. Some observers believe credit going to large farmers increases total investment in agriculture by substantially less than its value, part of it going to raise consumption; i.e. the investment in question would have been largely undertaken in the absence of the loan and would have required curtailment of consumption.[2] It is widely believed that a considerable amount of credit labelled "agricultural sector" winds up elsewhere; especially in urban residential construction; this is credit to large landholders who have urban interests. All this is logical in view of the very low or even negative interest rates traditionally attached to much agricultural credit, especially that of the Caja Agraria; it is good business to get it for almost any use.

[2]One member of the Board of the Banco Ganadero observed a high demand for credit, but noted that the cattlemen were putting little of their own money into cattle raising.

The ratio of new loans to output is much higher in the case of livestock than for crops.[3] (See Table III-12) On the other hand, since,

[3]It is true that the share of new loans to crops out of the total to crops and livestock has been rising gradually through time (see Table III- as the credit/output ratio rises for crops and (since the mid-fifties) falls in the livestock sector. The chief shift in this direction has occurred on the part of the commercial banks which in 1940 gave more than two-thirds of all their loans to cattle raising, but by 1964 were giving about the same amount to each of the two uses (according to the official figures).

at least according to ECLA estimates of 1953, the capital/output ratio is much higher in the livestock sector than in the crop sector, the "credit/capital (fixed and working)" ratio as of 1953 differed little as between livestock and crops:

coffee	5.84
Other crops	5.76
all crops	5.82
livestock	4.87
crops and livestock	5.34

In view of the higher wealth levels of livestock producers, these figures might suggest that the credit allocation is not output maximizing; a serious attempt would seem warranted to push the livestock credit/capital ratio farther below that for crops than indicated here. Some movement in that direction has since occurred.[1]

[1] If it is true that a good deal of credit registered as going to livestock, is actually diverted to urban uses, the ratio of credit applied/capital in livestock is lower than indicated here. But either way, the figures are not inconsistent with the idea that relatively too much credit has gone to this subsector.

Some reservations are in order since (a) administrative costs of livestock credit have been less than in crops (due to larger sized loans); (b) unless some other variable than credit can be manipulated simultaneously with it, whether the livestock producer could save or not is irrelevant--what matters is whether he would save if he did not receive the credit. Although he does not address himself directly to this question, Grunig's observations suggest that this individual's level of consumption may be fairly hard to budge, especially if the rate of return he sees to the investment in agriculture is not particularly high.[2] Still, some livestock credit

[2] At an impressionistic level it may be noted that in parts of Colombia the savings potential of the middle-level livestock farmer (Grunig's study referred to large-scale ones) is alleged to be constrained by his hard drinking and macho characteristics.

has been of dubious value in another sense. Grunig noted that the least successful Meta latifundistas in his analysis--the part time livestock producers--used large amounts of credit to run modern operations (characterized by high adoption of new technologies and so on) which were not profitable. These individuals, who were probably well placed to have good credit access--most appeared to be residents of Bogota--had little time available from their other pursuits to be good farmers; although they were favorably disposed to new and modern techniques, they lacked either the time or knowledge/experience to be selective adopters; thus they overadopted. The unsuccessful entrepreneurs studied by Grunig in Valle were mainly crop producers but had the same basic characteristics as the Meta group. Total efficiency of the agricultural sector could well be higher if these individuals did not participate; if, as seems possible, easy access to credit is one determinant of their participation, it could be credit badly channelled.

Of greater interest, perhaps, is the issue of credit productivity on small farms. Worries about the usefulness of credit are here of a different sort. First, the small farmer may seek credit for emergency consumption purposes, given his closeness to subsistence.[1] Frequently it is alleged that,

[1] In the absence of any data on this phenomenon in Colombia it is interesting to note that a lack of relationship between use of loans and the purpose stated in the application is not at all uncommon, elsewhere as illustrated in the following quote from Chen and Bailey. (Agricultural Credit in Taiwan, H. Y. Chen and R. . Bailey, Agricultural Finance Center, Department of Agricultural Economics and Rural Sociology, Ohio State University, August 1966.)

"...Only 30 percent of the farmer borrowers used their borrowed funds for operating expenses, such as for the purchase of chemical fertilizers, feeds, weenling pigs and payment of wages; 15 percent used the funds for purchase of assets, mostly for building of improvements. The greatest number of farmers, 55 percent of the total, used their loan funds for living expenses. The fact that only 43 percent of the farmers borrowed from non-institutional sources, while 55 percent used borrowed funds for living expenses is suggestive: even farmers borrowing from institutional sources for stated production purposes divert portions of those production funds to family living purposes.

Unless the credit is supervised and thus tied to some improvement in production techniques or expansion of operation, the small farmer will not reap any long-run benefit--he will not understand this capacity expanding goal of the credit. A further allegation is that even if his income is increased by the credit, some farmers are simply not psychologically prepared for such an increase, spend recklessly, and quickly wind up where they were before.

Tamago feels, that this credit, under present circumstances in the rural areas is not very productive. This is so only in part because the person desiring the credit may not understand how best to use it and how to couple it with technological change. But it is also true, due to the fact that these farmers do not seem to be socially prepared for having higher incomes than they had before they tend to squander them and sink back to their original level, or not to make use of them to educate their children, etc. This sort of problem apparently rises even in the case of the supervised credit. The credit given organizations have never been particularly concerned to make sure that their credit led to output increases, and this certainly contributed to the fact that it may have not even done so. In areas such as Caqueta many of the small farmers do not even understand the concept of credit, and believe that the cattle they have purchased on Caja Agraria credit actually belong to the Caja. This creates an obvious incentive problem, and also tends to make them think of the credit giving institutions as exploiters, apparently in a similar fashion to the way they would think of money shark lenders.

But other evidence suggests that the potential of credit to small farmers is not necessarily small.[1] In Subachoque, it was observed that often when a small farmer was not using a new technique this was due to a lack of funds.

A regression analysis carried out for several Boyaca municipios which received supervised credit over the years 1965-68 was not conclusive, although the author tended to feel that the credit had a positive impact.[2] The figures do suggest that real value added per hectare and value added accruing to the farmer per hectare rose 12 and 17 percent respectively over the 3-year period, with implicit total income accruing to the farmer[3] rising by around 50 percent, primarily via an increase in farm size.[4] But as of 1968 the favored farms were only equal in terms of value added per hectare and value added by the farmer's resources per hectare[5] to the set of non-included (i.e. excluding value added by hired labor and machinery)

[1] Grunig (James Grunig, "Economic Decision Making and Entrepreneurship Among Colombian Minifundistas," The Land Tenure Center, Edificio CIRA, Bogota, June 1964, mimeo, 25) concludes that for those minifundistas with the necessary physical and psychological characteristics, credit is clearly useful. He did feel that "credit programs are overemphasized in present development programs at the expense of more basic reforms and situational changes." Grunig considers his category "subsistence level campesinos" to be the dominant group in Colombia; they have great difficulty getting credit and perceive a strong need for a better credit system. It seems plausible to hypothesize that credit directed to them would pay off well. For Grunig's apathetic campesinos" much less optimism would be warranted.

[2] Guillermo Jimenez, Economic Evaluation of Supervised Credit in Colombia, M.S. Thesis submitted to the University of Missouri, May, 1970.

[3] It should be noted that the actual incomes of farmers may have risen faster or slower than just indicated, according to how the real prices of the products changed; this is not indicated in the study.

[4] This is a mechanistic accounting of the gains, however, since most of the additional land was in pasture and may not have been of the same quality or as fully incorporated in the farm's production activities as the original area.

control farms, for which unfortunately information was not available in earlier years.[1] This leaves doubt as to how much the credit had to do with the performance of the favored farms.[2, 3] It is true that the recipients applied more fertilizers and pesticides and spent more in seeds and machinery per hectare.

Another objective of INCORA was to affect crop composition, and a substantial change did occur, primarily towards potatoes and to a lesser degree towards dairying. The increased fertilizer and pesticide use was presumably associated mainly with the increased output of potatoes. Average physical output of potatoes did rise considerably over the period, although with some fluctuations; in 68 for three of the four crops average physical output per hectare was higher than before, although whether value added would be higher is not clear. The non-SCP supervised credit sample showed essentially the same yields in 1968 as the included farms, despite having smaller farm size. A substitution of crop land by pasture land was also pushed by the credit agency.

To . since there appears to have been considerable inefficiency in the distribution of credit within most major groups of recipients, the achievement

[1] This study and others based on INCORA information have been doubted by some observers on the grounds that said information has not been noted for its accuracy, and an obvious institutional bias in favor of good results from the supervised credit program might be anticipated. The author did not report gross or obvious inconsistencies.

[2] A production function analysis--a risky venture with this sort of data--failed to show a significant effect of credit, although since operating costs were also included, and did tend to have an output elasticity ranging from .31 to .56, one could argue that the credit variable was redundant. Specification was weak since family labor was not included, and a number of other problems were probably present. No evidence was found of returns to scale.

[3] It is interesting, though not explained in the study, that average size of the included farms increased substantially over the period.

of a higher overall rate of return would probably involve primarily better administration, with focus on the potential payoff on the funds rather than the bankability of the loans. A look at the distribution by groups does suggest that application of such a criterion would generate a different distribution, even if the only goal was output maximization and certainly if income distribution was taken seriously into account. An efficient distribution to smaller farmers would have to include certain technical advice, as we discuss later.[1] Since good administration

[1] If this were simply unavailable, our comments on distribution by groups would have to be modified.

requires skillful administrators, improvements cannot be expected overnight. One hypothesis as to why some of the inefficiency has crept in is that interest rates have been too low, encouraging investment in low payoff projects, diversion of alleged agricultural credit to other sectors, and generally requiring a higher (and unattainable) quality of administration to achieve a given degree of efficiency in loan applicant selection.

Was the Low Interest Rate Policy Efficient?

In view of the fairly persuasive evidence that (a) too much credit has gone to livestock and perhaps to the large farm sector as a whole, (certainly too much has gone to some farms in these groups) and that (b) possibly too little has gone to the small and medium size sectors, the wisdom of the low and negative real interest rate policy which has systematically prevailed seems doubtful. With the Caja Agraria charging monetary rates of less than 10 percent and corresponding real rates usually about zero; the incentive to bad use must have been high. The share of "agricultural credit" which slipped back into the urban sector was no doubt

higher as a result of the low interest policy--how costly this phenomenon was to the system as a whole depends on the productivity of its actual use; about which there are no hard facts. Another impact of the policy is to make credit attractive in general; if it were posited that large farms were preferred by both commercial banks and the Caja Agraria (in the latter case "large" means near the top of the category to which it is permitted to loan) for banking or other reasons; it might be posited that the higher demand by these farmers associated with the low rate would lead to a decreased availability to other farmers. In short, if the Caja Agraria had consistently loaned to small farms (in terms of the Colombian size scale) there would be less worry that the non-price rationing of credit led to bad allocation, though we do not in fact have much evidence on the interest elasticity of demand for credit, it seems very likely that such allocations permit many unworthy projects which would have been discouraged by a higher interest rate. Since the interest rates charged by the commercial banks have been higher, the issue is less important with respect to them.

Recent Developments in Agricultural Credit

The last decade has seen significant initiatives in the field of institutional credit--first a law in 1959 (Law 26) ruling that a minimum of 15 percent of all commercial bank time and sight deposits be directed to agriculture,[1] starting at about the same time and increasing in emphasis over

[1] Law 26 of 1959 had some legal antecedents. Decree extraordinary 304 of 1950 permitted the commercial banks to concede credit up to 10 percent of the value of their sight and term deposits for agricultural investments of various types; but some of the loans went to extractive industry and even to urban construction. Decree extraordinary 198 of 1957 raised the ratio to 14 percent and destined it exclusively to agriculture and cattle. The Decree obliged the borrower to make use of technical direction and in this respect would have been more advanced than Law 26 except that this requirement was not carried out. Loans made under this Decree are rediscountable in the Central Bank at an interest rate less by at least 1 percent than the ordinary discount rate.

the decade, a move towards supervised credit; finally, in 1966, the organization of a Fondo Financiero Agrario to channel more funds to agriculture, primarily by making it more profitable for the commercial banks to lend more.

The first step, Laws 20 and 26 of 1959, were especially aimed at helping people displaced by the violence or lacking enough land--they were designed to contribute toward a better distribution of rural property and income.[1] (The understanding of the problem seems, however, to have been dubious; along with an emphasis on resolving the minifundio problem by helping people to purchase more land, was another on preventing the splitting of larger farms by, for example, having one of several heirs to a piece of land purchase the rights of the others, etc; any contribution the latter objective would make seems somewhat illusory.) They may have helped to reverse a downward trend in agricultural credit; in 1957 and 1958, total (real) credit to agriculture had fallen well below its previous high. It began to rise again in 1959. Real credit outstanding has risen each year since then--new loans have fluctuated somewhat but their trend has been strongly upward.

[1] Recipient of loans under this decree could not have a patrimony greater than 200,000 pesos, excluding a house in the city and agricultural machinery or equipment; the wording seems to imply a preference for people devoting themselves principally or exclusively to agriculture, but does not make it a necessary condition. Loans can be up to 200,000 pesos per natural person. The resources are from 10 percent of the Caja Colombiana de Ahorros savings deposits and the savings departments of the other banks; this source reached 1,989 million pesos in December 1967.

A potentially important development of the 1960's is supervised credit, designed to assure that credit does not fail to produce positive effects due to lack of technical knowledge or planning on the borrower's side. The earlier efforts at supervision were directed primarily at the small

farmer, the implicit assumption being that he was the one most in need of help. The percent of credit now supervised has risen substantially.

A discussion and evaluation of the programs is presented in the discussion of "technical change," later in this chapter.

The most recent development of significance, an attempt both to expand agricultural credit and to tie it to better technology, is the Fondo Financiero Agrario, founded on May 11, 1966--with a capital of 150 million pesos to help channel resources of the Caja Agraria and the commercial banks to agriculture while not dealing directly with the farmers. The Fondo resulted in part from a feeling by parts of the government, the agricultural societies and others, that the sector was receiving too little credit and that much of it was not being well used. Its goals are described as (a) fomenting the production of agricultural goods whose productive cycle is less than one year, and of raw materials for popular consumer articles and (b) developing a commercial pattern in agriculture. Two important initiatives are the tying of credit to technical assistance and the provision of incentives for the banks to channel more resources to agriculture[1], i.e. not relying simply on

[1]The system works as follows. The banks, through the intermediary of "Agro Credito" (an organization of commercial banks) and the Caja Agrario respectively, elaborate in coordination with the Minister of Agriculture the programs which will be financed with the resources of the fund. The Junta Monetaria (Monetary Board) determines the number of hectares to be financed and assigns the necessary resources. The banks and the Caja must certify that the contracting of technical assistance and needs of improved seeds have been taken care of by the borrower. If this does not happen the credit authorized by the banks and the Caja is not rediscountable, and credit to the offending user is cut off. For a discussion see Jaime Velez Hernandez, Fuentes Internas de Financimiento a Entidades Crediticias del Sector Agropecuario, Ministerio de Agricultura, Bogota, Julio, 1968.

decree. The participation of the banks with the Caja Agraria is voluntary--financial entities administering funds for the F.F.A. can discount the loans they make up to 65 percent in the Central Bank (i.e. they may contribute as little as 35 percent of the credit from their own resources)--this is a real inducement

for them to come in since the rediscount privilege, according to Velez, brings the real rate of return for own funds invested to 22.6 percent for the banks[1] and to 24.1 percent for the Caja. The resources of the fund were assumed to be additional to those already assigned to agriculture by the banks and the Caja.

[1]The interest rate charged to the user is 13 percent (this is above that established by Law 26 which was 7 to 9 percent). But since the banks only really put in 35 percent of the credit authorized the return to them reached 22.7 percent. (See, Velez, Fuentes Internas..., op. cit.

The program appears promising thus far in terms of its goal of advancing commercial agriculture. Apparently from the second semester of 1966 to the second of 1967 the area cultivated rose from 194,000 hectares to 209,000. The resources used in the second semester of 1966 were 320 million pesos and in the second semester of 1967, 388 million pesos. The number of users has been around 5,000, with an average loan of 80,000 pesos.

Bailey claims that the Fondo has increased the (previously practically non-existent) demand for agronomists and agricultural engineers. He claims also that it has cut the diversion of credit away from agriculture.

The dubious aspect of the program lies in the possibility that it will cut the ordinary resources destined to small and medium size farmers; the patrimony ceiling for obtaining ordinary credit from the Caja was 700,000 pesos or 1.5 million pesos for cattle and agriculture respectively and the present system eliminates both those ceilings on patrimony and the loan ceiling for rice, cotton, corn and wheat.[2]

[2]Velez, op. cit., p. 6.

Even the Caja Agraria, originally organized to serve small farmers has now apparently accepted the position that large farms have so much greater commercial potential as to warrant channeling increasing flows in

their direction. Since it is also the nation's major supplier of agricultural inputs--all of which can be obtained with credit from the Caja--the direction of its credit affects accessability of such inputs. Its interest rates (ranging from 7 to 12 percent according to the use of the loan and terms, and ranging from one year up to 10 years according to the purpose) still contain large subsidies. The Caja Agraria administers the World Bank livestock loan out of which loans up to 800,000 pesos can be conceded. There is rather clear evidence that the recipients of these funds are not unable to obtain commercial credit--one of the rationales of the loan.

A.4. The Directions of Investment in Agriculture: Mechanization

Table II-7 presented the apparent trends in composition of the agricultural capital stock; the importance of whether new investment is primarily labor displacing or labor using was discussed briefly at that point. The major shift in the investment pattern over the last decades is the increased mechanization; this is also the most controversial form of investment Whether and in what contexts it should be encouraged, given the social goals of high employment and more even income distribution is a difficult question, considered at greater length elsewhere.[1] The present discussion is limited to the history of mechanization and the evidence as to which farms and farmers have the highest propensity to mechanize.

The traditional implements of cultivation in Colombia have been the hoe and machete; they are still used extensively, (whereas animal traction plays only a small role). But a dramatic increase in mechanization, pushed by the Caja Agraria, has occurred in the "commercial sector" since the Second World War. Mechanization did not occur on a really extensive scale until the post-World War II period though it did begin in the second half of the

[1] See Wayne Thirsk, op.cit.

the 1930's; during World War II imports were cut off. The fact that the pre-war machines were less advanced and productive than later models, coupled with the tight balance of payments situation in this period, was sufficient along with a probably limited interest on the part of farmers, to imply an absence of important change.[1] When the industrialized countries began once

[1] Although as discussed in Chap. II, the machinery imports of the second half of the 1930's may have.

more to sell agricultural machinery, Colombia's balance of payments situation was favorable and the inflow began (see Table III-19). The easy balance of payments was reflected in a decline in the "machinery/labor" price ratio; in the decade 1946-1956 it averaged only a little over half the level of 1938-1943 (see Table III-19).[2] Between 1956 and 1958 the devaluation sent the price of

[2] Between 1942 and 1956, for example, the price of imported machinery probably rose by about 225 percent, while the wage rate was rising almost 400 percent (both in monetary terms).

machinery up substantially again, while that of labor rose more slowly.[3]

[3] The prices of other outputs (insecticides, fertilizers, etc.) have, according to unpublished estimates of the Banco de la Republica, risen more or less in line with the price of labor, during the period 1950-1959 for which we have data.

This relative price rise was reversed again by 1960, and it appears that the ratio was almost as low in the mid-sixties as it had been in the mid-fifties.

A boost to mechanization was given in 1949 by a five million dollar loan for agricultural machinery from the International Bank. In 1954, along with two other United States banking institutions, it lent another 5 million dollars, administered (as in the case of the previous loan) by the Caja Agraria.

Table III-19

Investment in Machinery and Equipment and the Relative Price of Machinery and Labor

	Gross Investment in Machinery & Equipment (Millions of 1958 pesos)			Estimated Current Peso Price of Imported Machinery	Price of Labor: Average Daily Wage of Agricultural Workers	Price of Machinery/ Price of Labor	Price per Tractor Horsepower	Price of Tractor Horsepower / Price of Labor
	Est. A (1)	Est. B (2)	Est. C (3)	(3.5)	(4)	(5)	(6)	(7)	(8)
1938	351	275			112.5	.72	15.63		
39	380	308			110.0	.74	14.86		
1940	259	183			108.9	.78	13.96		
41	263	198			110.0	.71	15.49		
42	92	50		366.4	113.8	.72	15.81		
43	98	85		575.6	114.1	.73	15.63		
44	250	187		1,174.5	114.6	.94	12.19		
1945	535	410		1,326.9	115.3	1.09	10.58		
46	564	384		2,324.7	123.6	1.25	9.89		
47	845	686		2,959.5	142.8	1.62	8.81		
48	792	597		3,943.1	161.2	2.02	7.98		
49	1,095	925		5,843.5	191.7	2.03	9.44		
1950	1,125	1,125	115	6,197.2	196.0	2.52	7.78	224.9	78.9
51	950	1,030	111	5,511.5	224.6	2.84	7.91	221.3	69.9
52	877	963	85	5,442.7	229.2	2.81	8.16	227.5	72.6
53	1,199	1,325	112	8,931.3	204.1	2.92	6.99	178.2	53.1
54	1,889	2,085	189	12,049.5	206.1	3.27	6.30	182.3	48.7
1955	2,446	2,722	215	13,024.4	231.5	3.46	6.69	229.1	59.8
56	2,055	2,369	206	13,257.5	256.8	3.54	7.25	269.8	67.1
57	1,108	1,337	72	11,417.8	411.4	3.89	10.58	319.8	72.7
58	1,058	1,330	96	9,235.1	621.4	4.55	13.66	572.4	112.2
59	1,235	1,600	104	10,653.0	610.2	5.00	12.20	533.2	94.4
1960	1,428	1,886	125	13,284.3	596.3	5.51	10.82	469.2	73.7
61	1,390	1,870	171	13,664.7	610.5	6.29	9.70	478.3	66.8
62	1,437	1,971	177	14,665.0	722.1	6.92	10.43	536.8	69.9
63	1,189	1,653	182	12,092.8	727.7	8.99	8.09	657.7	67.1
64	1,357	1,905	185	14,662.4	713.3	10.30	6.92	623.4	58.2
1965	1,123	1,629		16,832.7	791.0	11.34	6.98	670.5	51.8
66				12,282.6	976.2	11.80	8.27	727.5	51.1
67				19,811.2	1,153.7	13.41	8.60	1,059.6	66.3
68								1,274.5	74.7

Sources and Methodology for Table III-19

Estimate A in Column I is based on ECLA's constant price Import Series for the period 1938-50; it uses the author's estimates of value of imports since 1950 and the deflator characterizing U.S. agriculture machinery exports for the post 1950 period. Estimate B in Column 2 is based on the author's estimate of imports in the 1938-50 period (and for subsequent years as well) and assumes no dollar price increase for agricultural machinery in the post 1950 period. Estimate C comes from ECLA op. cit., ... p. 19.

Column 4 is based on a weighted average of the price indices for tractors and other machinery, with tractors receiving a weight of 0.6, about equal to their share of total value of machinery investment over the period under consideration. The tractor price index for 1950-60 is from Thirsk, op. cit., p. 329; that for other machinery is the same one used in Appendix Table A-18.

The tractor price index before 1950 is the same as the other imported machinery index; it appears that average horsepower per tractor probably did not change much in the years preceding 1950; if this is not true, then the price index rises too fast during this period. Estimate 4.5, the average cost per tractor horsepower, comes from Thirsk, p. 320.

Figures on imports and domestic production of machinery suggest a close relation with the relative price of machinery vs. labor; there was a perceptibly slower rate of mechanization for some years after the balance of payments situation worsened in the mid fifties,[1, 2] and a renewed surge in the sixties. Whereas the number of tractors rose by about 5,000 between 1953 and 1956, as of 1965 it had only risen by about another 5,000. Since then the increase appears to have speeded up again; Thirsk estimates a stock of about 25,000 in 1968. (See Table A-26). These figures are somewhat misleading however, and appear to overstate the fluctuation in growth of stock; in terms of horsepower, presumably a more meaningful measure than tractor units, the upward trend has been more consistent. In the case of tractors the dollar price per horsepower was falling when Colombia was

[1] Some agricultural machinery is being produced in Colombia now but not of such items as tractors, combines, etc., and not of large overall magnitude.

[2] The methodology used to calculate the series on investment in machinery and equipment other than tractors and on the stock of that machinery and equipment suffers from possibly serious defects. Much depends on the assumption that the U.S. export price series for agricultural machinery can be used to reflect the Colombian import price. If either this U.S. export price series overestimates the rate of price change for U.S. machinery exports to Colombia or if prices of U.S. machinery rose more rapidly than these from other countries, then the series underestimates the inflow of machinery and equipment.

The idea that American machinery has become less competitive is indeed suggested by the recent switch to other sources for the purchase of tractors, and of other machinery as well. It seems probable that the price index is therefore somewhat overestimated in recent years, though unlikely the upward bias from the source would be more than say, 5 percent. (One half of these imports are still from the U.S.) A further problem relates to the fact that the stock of machinery other than tractors had to be estimated using the import quantities and length of life assumptions (See Table A-19) It is not clear to what extent the observable tendency in a country like Colombia to make things like cars last very long when new ones are hard to get extends to the various types of agricultural machinery; figures which do not to take account of this phenomenon would probably tend to under estimate the increase in the number of units of machinery being used when prices were high.

devaluating and after, so the effect of the latter was partially offset as far as the buyer was concerned.[1] The series on tractors per hectare of annuals (plus bananas and cocoa) shows the cycles of the tractor series, with slower increase over 1956-65 than before and since; but the horsepower/hectare series shows continuous increase at a steady rate (Table A-126).

[1] The relative price of machinery to labor still rose after the 1957 devaluation as other machinery prices presumably did not behave as did those of tractors, and even the latter price rose somewhat in relative terms.

The rapid growth of the machinery stock reflects in part positive government policy (as effected by both the Caja Agraria and INCORA) towards commercial agriculture, of which mechanization is assumed to be a key feature. The Caja has used BID and Export-Import Bank loans to finance imports of agricultural machines.[2] During this period prices of different implements have moved in opposite directions; price rises have in general characterized items undergoing an import substitution process. Tariffs are low on machinery not produced in the country, high for what is. Import substitution has been a major component of industrialization policy and has been increasingly evident in agricultural machinery.[3] The price per tractor horsepower has,

[2] As of 1966 the Caja had done 50 percent of the importing in recent years, under a program called "importacion-emprestito"; distribution was 85 percent in private hands

[3] As of the mid-1960's the major import substitution (apart from tools, which are mostly produced domestically by now) was in cultivating implements including rakes, plows, cultivators, etc. with output reaching $30 million pesos in 1964. There were 16 firms producing these items, though four produced the bulk of the total. In terms of harvesting and processing machinery import substitution has been slow; output was .92 million dollars in 1962 and 1.6 in 1964. ECLA (op. cit., p. 40) observed that development along these lines would depend primarily on the production of agricultural tractors in the country.

Production of agricultural tools such as hoes, picks, machetes, etc., is now almost complete, but in 1964 48 percent of raw materials were imported. Prices to the farmer were at that time 30 percent above those brought in from

Germany and Japan. Quality seemed to be acceptable; production was mostly done on the basis of patents and technical assistance from foreign producers.

It was noted that basic prices of steel were higher in Colombia than in Argentina and Mexico where the production of agricultural machinery and equipment was more developed; Colombian steel prices were 75 percent above European ones even though the expansion of Paz de Rio was felt to offer good perspectives for the production of costs.

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as already mentioned, tended to fall.[1]

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[1]Commercialization margins for machinery are relatively low, according to CEPAL, although they are higher than those present in some developed countries, such as the United Kingdom. There is considerable competition in the commerce within Colombia (50 distributors). Caja prices rule; it does some of the distributing, and private sellers in the "Maquinaria-Emprestito" plan cannot sell above Caja prices or at prices involving a mark-up of more than 24 percent. CEPAL feels this is efficient. As a result of lower transport cost and lower commerce margins, the price in Colombia is lower than in Chile by 20-40 percent, depending on the item, but well above the English price. The control of parts prices does not appear to effective, but availability is probably more important than price; still there have been many complaints about the high price of replacements, forcing the government to intervene in 1962.

A large part of parts importation is done by distributors through the Caja Agraria, which is obliged to import replacements to a minimum of 18 percent of the value of its imports of tractors and auto propelled machinery and 8 percent of the value of other agricultural machines. There is a rule whereby direct importers are not supposed to sell parts above the Caja prices and they have to show copies of invoices sent by the seller; this rule can be evaded, though, and apparently is.

Very favorable credit terms are still available to aid the mechanization drive.[2] Over the period 1954-1964 the Caja by itself loaned more than

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[2]CEPAL (op. cit., 1964) observed that in 1966 tractors distributed directly by the Caja could be financed up to 90 percent by credit, and up to 180,000 pesos of machinery distributed by the Caja could be financed 75 percent, with a maximum term of 36 months. And for agricultural machinery purchased through any distributor up to 40 percent of its value could be financed by the Caja. Interest rates were 9 percent for short term and 11 percent for long term. There is, finally, credit from the distributor to the farmer, sometimes jointly with the Caja and sometimes not. Usually these loans are discounted by the commercial banks.

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a third of the value of all imported machinery. Various foreign loans have

been used in this way.[1] Machinery credit averaged 71.5 M pesos (9 million dollars) in 1963-5.

[1] Including 2 million dollars from BID at the beginning of 1967 to help carry out a mechanization project proposed by the Colombian government. Eximbank authorized 10 million dollars in 1964.

A school for training in the management of agricultural machinery was opened in Buga in 1967. It is a project in which SENA, the United Nations and FAO are collaborating along with the Massey-Ferguson Company, and is open to students from all of Latin America.

Mechanization and Distribution

The implications of mechanization for income distribution are, as mentioned on more than one occasion above, a hotly debated issue and an extremely important one when one tries to evaluate the successfulness of the growth process in Colombian agriculture. Obviously, most of the machinery is associated with larger commercial type farms, so the possibility that it has the effect of worsening income distribution among farm operators cannot be disregarded. The other aspect of its income distribution impact would be the predicted worsening of distribution between owners as a group (whether large or small) and landless farmers. In countries with relatively equal distribution of land, such as Japan, mechanization has tended to emerge more or less evenly and rapidly--in that case, in the 1950's--and in such instances its arrival presumably reflects the representative farmer's weighing of the opportunity cost of his labor versus that of the machinery. Some feel for whether there has been any filter-down of the mechanization trend to smaller farmers in Colombia is provided by the 1960 Agricultural Census and subsequent sample figures. These do not suggest any tendency for machine use to be

increasingly reaching the smaller farms. As of 1960 (see Table A-125) of farms in the 3-5 hectare range about 6.6 percent were using mechanical power, (including any power developed by a moving machine or any machine using gas, oil, water, wind, etc.). In 1968, the percent of all farms using machinery (and in this case use was not defined so no precise comparison is possible) was only 3.6, as opposed to 6.2 in 1960. Probably the definitions are not fully comparable, but the data for 1968 would argue against any significant change having occurred in the direction of broadening use of mechanization in the 60's.

Table III-21 presents estimates of the distribution of tractors by crop.[1] It suggests that the four major tractor using crops are cotton--

[1] The figures are based primarily on a study of Adimagro, and presented by Thirsk, op. cit., p. 323. Column 4 is calculated as the ratio of Column 2 to Column 1 times Column 3; since the grand total implicit in the methodology is less than half the total number of tractors in the country, it is clear that either the estimate of tractors required is not valid, or hectares under mechanization are underestimated for some crops, or some tractors are not being used efficiently (or the tractor stock is currently being overestimated). In any case, for purposes of relative quantities the table gives valid impressions.

by far the most important--followed by sugar, irrigated rice, and corn. Mechanization of small farm crops is indicated to be small by these figures, although this assumption may have been built into the estimates;[2] nevertheless

[2] Methodology of the estimates is not presented.

it is probably correct. Mechanization has clearly reached the bulk of the large scale producers of those crops where it is an obvious alternative; there is considerable dispute as to how easy or difficult it would be for further mechanization to occur. Considerable discussion has surrounded the question

Table III-21

Total Area, Cropped and Mechanized (1) Per Crop in 1966 (5), in Thousands of Hectares

	Total Area Under Cultivation In Hectares	Hectares Under Mechanization	Estimate of Tractors Required	Implicit Tractors in Use
Cotton	175	175	3,875	3,875
Sesame	80	15	500	94
Rice - Irrigated	130	75	1,875	1,082
Rice - Dry (4)	246	5(6)	125	-
Bananas	32	30	750	703
Cocoa	38	-	-	-
Coffee	700	-	-	-
Sugar Cane - White	46	46	1,530	1,530
Sugar Cane - Brown	312	40	1,350	173
Barley	50	35	700	490
Hemp	28	5	150	27
Beans	60	10	250	42
Fruit Crops	92	10	250	27
Vegetable Crops	50	10	400	80
Legumes (7) (Peas, Beans & Lentils)	45	12	400	107
Corn	700	165	4,100	967
Minor Oil Crops (Coconut, peanuts, etc.)	8	-	-	-
African Palm (3)	20	20	500	500
Potatoes	82	35	500	152
Plantain	330	35	835	96
Sorghum	40	25	625	391
Soy Beans	40	20	500	250
Tobacco	26	7	350	77
Wheat	102	40	80	310
Yuca	220	30	700	95
Total	3,652	845	21,065	
Land in Pasture Crops	6,000	300	2,000	100
Grand Totals	9,652	1,145	23,065	11,168

Table III-21 continued

(1) Hectares under mechanization refers to land where machinery is used to harvest or to perform other major operations, or in the cultivation of permanent or semi-permanent crops. It does not include areas which are double-cropped for either the same or a different crop.

(2) "Tractors required" are those which theoretically would be necessary in order to cultivate the mechanized area specified per crop, under conditions currently prevailing in the country. In practice, however, machinery is used either simultaneously or alternately to cultivate several crops (cotton and corn; barley and potatoes; rice, bananas and cane) at the same time.

(3) The land planted in African palm is estimated as if it were equivalent to that of an earlier maturing crop, in order to overcome the long period of waiting for the group plants to bear fruit.

(4) For crops like dry rice, potatoes, tobacco, etc., machinery is used especially in land preparation.

Source: ADIMAGRO, La Mecanizacion Agricola en Colombia, Bogota, 1969.
The major sources for this study were:

(1) Ministerio de Agricultura--Actualidad y Perspectivas de los principales Cultivos Agricolas en Colombia 1966.

(2) Datoes de Federacion de Arroceros, Departamento Tecnico, 1967.

(3) Instituto Nacional de Abastecimientos INA, Produccion, Consumo y Faltantes de Productos Basicos, 1964.

with respect to cotton picking; there is always, inevitably, some activity on the margin.[1] Mechanization is widespread with respect to preparation of the soil, and considerably less so with respect to harvesting.

[1] ILO (op. cit., p. 105) notes "Nevertheless it is this picture which immediately suggests itself. The picture may very with the activity concerned. In commercial sugar production in the Cauca Valley, for example, although transport and land preparation are mechanised, cane cutting is not. If it were, very large numbers would be thrown out of work. Production of corn, sorghum, soya and beans is very highly mechanised already. In production of cotton in Valledupar, as with sugar in Cauca, land preparation and pest control are mechanised but harvesting is not. Again, if it were, very large numbers would be thrown out of seasonal work. The same problem arises in land development in the Sincelejo region where scrub clearance, which once gave seasonal employment, is now being done by machinery, as extensive cattle ranching is changing to intensive pasture with water improvement and fencing. Small farmers in this region are very unhappy about these developments as they have lost important sources of income. On the other hand, many tropical crops in Colombia, particularly coffee, which employs very large numbers of seasonal labour, do not lend themselves to mechanisation; so the threat of unemployment through mechanisation has to be considered not only with all its credits as well as its debits, but also very much for the particular situation concerned.

A.5. Social Infrastructure

Of the government's direct contributions to growth of agricultural output, the development and extension of new seed varieties, livestock breeds, and methods of cultivation is one aspect and the provision of public investment in social infrastructure (i.e. irrigation works, large-scale drainage operations, flood control, feeder roads) is another. During most of the period up to the late 40's, and consistent with a general policy of little emphasis on the agricultural sector, the government spent little on either. Over 1925-46, it was responsible for an average of about 10 percent of all agricultural investment, according to ECLA (see Table III-22);[2] and before

[2] Government investment in rural construction and improvement was estimated by ECLA for the period 1925-1953, along with private investment in construction and improvement, and total agricultural investment. Investment in feeder roads is presumably not included in the figures given here.

Table III-22

Role of Public Investment in Agriculture
(absolute figures in millions of 1950 pesos)

	Total Investment in Agriculture (1)	Private Investment in Construction and Improvements (excluding buildings) (2)	Public Investment in Construction and Improvements (3)	Public Investment as a percent of all investment in Agriculture (4)	Public Investment in: Roads (5)	Public Investment in: Rail-roads (6)
1925	183	144.0	-	-	38.1	60.6
1926	184	145.4	0.6	0.33	57.4	96.6
1927	192	148.1	0.9	0.47	70.3	92.7
1928	204	156.0	1.0	0.49	77.5	114.4
1929	200	152.4	1.6	0.80	70.0	70.6
1930	206	162.0	2.0	0.97	38.5	52.6
1931	201	163.5	2.5	1.24	37.7	35.6
1932	273	234.7	2.3	0.84	37.3	4.7
1933	197	160.1	3.9	1.98	50.7	4.5
1934	203	163.8	3.2	1.58	38.3	4.0
1935	217	179.1	3.9	1.80	45.4	7.7
1936	226	186.5	2.5	1.11	60.0	4.9
1937	229	178.4	14.6	6.38	67.3	13.1
1938	233	167.1	28.9	12.40	80.0	28.8
1939	242	177.7	26.3	10.87	80.6	41.3
1940	258	154.0	70.0	27.13	80.6	41.3
1941	262	138.0	89.0	33.97	73.7	22.6
1942	280	133.3	116.7	41.68	65.2	26.8
1943	299	179.6	88.4	29.57	69.9	34.4
1944	342	275.0	34.0	9.94	68.2	27.6
1945	348	297.1	15.9	4.57	56.4	34.0
1946	362	290.9	32.1	8.87	55.0	26.4
1947	330	237.7	49.3	14.94	75.8	31.0
1948	370	281.4	45.6	12.32	79.1	21.3
1949	226	147.2	31.8	14.07	52.6	17.3
1950	256	173.6	27.4	10.07	56.8	14.4
1951	272	164.2	56.8	20.88	106.7	29.5
1952	295	187.2	60.8	20.61	79.9	35.1
1953	411	302.5	59.5	14.48		

Source: The ECLA study, statistical appendix, pages 9, 28 and 50. The road and railroad investment was not included in agricultural investment, but is shown here as relevatn to the development of agriculture .

1937 its investment was almost nil. Since the late 40's, however, considerable funds have gone into roads and in the last few years INCORA has spent heavily on irrigation, reclamation, etc., raising its share of total investment in agriculture (see Table V-8). It can no longer be assumed that further investments, unless chosen with considerable care, will have high payoffs.

Until the 1960's, when INCORA began heavy expenditure on irrigation works, the main type of social infrastructure which would have been expected to affect output and in which a substantial amount was spent, was transportation.[1]

[1] Since amount of irrigated land is relatively small, and has not increased rapidly over the historical period under consideration, it is reasonable to assume that increases in output which have occurred are not particularly related to it. The question of likely benefit cost ratios from further investment in irrigation works is taken up in greater detail elsewhere. Rural electrification has not proceeded far in Colombia. As of 1951, only 4.2 percent of rural dwellings had electric lights. (Based on figures from Departmento Administrativo Nacional de Estadistica, Censo de Edificios y Viviendas: 1951, Resumen General.) The figure in 1964 was only 5.5 percent.

McGreevy, in his discussion of the development of the railroad system from the late 19th century to the 1930's, concluded that the payoffs were quite high, in fact so high that it was a mistake not to have invested more heavily earlier. "There was a symbiotic relationship between coffee exports and transport improvements. One is tempted to conclude that had the railways been built earlier, by the 1880's rather than by the 1920's, for example, coffee exports would have reached their 1920's level in that earlier decade. The country would have been 4 decades further along in its path of economic development that it in fact has been. An explanation of the failure to undertake railway construction earlier and with more vigor lies in the dominance of a laissez faire ideology and the inability of the central government to

perceive and appropriate the external benefits of railway construction."[1]

[1] McGreevey, op. cit., p. 279. Over the long run, Colombia's political system has not, unfortunately, been the picture of efficiency in terms of moving quickly and efficiently into such social investments as offered high potential social returns. Both the concept of government as an instrument of furthering the interests of the ruling party rather than the country and the laissez faire ideology characterizing most governments until recent decades contributed to slowness in perceiving high payoff possibilities, and in some cases an inefficiency in moving to invest in them when they finally did become evident.

Colombian politicians attempted to leave the construction and operation of roadways to private entrepreneurs, with some special subsidies, but with contracting of construction virtually unknown in the 19th century. Substantial investment occurred over 1905-10 and more in subsequent years. But public incentives for construction and tollway operation were too limited to encourage much improvement, not surprising given the nearly universal failure of toll companies in the U.S. and in Europe.

McGreevey concludes that as a whole the railways were as beneficial in Colombia as they were in the U.S.

Colombia's late start in railroads is reflected in her having in 1880 only 5 percent of the final track length built (compared to 26 percent in the U.S. and in various European countries, over 50 percent; in 1910 only 26 percent was built, below most of the Latin American countries it would appear; its major road building period was 1910-30. Coffee exports were very closely tied statistically to kilometers of track. Over land transport costs may have been some 65 percent lower on railroads than they had been on other overland carriers, possibly more. For roads built up to 1924, McGreevey feels that a benefit cost of 2.6 is possibly on the low side, with a 10 percent discount rate.[2] The lines built in the late 1920's were

[2] Ibid., p. 267.

financed by easily available foreign funds during the highwater market years for lending; pork barrel legislation in the 20's required the national

government to spread investment funds among the various departments and made concentration on a few key projects impossible; cost of construction rose markedly in the 20's. McGreevey still estimates the benefit cost ratio for these railroads as greater than one. In particular / the extension of coffee railroads in the 1920's had a quite high internal rate of return, estimated here at around 20 percent. The high productivity of the coffee extensions included the linking of the railroads in the West and making possible of through service from the Magdalena river to the Pacific.

The arrival of the liberal party to power in the 1930's brought a new transport program and the abandonment of the former goal of the National Trunk Railway System. A 6,400 kilometer network of highways was proposed; although little of the proposed program was completed; it did represent a reversal of an 80-year old trend favoring external over internal commerce.[1]

[1] Ibid., p. 278.

Table III-22 presents figures on government spending on roads and railroads through the early fifties. These figures, along with the over time estimates of the kilometers of railroads and roads and the distribution of the latter by quality shows the transition from the older mode to the new; highways became more important in terms of total tonnage moved as of perhaps 1945-1950.[3] With the arrival of the World Bank mission (1949) and the preparation of a national highway plan, a new period was being entered upon.

The post-1950 experience with the development of the transportation system is discussed by Weisskoff.[2] He describes the transportation facilities

[2] Richard Weisskoff, "The Colombian Experience: 1950-62," in Edwin T. Haefele, editor, Transport and National Goals, The Brookings Institution, Transport Research Program, Washington, D. C. 1969, pp. 122-176.

[3] ECLA's data (op.cit. Appendix p. 158) indicate that value added by truck transport surpassed that by railroads in 1940. But since the railroads carry heavier items, they would be ahead in tonnage for some years after that.

in 1950 as "a puzzle of crudely connected pieces accumulated over centuries of deterioration, repair, and substitution."[1] Though the promise of the early fifties was not fully borne out, as financial difficulties and other problems prevented the transport plan from going ahead in the way planned, and helped to make overall planning unintegrated and piece-meal, total highway investment was high and the country's integration increased markedly.

[1] Ibid., p. 131.

No studies analyzing the impact of road building (as a whole nor of any specific segments of the network) on agriculture are known to this author, so judgments remain subjective and impressionistic. Lauchlin Currie feels that the road building program undertaken in response to the World Bank Mission was important in increasing output. J. Atkinson agrees that the Villavicencia-Bogota road was important in increasing agricultural output in Meta, but feels that recent road-building did not particularly effect output in Valle, and may or may not have with respect to the Magdelena Valley. One might deduce, simply from the fact that many people feel that Colombia is short of roads relative to other countries, that the rate of return should have been high. For the moment, nothing more solid is available.

B. The Rate of Technological Change in Colombian Agriculture: Some Micro Measures

Growth of per capita output in any system depends on increase in capital per man (discussed in the first part of this chapter), increase in natural resources per man (mentioned in Chapter II), organizational improvements of markets, etc. and technological change in

the form of improved production functions and improved inputs.[1] We turn now to this last factor.

[1] As will become apparent in the discussion, the application of improved inputs (and even the availability of better information) may be due to better markets; no attempt is made here to allocate productivity increases precisely to their ultimate causes.

In some cases, also, there is both a difficulty in sorting out and a need for careful definition of the difference between an improvement in technology and an increase in capital stock. When a farmer is already aware of the advantages of using fertilizer, but does not do so because he lacks the working capital, then whatever improvements result when he finally does introduce fertilizer can be attributed to capital formation, not to technical change. If the bottleneck was his own lack of awareness of the value of the fertilizer, then the improvement would be attributable to technical change. In many countries it has been shown that what was at first interpreted as a lack of knowledge on the part of farmers was really a lack of capital and a lack of willingness to take risks.

In Chapter II it was argued that the growth of land, labor, and capital accounted for most and possibly almost all of the increases in output registered before the Second World War, but for a smaller proportion since the war.[2] Since aggregate production function analysis gives only a rough reading on the total residual attributable to organizational improvements, technological change, or economics of scale at the industry level, and provides no assistance in sorting out the elements which jointly compose it, any micro level evidence on the importance of a component like technological change is useful; such micro evidence may also be the only way to analyze the process of change. In other words, while time series production function analysis may, under favorable circumstances, permit measurement of the residual, it remains to be determined

[2] Specifically, that the residual probably accounted for growth of 0.5 to 1 percent of output before 1945 or 1950 and between one and two percent thereafter.

a) how much of this residual corresponds to technological change,

b) what type of technological advances were occurring, as among improved implements and machinery, better cropping practices, better varieties of seeds, greater use of material inputs such as fertilizers, pesticides, etc.;

c) through what mechanism these changes were occurring;

d) what the rate of return on expenditures directed toward such changes was.[1]

[1] One can, of course, view such expenditures as a form of investment, add them into the capital stock, and calculate the rate of return on them along with the other investment occurring.

Information on the extent, process, and returns to specific types of technological change is scanty, but in general one is led to conclude that:

1) Few generalizations can be made about technological level or change, given the contrasts between the growing commercialized sector which already uses relatively advanced technologies and the traditional sector (including both large and small farms) with, in many cases, implements and techniques of distant vintage. Technological advance has been rather concentrated on the "commercial" crops e.g., cotton, rice, etc.; for crops grown by both large and small farmers, techniques and varieties have often changed on the former and not on the latter (e.g., corn, and the panela case mentioned previously); where the combination of need and availability is sufficient, the small or otherwise traditional farmer is found with new technology (e.g., pesticides in potato production).

2) There are dramatic success stories of Colombian developed varieties which quickly became widespread and raised average yields

substantially, but such cases have been relatively few; one example was Funza barley.

3) Many of the new yield raising varieties have been imported with little Colombian modification (e.g., as in cotton) though other aspects of technology (e.g., application of pesticides, and other cropping practices) have sometimes involved domestic research and extension.

4) The part time character of many commercial and livestock farmers reduces the efficiency with which they adopt new technology leading in some cases to non-adoption and in other cases to over-adoption.[1]

[1] See especially, James Grunig, Economic Decision Making and Entrepreneurship Among Colombia Latifundistas, op. cit.

5) The extension service does not effectively reach a significant share of the smaller farmers producing most crops, but it is unclear how important this it.

6) Empirical information is too scanty to guess at the overall rate of return to past efforts directed toward technical change, but it appears that high returns could be achieved in the future.

We review now some facts and general hypotheses about the process, then turn to a detailed look at certain specific types of change (e.g., introduction of new seeds) and finally attempt to interpret the relative successes and problems of the different stages of the process, i.e. research, extension, and diffusion with a view to policy relevance.

B.1. General Characteristics and Determinents of the Rate of Technical Change

As of 25 years ago almost all of the agricultural sector was technologically retarded and most of it still is. This is, of course, a feature of most underdeveloped countries, so differences are ones of degree. In Colombia earlier times did see the advent of a few notable changes, such as the introduction of improved pastures in the 19th century, and the introduction of wire fences,[1] but these were infrequent.

[1]Note, however, that wire fences are still not widespread in much of the country, presumably for good economic reasons.

A number of factors have conspired against significant technological gains. Broadly, and in reference to the long run the basic problem has been a lack of research. Sometimes the failure to use modern techniques may be a result of lack of desire to maximize profits--other times to small farm size, lack of accessible information, etc. A frequent view (though more characteristic of some anthropologists than of economists) is that the traditional farmer is resistant to change and highly risk averse.[2] All these latter

[2]See the discussion later in this chapter. While this is certainly a factor in some areas, its overall significance is hard to measure due to regional differences and to difficulty of guessing how dependent on the precise situation he faces is the peasant's risk-averseness. In any case such risk-aversiveness tends to be a short-run obstacle.

obstacles, if they exist, are likely to give way over time in the face of highly productive new techniques, varieties, etc., i.e. their impacts are likely to be short run ones. Much of the explanation of the rate of change must, accordingly, attach to governmental behavior[3] in the areas of research

[3]Factor productivity changes do not depend only on public research, obviously. New technologies, especially new cropping practices have historically been induced by rising man land ratios, new trading opportunities,

etc.; but the former change is a reaction to changing factor proportions and the pressure of the income level decrease which would occur if no adaptation were possible, and the latter has not usually been dramatic, except where science has been applied in one way or ather. Colombia has not been in a situation to benefit extensively from such change.

Another form of advance independent of formal research involves improved use of existing factors, i.e. improved farm management practices. With given factor availabilities, an agriculture tends to evolve gradually towards efficient use, and studies of stagnant agriculture tend to find static efficiency of factor use. When factor and technological availabilities do not change much over time (as in Colombia) the scope for such gains tends to be limited.

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and adaptation.

Also relevant, of course, is the extent of relevant research and development of a country's products elsewhere in the world. A considerable part of Colombia's agricultural activity is in tropical and subtropical regions, on whose products relatively little experimental work has been done anywhere in the world, rendering profitable borrowing of new technology less likely. Even within Colombia, much of the experimental work (fostered considerably in the early years by the Rockefeller Foundation) has been concentrated on commercial crops, most of which are also temperate or sub-tropical, e.g., wheat, corn, barley, etc.[1] Problems of past and disease control tend

[1] This situation is now in process of change, with the establishment of CIAT (Centro Interamericano de Agricultura Tropical) near Cali. Though there have been some indications that this center would help to redress another balance by putting more attention on the crops and special problems of the small farmer, at present it appears not to be focussing much effort along these lines.

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to be more serious in tropical regions, partly because the lack of a cold season eliminates the possibility that some germs, seeds, etc., will be killed during that part of the year.

Twenty five years ago, technology was more homogenous than today. Atkinson considered the most striking feature of the post-war was that

technological progress had been fast in some areas and for some crops and almost absent in other areas and other crops.[1] Colombia mirrors the situation of many other countries in the great shortage of research effort and advance on the traditional crops; this laguna is exemplified by the case of yuca. Since a number of these crops are grown primarily in warm climates (e.g., platanos, yuca, sugar for panela), borrowing has been difficult; but little substituting effort on adaptation or more basic research has been expended. A high yielding variety of yuca is now grown in Brazil; different varieties which seem appropriate for processing into starch are only now receiving some attention in Colombia. The improved varieties of sugar cane are available for panela but are used only on a few Cauca Valley farms with relatively modern technology;[2] again the small farmer has not been reached. Platano, even more of a subsistence crop than panela, rarely involves the use of non-traditional inputs; almost no research effort has been made on it.[3] In the case of beans, new varieties have been developed. Some regions of the Cauca Valley are producing with non-traditional inputs; and on a commercial scale, but there is a question whether this type of production is available for small traditional farmers.

[1] Under the excess labor conditions of the Colombian sector, this very different degree of change for different subsectors may explain the rather low residual showing up in the production function despite what looks like rapid change for part of the sector--a part which now has considerable weight in total output. Rather rapid technological advance would probably show up if one could calculate a production function for the commercial sector alone, but if it has the indirect effect of lowering the efficiency of use of labor by shoving it to traditional very small-scale farming, this loss of efficiency tends to offset the technological improvement registered in the modern sector when we look at whole sector figures.

[2] Farms "on the periphery" of the "sugar for refining" area. See Atkinson, Agricultural ... , op. cit., p. 90.

[3] Partly because it is frequently grown together with coffee.

The extensive way in which much of Colombia's beef is raised is not conducive to great technological advances. Most technological change in the world beef industry has involved increasing intensity of use of modern inputs, etc., rather than increasing efficiency of extensive production. In Colombia a considerable percent of all cattle are grown on very large farms, frequently with absentee owners, and cometimes far from centers where modern inputs can be purchased (e.g., in the llanos). Intensive techniques appear to be ill adapted to the absence of the owner or a well trained administrator.[1]

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[1]It is widely argued that some owners have income levels sufficiently high as to decrease their concern with profit maximization, and their worry about high mortality among their cattle, carrying beasts for four or five years before marketing etc. To the extent that this is true there is uncertainty as to how much improved technology these farmers would adopt if it were available; the incentives would probably have to be greater than for others. The alleged lack of profit-maximizing is probably substantially exaggerated; few, if any, owners would turn down higher profits, other things being equal. But their preference not to live on the farm or allocate much time to its management may per se change substantially their potential profits, under many circumstances. This point comes out strongly in Grunig's analyses of Valle and Meta latifundistas; the unsuccessful farmers, profitwise are not uninterested in profits per se, but it appears that the opportunity cost of farm management time is very high for them and the result may in some cases look as if they are "unconcerned;" but as frequent seems to be the case of the farmer whose inefficiency lies in the wrong adoption rather than no adoption--here the inefficiency will escape the detrection of the casual observer. (See Grunig, "Economic Decision Making and Entrepreneurship Among Colombian Latifundistas," op. cit., p. 31.) The overall question of farmers' receptivity to new technology, especially that of cattle farmers, is discussed later in this chapter.

Atkinson contrasts the subsectors of change and stability as "two camps so far apart that they seem to belong to different worlds." Although he feels that a whole set of features tend to distinguish the subsector of change, he finds no simple difference or apparently strategic factor which clearly divides progress and stagnation.

Crops in the advancing subsector are ones whose output has expanded rapidly; in fact almost all of the recent expansion in output has been in this

group of sub-tropical crops, i.e. cotton, rice, sugar, sesame, barley, soya beans, and grain sorghum. It has been primarily on level land of prime fertility, often in new alluvial valleys not previously cropped. The yields on these fertile soils have been high without fertilizers, and the increased yield response is often rather limited relative to the quantity of fertilizers used. As a consequence the idea of modern soil management is little developed, thus lending a temporary character to the production in a given region as at the beginning rather good yields are obtained by mining fertilities.[1]

[1] Atkinson, op. cit., p. 127. This point is interesting in bringing out the definitely partial nature of "technological change;" it often has less to do with scientific and careful farm management than with the opening of new areas with new or relatively new cultivation techniques, new seeds, new pesticides, etc; the statistically measured residual would possibly not have shown up had the land increase not occurred. The transitory nature of high yields in some of the new areas gives something of an optical illusion that more advance is accurring than really is; it is one thing to make this land bloom permanently and another to make it bloom for a few years only. (The aggregate figures include, of course, the zones where average output is falling after the first good years, as well as the new ones.)

Most of the new acreage is fairly near a large city with good transportation; areas that are now not very well developed do have good availability of non-traditional inputs. A partial exception is the principal cotton producing area near Valledupar; the modern crop cultivation generated the town, services, etc. rather than the town's being there first. Improved varieties are the rule in these areas, with most of the improved seeds having been imported; use of strains developed or adapted in Colombia is limited (see Table A-104). There is little hand cultivation although harvesting techniques cover a wide range. Much of the expansion is by renters who are usually non-residents and part-time farmers. Scale of operation is large.

Coffee warrants special treatment in respect of technological change. Although it is an important crop, the ease with which world demand can be

matched and the fact that a considerable part of the coffee land is not very good for other crops, reduces the potential payoff to technological improvement. Such improvement would release labor, but the agricultural sector already has a labor surplus in some areas. Nevertheless, newly introduced varieties (especially caturra) which do not require shade and produce at levels well above those of the traditional varieties now threaten to do just this. The substantial research effort in coffee compared to that in the other small farm crops has been one of the unfortunate results of an unplanned research strategy, where the direction of research was determined by which institution had the funds (in this case the Coffee Federation). Change was unfortunately slow in coffee for a long period when its import might have been more positive than now, i.e. when world demand for Colombian coffee was more elastic.

Indicators of technological change in livestock are fewer than for crops but all evidence points also to less change. The last 30 years have witnessed some improvements in cattle raising via new breeds, disease control, etc. Most cattle are raised on farms with continuous pasturing and little or no rotation or planting of mixed pastures. Among the developments in the area of pastures was the introduction of kikuyo grass which can be combined well with other grasses and is exceptionally good on eroded soil, due to its great thickness. Many observers feel that the basic problem in livestock is low low desire to use modern practices. Thus Atkinson notes

> "A survey of ranches conducted by the organization of livestock producers (FEDEGAN) indicates that the level of technology is quite low, even in the areas which have the better ranches.

> A series of questions about "recommended" practices revealed that few of them are being used anywhere, and thus the results of such practices could not be observed. Seldom was any considerable combination of them used on any ranches other than those specializing in purebred cattle for breeding purposes. Accordingly, it is important to point out that we have few empirical results to show how profitable such practices would be under Colombian conditions. On the other hand, the technology of beef cattle production is not so mysterious, and superior practices have been tried and adopted in countries with climatic conditions similar to Colombia's. The judgment of livestock specialists that Colombian ranches are technologically backward and that they would be more productive and profitable with the use of improved technology seems plausible. In any case, considerable improvement is essential to any expansion that would be fast enough and great enough to permit announced export targets to be met.[1]

[1] U.S.D.A., Agricultural..., op. cit., p. 93.

Grunig's findings that traditional technology often pays better than modern complicate the interpretation of the low productivity in livestock, however, and deeper digging must be done in this area.

Most of the sheep are creole descendants of those brought by the Spaniards. Sheep are raised primarily by fairly small producers.[2] High

[2] According to the 1960 census, over 70 percent of the sheep were found on farms of less than 20 hectares and 60% on farms of less than 10 hectares.

quality purebreds have been imported from Australia and New Zealand, but disease problems remain serious, and the industry remains a stagnant one. Sheep raising is carried out primarily on poorer soils[3] and has not received high

[3] Guajira, Boyaca, Cundinamarca and Narino are among the leading producing departments.

priority in government credit or technical assistance programs. These facts along with its often being a side activity of small producers and facing a disorganized market for both wool and mutton, have impeded technical

Table III-24

Percent of Crop Area Sown to Improved Seed Distributed in Same Year, By Selected Crops[1]

	High "Improved Seed" Ratios			Medium "Improved Seed" Ratios			Low "Improved Seed" Ratios	
Year	Cotton (1)	Barley (2)	Soybeans (3)	Rice (4)	Wheat (5)	Corn (6)	Beans (7)	Potatoes (8)
1953	100%		100%		1	0.5		
1954					4	1		
1955		(1)			1	3		
1956		(20)			3	4	0	
1957		(50)			3	7	0	
1958		(70)			8	5	-	
1959		(90)			15	6	0	1.9
1960		89	(92)		11	6	1	0.4
1961		89		2.5	15	8	1	0.2
1962		77		19	14	10	2	0.1
1963		89		25	15	9	3	0
1964		71		39	16	14	2	0
1965		79		51	19	14	9	0
1966		85		54	24	15	7	0
1967		72		55	(45)	23	12	0.4

[1]These figures refer only to the share of total cropped land which would have been planted to improved seed in the year in question if farmers had not saved any of their own improved seed. The fact that farmers do so probably accounts for the failure of barley sales to remain at their high levels of 1960 in some subsequent years; it would be reasonable to expect a period of rapid sales as farmers accept the new varieties and then a period of decreased sales (assuming, for example, that the same share of land is under the improved varieties) as more farmers become in a position to use their own saved seed. This problem of interpretation may not be so serious in the case of rice, wheat and corn; for corn a substantial share of the new seed is hybrid and therefore cannot be saved; and in the case of the other two crops there has been a very rapid increase in the use of improved seed, so that the percent error is probably not too great. Wheat and barley are probably the crops where the figures shown here are somewhat below the percent of area planted to improved seeds.

Source: Cols. (5), (6), (7), (8) come from the Caja Agraria. The figure for wheat in 1967 is in parenthesis since such a rapid rise seems surprising; that year saw a dramatic fall (of about 35%) in area (see Atkinson, Changes... op. cit., p. 33; if the fall was not overestimated, then a very dramatic increase in share of land using improved seeds did occur. Cols. (1) and (3) are from the Instituto de Fomento Algodonero; for Col. (2) the figures in parenthesis are from an unpublished study prepared for the United States Department of Agriculture as part of overall supply and demand projections for agricultural products and refer to estimates of the share of land under barley planted to the variety Funza; the figures not in parentheses are from Procebada and are based on the same ratio as for the other crops. Col. (4) is from data of the Federacion de Arroceros (Rice Growers Federation). Most of these same figures were summarized in Eduardo Restrepo, "Semillas Mejoradas," Departmento Nacional de Planeacion, 1968.

progress.[1] Relatively little is known about this industry. Hogs are also still mostly native breeds but they are good fat producers and economical in terms of food requirements. Recently foreign breeds have been introduced, but possibly there is less to be gained in the case of pigs than for most other types of livestock.

[1] See, for example, Vincente Florez Dassan and Jorge Enrique Vargas, Problemas de Produccion y Mercados de la Industria Ovina en Colombia, ICA, Departamento de Economia Agricola, Boletin Departamental #7, Tibaitata, April, 1970.

Chickens (and eggs) are a fast growing and increasingly important part of the livestock sector--of particular interest because of the potential they bear for the small scale (land-wise) producer and the danger that technological change will pass by and work against the small scale (capital-wise) producers. Production of both birds and eggs about doubled over 1948-50 to 1965-7 according to the official figures (weak in this area). About 75 percent of chickens were on farms of less than 10 hectares according to the 1960 census, but these include some quite capitalized operations. In some regions (e.g. the Sabana de Bogota) a major form of technological change has been disease control, and this has worked to favor the large scale producers. Extension workers and Peace Corps volunteers have given favorable reports on the possibility of successful poultry operations on small farms starting with little capital (i.e. not run by educated "modern" managers) etc. In this connection Atkinson notes

> "A type of farm enterprise with modern technology available which is more easily adapted to small, traditional farms is poultry and egg production. The typical modern poultry establishment in Colombia--as in the United States--has several thousand birds. Production is modern and efficient. A program to establish small enterprises as supplements to coffee production is being developed for both production and marketing of eggs in the Caldas area. A key consideration is that it seems feasible to have a poultry enterprise of only a little over a thousand birds without

compromising efficiency of production. Then, as conditions permit, such a unit can be doubled, tripled, and so forth to permit expansion in production. Such an enterprise has various other advantages. The technology is well developed, and thoroughly tried in Colombia; it is not too complicated, and can be readily supervised in connection with the sale of feed or the purchase of the product from the farmers.

Expansion is already underway. The margin between prices of broilers and costs of production under efficient management appears to be unusually broad. It should be noted that modern poultry and egg enterprises are very non-traditional and have little relation to the management of a farm flock of 15 or 20 chickens. It seems quite likely that the traditional farmer, such as the coffee grower, will need special advice and supervision both in production and marketing if he is going to be competitive. As stated earlier, an effort is being made to provide such help in the Caldas area."[1]

[1] U.S.D.A., Agricultural ..., op. cit., p. 95.

B.a. Technological Change: Seeds and Purchased Inputs

What has been the relative importance of certain specific types of technical change over time, and the relative progress of different crops? What factors have been important in the spread of the new techniques? This section reviews some of the evidence.

Improved Seed

The 1950's saw the first use on any scale of improved seeds in Colombia, but for only a few crops (especially cotton and barley); substantial further progress has been made in the 1960's, though much variety improvement remains to be done; many farmers still use unimproved varieties and some of the new ones do not in any case represent great advances compared to what should be possible, judging by achievements in other countries.

There is a clear difference in adoption rates between such modern commercialized products as cotton, soybeans, and barley, all of which use almost exclusively improved seed and the more traditional crops such as beans, potatoes and Yucca, (probably almost none of the yuca seed is in any sense improved). Corn is an intermediate case with improved varieties generalized in the Cauca Valley, but not in the rest of the country, in spite of an extensive promotional campaign in 1964 which had good results on the production side, but which apparently did not increase the use of improved seeds dramatically. The use of improved wheat and rice seeds has increased rapidly in recent years; in rice it rose from a base of almost zero in 1961, due largely to the efforts of the Federacion de Arroceros, a strong private organization of rice growers. Improvement in wheat has been more gradual, beginning in the late fifties; as of 1966 probably between 25 and 40 percent was sown to improve seed.[1, 2] Availability of new seeds requires

[1]The figure presented here for 1967 suggests a tremendous improvement (to 45%) in that year; it is hard to believe, and I have been unable to verify it.

[2]The main agency disseminating improved seeds in the Caja Agraria and the main types of seeds involved are wheat, corn and beans but peas and some pasture seeds have been distributed recently and plans are in progress for the distribution of soybean and sorghum seeds. Seed development and extension is also carried out by the Coffee Federation, the Tobacco Growers Association, ICA (Colombian Agricultural Institute) and the Rice Growers Association. For the latter crop, and for tobacco, farmer acceptance of new varieties of plants and seeds seems to be better than in the case of the main Caja crops. This is at least partly due to the fact that the same condition which leads to producers' organization (a limited number of large producers) also makes extension work easy. Tobacco is a special case--see the discussion below.

a gestation period, sometimes on the lengthy side (for example in the case of potatoes). For most products there has been a healthy tendency for the price of seed relative to that of the product to fall over time.

In general, the less commercialized products, which are grown in relatively small plots, and do not have strong producers' organizations are

the ones with low usage of improved seed. (Cotton, barley and rice of the above crops have had important producers' organizations.) But exactly why these relationships exist is only partially clear. Relatively little research has gone into such products as beans and yucca, so it is hardly surprising that the use of improved seed is low. Another factor sometimes limiting the spread of improved seeds had been lack of supply.[1] Since availability is

[1] Guerra (Guillermo Guerra, Economic Aspects for Corn and Milo in Colombia, Universidad Nacional de Colombia, Medellin, July 1966, p. 125) estimated in 1966 that only 10 percent of the area seeded to corn used improved seed, and noted that the Caja Agraria did not have capacity to multiply hybrid seed rapidly enough and the production of private companies was relatively small. The Rice Federation, presently in charge of multiplying improved rice seed, was as of 1968 supplying only 33 percent of the needs of the country, but with the completion of three new plants to accompany the two existing ones it expected to meet the demand. (See Grunig, op. cit., p. 408).

clearly more satisfactory in areas of extensive commercial production, a part of the commercial-traditional differential is no doubt accounted for by this factor, especially in the case of crops like corn where seed must be purchased each year. Much of the explanation for the faster adoption of improved corn varieties in Valle lies in the fact that highly productive varieties usable in the cold regions of the country where there are many small plots have not yet been developed.[2] An important research problem is

[2] This was pointed out to me by Dale Adams.

to sort out the relative importance of lack of relevant research, ineffective extension and/or multiplying services, poor marketing channels, and propensity to adopt among groups of farmers[3] At present it is unclear whether the policy

[3] A more detailed look at several individual crop histories (see Appendix III-A) helps to illustrate some of the above comments and occasionally allows tentative guesses as to the effects of new varieties.

implications of observed relationships include favoring commercial agriculture with a view to speeding technological change, or putting more effort into bringing technological change to the small farm.

Relative yields for a given crop by farm size provide complementary information of value in pinning down the relative importance of the factors cited. The figures presented in Table III-3 suggest a substantial differential--an average yield advantage for the largest size category relative to the smallest one of about 50 percent and a greater advantage for crops with rapid technological advance in the last 10-20 years. Incautious reading of this data might suggest that differences in the "farmer" must be important when yields vary so much for a given crop. But it must be remembered that (a) yields differ by more than does value added/hectare, since the larger farmers use more purchased inputs; (b) all of the other differences (relative amounts of information available, potential gains from adoption, the research and extension bias, etc.) which produce different rates of technological change by crop can lead to differences among farm categories. Again, few conclusions can be drawn without additional information.

Improved seeds have, it appears, had quantitative significance in raising yields and total factor productivity in barley, tobacco, rice, cotton, wheat and perhaps a couple of other crops,[1] though few attempts to quantify these effects, even for individual crops, have been carried out. Probably their impact (and that of fertilizers) would show up primarily in increased yields--while the contribution of mechanization and road building would be mainly in facititating the opening of new areas and the switching from livestock to crop production. As noted in Chapter II, over the 1948-50 to 1965-67 period about one quarter of major crop output growth was associated with yield increases; almost all of the yield index increase was concentrated in

[1] Coffee would now have to be added to this list, but the advent of the sun grown varieties had not yet affected yields during the period under consideration here.

the years 1957-62 (see Table II-1) for which the calculated residual was 0 high.[1] This corresponds to an increase in value of major crop output of a little less than 1 percent per year, and a somewhat smaller increase in value added. Given our guestimates of the importance of pesticides and fertilizers, (see below) it seems unlikely that more than 0.2 to 0.4 percent per year growth in crop output could be attributed to improved seeds.[2] As a share of total agricultural output the figure would be less by about one-third.

[1] For the non-coffee crops, whose output increases are the relevant ones after 1957, the yield index rose by 27% over the 1948-50 to 1965-67 period; with base 1948-50 the index stood at about 95 in 1950 and over 120 in 1962, indicating the concentration of average yield gains in the same period as for the total index.

[2] "Attributed to" must be interpreted with care. The sort of "growth accounting" engaged in here is based on unsupported implicit assumptions about the degree of complementarity of the different changes occurring. If, for example, these changes were perfectly complementary, the improved seeds would be a necessary condition for any productivity increase, but would by themselves bring about no increase. The calculation of the text implicitly assume unit elasticity of factor substitution (or technological change component substitution).

Use of Fertilizer, Insecticides, etc.

Another measure of modern cropping practices is the adoption of fertilizer, insecticides, etc.[2] Colombia still ranks low on this score. Cattle manure is used for growing potatoes and sometimes vegetables but the fact that relatively few farms combine crop and livestock production prevents more general use; low feed quality would in any case limit the pay-off from it. The low usage of chemical fertilizers in 1960[3] is illustrated in Table III-25;

[2] One must recognize that the use of more fertilizer does not result only from an increased knowledge on the part of farmers in an otherwise unchanged situation, but may also be a result of other changes such as decreasing soil fertility, introduction of new seed varieties with which fertilizer is more productive, etc., where its introduction is part of a "package" reaction. It can also come about through price change. Still, there is no question in broad terms that modern scientific agricultures use fertilizer and similar inputs heavily and that their increasing adoption is eventually necessary if sustained high factor productivity is to be achieved.

[3] Though this was a "below trend" year, with usage perhaps 50 percent below the average of 1961-67, this difference is not significant in the context of the comparison made here.

Table III-25

Comparative Applications of Fertilizer: Colombia and Other Selected Countries: Early Sixties

(metric tons per hectare)

	Date of Land Census	Phosphate		Nitrogen		Potash	
		Arable Land	Total Land	Arable Land	Total Land	Arable Land	Total Land
Denmark	1963	45.9	40.9	55.2	49.5	65.6	58.6
France	1963	57.7	35.7	36.7	22.7	45.8	28.3
Germany	1963	89.6	53.4	88.5	52.7	133.5	79.5
United Kingdom	1963	62.0	23.3	78.8	29.5	61.3	22.9
United States	1959	16.1	6.8	21.7	9.1	13.7	5.76
Chile	1956	9.7[1]	8.9[1]	62.5*	57.4	2.29[4]	2.11*
Colombia	1960	3.5*,[4]	8.9*,[4]	10.9*	2.8	1.00[4]	0.26[4]
Peru	1962	18.4*,[1]	1.6*,[1]	39.5*,[1]	3.5*,[1]	5.09[1]	0.45[1]
Uruguay	1961	5.7[2]	.79[2]	4.1[2]	.55[2]	4.08[2]	0.57[2]
Venezuela	1961	1.97[3]	.25[3]	1.07[3]	.137[3]	1.50[3]	0.19[3]

*Unoffical figures for fertilizer.

[1]Fertilizer estimates for 1962-1963.

[2]Fertilizer census of 1959-1960.

[3]Fertilizer census of 1960-61 (60 percent lower in nitrogen than 1958-1959 census).

[4]Fertilizer estimates for 1958-1959.

Source: Fertilizer figures from United Nations, Food and Agricultural Organization, Fertilizer: An Annual Review of World Production, Consumption and Trade, 1964. Land figures from Food and Agricultural Organization, Production Yearbook, 1964.

Notes: Total land equals arable land plus permanent grassland.

applications of phosphate, nitrogen, and potash were far below those European countries with intensive agricultures, well below the United States with its rather extensive agriculture, and (perhaps more significantly) below such Latin American countries as Peru and Chile, which are at about Colombia's general level of development.[1]

[1]While these figures are not fully comparable between countries, the extreme variations are, nevertheless, sufficient to demonstrate how far Colombia is behind the United States and the European countries. For example, Colombia's application of phosphate per acre of arable land was, for the years in question, only about one-fifth that of the United States, and less than one-tenth of any of the European countries, while also being strikingly below the figures for Peru and Chile (in spite of the fact that Colombian soils are deficient in phosphate). In terms of nitrogen, the Colombian application was about one-half of that in the United States, and again much below all of the European figures; for potash it was about one-fourteenth the United States figure, and less than one-fortyfifth of the lowest of the European countries, France. These comparisons are somewhat misleading in that they fail to distinguish between cropped land and permanent grassland, both of which are included in the term "arable land." Since applications of fertilizer are usually higher on cropped land than permanent pasture, the countries with a higher proportion of their arable land in the form of grassland look worse than they really are. It must also be borne in mind that some soils naturally need less of a given type of fertilizer than others.

Since optimal levels at present are substantially lower in Colombia than in more developed countries (because of less research, higher prices, etc.), a more relevant figure may be the National Experimental Station's estimate that, at a minimum, fertilizer usage should be three times its present level.[2]

[2]Atkinson, "Agricultural ..., op. cit., p. 99, referring to about 1968. Often experimental station estimates are upward biased relative to what is optimal from the private individual's point of view; this estimate seems reasonable, however.

Despite the present low utilization of artificial fertilizer, the rate of increase between the mid 30's (when almost none was used) and the early 60's was quite rapid (see Table III-26).[3] Utilization appears to have been

[3]Although different sources of information diverge in their estimates of imports and utilization of fertilizers, all indicate a rapid increase of use.

Table III-26

Indicators of Fertilizer Use, 1935-1967, and Fertilizer Prices, 1950-67

	Nitrogen (1)	Phosphorous (2)	Potash (3)	Fertilizer Use (Domestic Production & Imports of Nitrogen Phosphorous and Potash): Millions of 1958 pesos (4)	Domestic Production (Tons of Nutrients) (5)	Index of Real Price of Nikostal (6)	Price of Fertilizer/Price of Value Added in Agriculture (7)	Price of Fertilizer / Price of Value Added in Non-Coffee Crops (8)
	Indices:	1953=100	(Source ECLA)					
1935-39	17	5	2					
1940-44	18	6	13					
1945								
1946	60	41	35					
1947				7.31				
1948				5.89 } 7.87		70.9	85.6	69.6
1949				10.42		98.2	112.0	104.9
1950	90	88	105	8.70	6.1	86.7	88.0	75.7
1951				25.41 } 23.87	23.3	79.8	81.7	73.2
1952				16.84	14.9 } 20.2	97.1	100.0 } 86.5	82.1
1953				22.71	18.4	78.6	76.3	76.7
1954				45.71		63.0	55.0	56.0
1955				65.64	52.1	69.9	66.2 } 60.8	70.3
1956				64.96	50.0 } 52.8	69.4	63.3	67.3
1957				85.24	62.00	63.0	58.6	62.9
1958				77.49 } 68.65	60.2	100.0	100.0	100.0
1959				49.92	39.6	102.4	105.2 } 96.8	99.9
1960				74.91	54.5	93.3	97.8	97.9
1961				100.36 } 100.12	74.3 } 87.1	86.7	91.5	86.0
1962				99.21	82.2	82.8	90.4	85.9
1963				126.00	92.0	123.8	135.3	118.1
1964					132.3	125.0	123.4 } 131.2	172.1
1965					84.8	120.8	123.2	108.5
1966					123.5 } 109.0	125.0	131.8	115.2
1967					118.8	132.0	142.5	-
1968						119.0	129.8 } 131.0	
1969						121.9	132.1	

[1] The GNP deflator was used for the period 1950-58 and the national income deflator since 1958.

Source: Tables A-3, A-65-66, and A-67.

almost zero before 1935, so that between 1935 and 1950 there was a rapid percent increase (though a small one in absolute terms) for all three types of fertilizers. The first significant increase in absolute terms occurred in the 1950's; the 1957 application was 10 times that in 1947. Since about 1957 the increase has been much slower and the fluctuations more violent; as of the mid 60's it was not clear whether a plateau in use had been reached; the ratio of fertilizer used to cropped area was no longer rising. One factor in this leveling off has probably been a price increase corresponding to the period of import substitution since 1962. In 1962 virtually all fertilizer was imported; for the years 1965-7, almost all of the supply was domestically produced, although measured in terms of tons of the three basic nutrients the domestically produced share was still only about 30.7, i.e., most of the basic ingredients were still being imported. The average price of nifoskal over the years 1963-6 was about 30 percent above that of the years 1958-62 (which in turn was well above that of most of the preceding years). And the severe fluctuations in the period 1964-67 associated with the balance of payments fluctuations must have involved some inefficiency in fertilizer use.

Changes in fertilizer use do not necessarily signify technological change in agriculture (knowledge of a better production function) if such things as credit availability, price, or quality change substantially. Prices have varied but the long run increase in fertilizer use could only be explained as a "price phenomenon" if it were argued that the substantial price decrease[1] during 1954-7, associated with a very large increase in use,

[1] The fertilizer price series available records wholesale rather than retail prices. Its swings are so substantial that it would be hard to imagine their not getting through to the latter level.

created a habit which then contributed to continued increases in purchases even as prices subsequently rose past the level of the early fifties.[1]

[1]The Rojas government helped to lower the real price by giving fertilizer a preferential exchange rate. In 1958 the exchange rate was unified again.

The Pattern of Fertilizer Use:

Atkinson describes the pattern of fertilizer use as follows.

> With less than 2 percent of total acreage in cultivation, potatoes account for a third of all fertilizer application. Potatoes are the one crop in Colombia for which fertilizer is almost always used, and as much is used as has been recommended by a committee of specialists (table 30). Fertilization is common for irrigated rice, and among minor crops, bananas for export and tomatoes and some vegetables grown for urban markets. Fertilizer use is also important for wheat, where three-fifths of the area receives an application. Smaller proportions of the area of tobacco, cotton, sugarcane, barley, and other crops and coffee account for most of the rest of fertilizer used. On the whole array of other crops and pasture, little inorganic fertilizer is used. Organic fertilizer is of some importance for coffee. The manure from the fairly large number of animals is of limited value, as a consequence of the low level of feeding.
>
> One of the characteristics of fertilizer usage is that it is limited to specific crops produced for sale. Practical problems (such as financing) prevent fertilizer usage on subsistence crops. Lack of research results and specific input recommendations add to the uncertainty of obtaining profitable returns. Fertilizer application to seeded pasture has been reported as highly profitable (table 33), but it is insignificant in Colombia.[1]

[1]U.S.D.A., Agricultural ..., op. cit., p. 65.

It is interesting to observe that the modern "commercial" crops are not the main fertilizer users (though irrigated rice is, individually, a major user) but rather some of Atkinson's "mixed technology" group, (in particular potatoes, tobacco, and wheat) (see Table III-28). The commercial crops are frequently produced in new zones where the land, during the first few years at any rate, is very fertile. None of the subsistence type crops

Table III-28

Area fertilized (1966) and inorganic fertilizer usage (1967) in Colombia for selected crops.

Crop	Area fertilized		Nutrients per hectare	
	1,000 hectares	Percent of total area cultivated	Kilograms per hectare	Deficiency in relation to recommended usage
		Percent		Percent
coffee	97	12	49	65
yuca	2	1	53	*
beans	5	7	42	86
plantains	3	1	53	*
non-centrifugal sugar (panela)	23	10	130	19
corn	12	2	35	60
potatoes	79	100	414	8
wheat	42	62	220	0
tobacco	6	26	165	29
bananas	19	33	140	30
cocoa	4	11	*	*
cotton	49	28	140	0
rice	82	28	154	27
sugar cane for sugar	16	18	130	19
sesame	9	17	*	*
barley	12	20	81	63
soybeans	8	16	56	81
grain sorghum	5	12	53	85

*No recommendation or information available.

Source: USDA, Agricultural Production..., op.cit., p. 67, who notes that "The first two columns are estimates for 1966 based on FAO/CEPAl, "El Uso de Fertilizantes en Colombia." The last two columns are estimates for 1967 based upon the same source."

with the partial exception of sugar for panela (not heavily subsistence nor a heavy fertilizer user) use a significant amount.

Very low proportions of the areas sown to corn, beans, yuca and platanos receive inorganic fertilizer and rather low proportions of cane for panela and coffee; seven crops (potatoes, irrigated rice, bananas for export, sugar cane, wheat, barley and cotton) absorb 80 percent of all such fertilizers. (see Table III-28.)

Some observers interpret the relatively high use of fertilizer for irrigated rice, and cotton as showing the influence of strong producer organizations which provide ample supply and easy access to such key inputs as fertilizer.[1]

[1] Gustavo Pérez, Some Factors Affecting the Consumption of Fertilizers in Colombia, unpublished M.A. thesis, University of Wisconsin, Madison, Wisconsin, 1966, p. 19. Perez also includes coffee as a high user, though here it is organic fertilizer which is widespread. Probably the Federacion has contributed to but not been the determining factor in this practice.

But the very high consumption of fertilizers on potatoes cannot be explained in this way, and suggests that if the incentive is there the typical farmer, even though he be quite small, will adopt.

Farm Size and Fertilizer Use

It has been argued that the adoption of an input like fertilizer is much more difficult for the small farmer than the larger one (even after any information hurdle is crossed), since the credit and commerce systems are not designed to take care of him. The complaints about the low quality of fertilizer appear to have been well founded in some regions and given the cautious psychology of the farmer who lives close to the subsistence level, this negative publicity, warranted or not, may be a deterrent to the spreading use of fertilizer. Despite impressionistic evidence to these effects, data from the 1960 agricultural census suggest as much acceptance of inorganic

fertilizer by the small farmer as by the large one[1]--the percent using it was

[1]This could mean either that the special obstacles of the small farmer are sometimes overestimated, or that the payoff to fertilizer use is greater than for the large farmer.

small for all farm sizes;[2] (excluding Valle, for which no data were available),

[2]Research during the years subsequent to 1960 seems to indicate a more widely spread use of fertilizer than indicated in Table III-29. Adams, for example, notes that most of the 1,000 farmers interviewed in the process of several research projects he carried out in the early sixties did use fertilizer. The increases in use shown in Table III-28 are consistent with this.

only 11 percent of farms applied inorganic fertilizer; for no size category was the ratio greater than 15 percent (see Table III-29). Many more farms used organic than inorganic fertilizers in 1960 (about 264,000 as compared to 130,000). The percent using organic fertilizer of some sort was about 22 (sum of Columns 2 and 3 in Table III-29). Usage (especially of organic fertilizer) bore a rather strong negative relation to farm size; over 30 percent of farms up to 10 hectares used some sort of fertilizer as opposed to a little over 10 percent of farms of 110 hectares and up. Whether these results indicate a propensity to use fertilizer which (other things being equal) varies with farm size is open to question since (a) the census indicates only whether organic or inorganic fertilizers are used on a given farm, but not the quantity used,[3] and (b) given that less fertilizer is used on pasture

[3]As a measure of "receptivity," the fact of using fertilizer at all may be more significant than the quantity (which may be influenced a lot by price, credit availability, etc.).

lands, and that larger farms have high pasture/total land ratios, some decrease in usage with increasing size could be expected, i.e. the observed differences could be due entirely to product composition differences by farm size. A calculation based on the (mildly) invalid assumption that only farms producing

Table III-29

Use of Fertilizer by Farm Size

(in hectares)

Farm Size	% of Farms on which Organic Fertilizer Only is Used (1)	% of Farms on which Inorganic Fertilizer Only is Used (2)	% of Farms on Which Both Types are Used (3)	% of Farms on Which Inorganic Fertilizer is Used (4)	% of Farms Using Fertilize of Any Sort (5)	Farms Using Inorganic Fertilizer All Crop Farms (6)	Farms Using Any Fertilizer All Crop Farms (7)
Less than ½	18.79	3.39	2.09	5.48	24.27	9.69	42.88
½ - 1	21.91	7.36	4.79	12.15	34.06	13.79	38.66
1 - 2	19.87	6.83	5.23	12.06	31.94	13.32	35.26
2 - 3	18.17	7.24	5.56	12.80	30.97	14.33	34.66
3 - 4	18.96	7.71	6.11	13.82	32.78	15.86	37.61
4 - 5	17.35	7.26	5.87	13.13	30.48	15.41	35.75
5 -10	17.35	8.00	6.09	14.09	31.44	17.60	39.28
10 -20	14.68	6.59	4.69	11.28	25.96	16.12	37.03
20 -30	12.48	5.73	3.47	9.20	21.66	15.18	35.61
30 -40	10.52	5.51	2.82	8.33	18.86	15.26	34.53
40 -50	9.30	4.75	2.29	7.04	16.34	13.73	31.83
50-100	7.69	4.47	2.12	6.59	14.29	14.76	31.97
00-200	6.43	4.45	1.66	6.11	12.54	17.92	36.80
00-500	5.42	4.60	1.57	6.17	11.60	26.70	92.79
00-1000	6.37	4.33	1.32	6.05	12.44	45.22	92.79
00-2500	4.91	5.52	1.36	6.88	11.80	93.79	160.68
re than 2500	3.43	6.11	1.39	7.50	10.94	173.52	252.94

Source: Agricultural Census of 1960, op. cit., p. 40 and p. 58.

crops use fertilizer suggests primarily/a range (up to the 5-10 hectares category) over which the share of crop farms using inorganic fertilizers increases and a subsequent range (from there to perhaps 100 hectares) over which it decreases.[1] Since usage depends so much on the crop, and since many "large-scale" crops are not heavy users (Table III-28) these data would not necessarily be inconsistent with constant or increasing usage by farm size for individual crops.

A comparison of usage by regions shows that the major users of inorganic fertilizers are the cereal producing departments--Boyacá, Cundinamarca, and Nariño. (Table III-30). Since Boyacá and Nariño are among the poorest departments in Colombia, it would appear that, while poverty may be a limiting factor in the use of fertilizers, it is certainly not dramatically so.[2] In the departments specializing in the production of livestock, such as Bolivar, Cordoba, and Magdalena, fertilizer use is virtually nil. Organic fertilizer is more widely used than inorganic, and all of the coffee producing departments (where residue or pulp of the coffee crop is a common form of organic fertilizer) ranked high; in Caldas, for example, about 35 percent of all farms used some form of organic fertilizer; Cundinamarca and Boyacá had about the same percent.

[1] It is interesting to note that independent data for the region of Rio Suarez (in 1963-4) are consistent with this in that the size group 5-9 has the highest percent of users, both of organic and inorganic fertilizer. But the lowest users of inorganic appear to be the smallest farms. All the figures are far above those for the country in 1960.

Comparable data for Cundinamarca reveals a pattern similar to this; the decrease in usage of inorganic fertilizers for farms over 10 hectares does not appear in any marked way except for the largest farms. A higher share of farms in the 200-500 range apply than farms less than 1 hectare. Boyaca reveals the national pattern, probably because non-mixed livestock farms dominate in the higher size categories.

[2] It would be theoretically possible that only the larger cereal producers in these departments used inorganic fertilizers, and that the small farm users were in other, better-off regions. This is not true however in Cundinamarca, for example; the relation between plot size and use is very similar to that for the nation as a whole.

Table III-30

Utilization of Fertilizers by Department, 1959
(percent of farmers using fertilizers)

	Inorganic Only	Organic Only	Both	Inorganic	Either
Antioquia	4.90	26.58	4.12	9.02	35.60
Atlantica	0.02	7.74	0.10	0.12	7.86
Bolivar	0.08	0.57	0.28	0.36	.93
Boyaca	15.28	25.24	12.20	27.48	52.72
Caldas	3.51	32.18	2.56	6.07	38.25
Cauca	1.71	13.80	0.31	2.02	15.82
Cordoba	0.00	0.24	0.01	0.01	0.25
Cundinamarca	15.90	24.86	10.27	26.17	51.03
Huila	1.42	19.30	0.03	1.45	20.75
Magdalena	1.17	3.68	0.18	1.35	6.03
Meta	1.02	2.09	0.28	1.30	3.39
Narino	5.07	16.50	8.93	14.00	30.50
Norte de Santander	6.54	15.71	0.45	6.99	22.70
Santander	6.77	11.63	1.53	8.30	19.93
Tolima	2.62	9.32	0.65	3.27	12.59
Valle	--	--	--	--	--
Total	6.43	17.24	4.57	11.00	28.24

Source: The fertilizer figures come from the Agricultural Census of 1960, op. cit., p. 35.

The high price, unsatisfactory distribution, lack of research, and deficiencies in knowledge about the use of fertilizers are greater obstacles to small farmers than to larger ones. Relatively low prices of machinery and high ones for fertilizers and pesti·ides have undoubtedly helped to push Colombian agriculture in the direction of acreage expansion rather than increasing productivity per hectare. For the small farmer the latter is the only alternative whereas the large farmer, who typically has the possibility of expanding cropped areas, is in a relatively better position to take advantage of mechanization and less in need of fertilizers.[1]

[1]The high complementarity between the biological revolution and fertilizer use is widely recognized.

In summary the use of fertilizer in Colombia is still quite low, relative to countries with advanced agricultural sectors, but it has increased at a high (percentage) rate over the last 20 or 30 years. How much farther it will increase and should increase, and the optimal policy for bringing about whatever increases are desirable are the questions of importance at this point. Current fertilizer application is probably far below what the optimal level would be with, say, U.S. prices and quality and good availability, but less distant from the optimum based on the corresponding Colombian variables. The slow increase in the use of phosphorous and potash is far from making up the marked deficiency (especially of phosphorous, the lack of which appears particularly evident in the soils). These deficiencies are becoming more serious in some areas due to the common practice of uninterrupted cropping without rotation or rest. Research station experiments indicate, as may be expected, that higher applications typically lead to substantial yield increases but application of benefit cost criteria gives mixed results, and it

is unclear how representative the experimental stations' conditions are, so that it is not clear how much inefficiency there is through underusage.

Pesticides

Consumption of pesticides has risen in a fashion similar to that of fertilizers, reflecting in part an increasing need due to increasingly resistant varieties of insects, diseases, etc. The major users are cotton, rice (especially irrigated) and sugar cane. A typical pattern with crops like cotton and rice is that in a given region there are at first few pests, etc. but as production expands and time passes, these are introduced from other areas and/or multiply and cost of control rises. Sometimes this problem (along with depletion of soil quality) becomes so serious that production is terminated; in other cases the new defense proves adequate.[1] Thus, even less than in the case of fertilizer can increasing use be interpreted as a measure of increased knowledge at the farm level (though this undoubtedly plays some role) or of net improvement in the production function; it is, rather, a defensive input, albeit a crucially important one.

[1] Often well co-ordinated action is necessary to save these situations. Over-cropping is usually a source of problems in cotton districts; failure to purchase new seed leads to expansion of red rice in rice areas, and so on.

The period of rapid growth of use on a per hectare basis was from the late 40's to 1957-58; balance of payments problems have made supply more costly and above all, more erratic, since then. Domestic production rose rapidly from 7 percent in 1964 to 34 percent in 1966. But, as in the case of fertilizer, there seems to have been a quality problem, albeit a gradually diminishing one. (Major using institutions have adopted procedures to check on quality.) In any case, all of the raw materials

were still being imported,[1] as of the late sixties. Presumably the relative price of these items rose somewhat over the post-1950 period as a whole (a period of worsening terms of trade).[2] During that period pesticides have been somewhat more important than fertilizers (in terms of total cost; see Table A-100) and have been applied over a greater area, at least in recent years--the Technological Institute indicated this area had reached about one million hectares in the late sixties.

" Most insecticides and fungicides have been used on a relatively small number of crops produced for sale. In 1967, over three-fifths of insecticides were used for cotton, and one-fifth for rice. In the case of cotton, control of insects may represent one-third of the total cost of production of the crop. In addition to facing destructive tropical pests, Colombia has been infested with all the principal insects that cotton growers have had to contend with in subtropical and temperate climates. Fungicides are used principally on bananas for export and on potatoes. Potatoes and some vegetables--especially tomatoes--are of special interest since the spraying methods used for them can be adapted to the needs of very small growers. Sprayers mounted on mules and burros give acceptable control.

[1] See Fitchett, Delbert, op. cit., p. . "Insecticides and other chemical inputs are produced in Colombia but mainly by foreign companies and with most of the basic ingredients merely mixed in Colombia, thus making them dependent on imports." Table A-103 shows that imports of these materials have not shown any upward trend during the 1960's, while fluctuating, sometimes violently, with balance of payments.

[2] Atkinson, (U.S.D.A. Agricultural Productivity ..., op. cit., p. 63) felt that relative price had fallen but he based this on a series for all chemicals, which would not necessarily be a good indicator of pesticide prices.

> "It has not been feasible to evaluate the progress made in the use of pesticides in Colombia. The area of nearly a million hectares on which they are used is impressive, but it is difficult to judge whether or not the relatively constant quantity used from 1951 to date has represented improved control per unit of pesticides. The wholesale F.O.B. value of insecticides imported has been about 1 percent of the value of all crops produced in recent years. Despite the infeasibility of evaluating the effects of pesticides on output in Colombia, it is apparent that: (1) potatoes, tobacco, and tomatoes grown for sale require both pesticides and fertilizer, and small farmers or sharecroppers use both these inputs; and (2) cotton, irrigated rice, and sugarcane for sugar require pesticides. Cotton and sugarcane are often grown without fertilizer, and irrigated rice is sometimes so grown."[1]

[1] U.S.D.A., Agricultural ..., op. cit., p. 64.

How much of the growth of value added in agriculture over the last couple of decades is attributable to increased inputs of fertilizer and pesticides. If one accepts the FAO-CEPAL estimates of the profitability of inorganic fertilizer use[2] as ranging from equality with the cost of the

[1] From FAO-CEPAL "El Uso de Fertilizantes en Colombia," 1964.

fertilizer to three or four times as great, then the part of 1967 agricultural value added attributable to its use was only one to four percent. Most of this gain would have occurred during 1950-67, and its relation to the total residual (output increase unexplained by increases in land, labor and capital) would be from less than 5 percent (if the increased profits from fertilizer use were equal to its cost and the residual were about 2 percent per year) to between one quarter and one third (if the "increased profits to fertilizer cost" ratio were 4 and the residual were only 1 percent per year). On balance, then, it seems unlikely that fertilizer accounted for more than 20-25 percent

of the total unexplained output.[1, 2] When annual use is plotted against

[1] Apart from the possibility that the FAO-CEPAL figures are incorrect as measures of the private profitability of fertilizer use, this way of estimating the output effects of fertilizer has two defects. The possibility that the effects on value added could be greater than those on private profits creates a possible downward bias (though this is not clear--I do not know how the profitability calculation was made). The fact that part of the pay off to fertilizer at a moment of time is due to other developments (like new varieties) creates a sort of upward bias.

[2] This is consistent with figures presented by Peter Hildebrand on the relation between crop yields and fertilizer and pesticide use--see below.

calculations of the residual (for crops), no obvious relation emerges, but random fluctuations might be expected in any case to drown out its impact.

A similar argument would imply a similar share of the residual due to use of pesticides since their value had been in the same range (or somewhat higher) than fertilizers. But here it is difficult to interpret the pay off; sprays are basically a defense against losing crops (in a given year) and against over time decreases in average yields. Their positive impact on total agricultural output bears little relation to the difference between, say, the cotton produced with spray and without it. The real alternative is some other crop, and it is hard to guess what the differential in profits or value added per hectare between sprayed cotton and that crop is. The problem is not so severe with fertilizer since crop composition is less sensitive to its use, and many reported experiments on its pay off have been undertaken.

Hildebrand[3] argues that yield per hectare of commercial crops (rice,

[3] Peter B. Hildebrand, Progress Report on Study of Impact of Fertilizers and Pesticides on Production and Productivity of Commercial Crops in Colombia, Preliminary, US AID, Bogotá, April 1968.

sesame, cane for refined sugar, cotton, barley, soy beans and sorghum) is closely related over time with the combined availability of fertilizers and

pesticides. The argument is more persuasive with respect to pesticides, where perhaps 80-90 percent by value are applied to this group of commercial crops,[1] than to fertilizers where considerably less than half (perhaps 25-35 percent) are.[2] If all of the yield income between 1949-51 and 1961-63 (low and high groups of years respectively) were attributable to that portion of these two inputs used on them (assuming the portion constant over time), and if they were equally productive in their other uses, then a rough calculation suggests that the "increased value added/cost of fertilizer and pesticide" ratio was in the neighborhood of 1.5 to one (i.e. the B/C ratio was 2.5:1). This figure is probably upward biased in assuming all the increases in yield resulted from heavier applications of these inputs. Allowing for all this, it could hardly suggest a greater "increased value added/cost of fertilizer and pesticide" ratio than the four to one upper limit we assumed for fertilizer.

[1] Based on figures from the Instituto de Investigaciones Technológicas, presented in Atkinson, Agricultural Productivity ..., op. cit., pp. 85-86.

[2] See Ibid., p. 91.

As has been abundantly clear throughout the above discussion, the data base in Colombia does not permit a satisfactory analysis of the relative importance of different components of the residual (if in fact it can be meaningfully decomposed[3]). Three categories which may be distinguished are: biological advances (seeds, fertilizer, etc.), mechanical advances, and public

[3] If we think of the sources of change in the production function in terms of inputs, it can be assumed that some have a more or less substitute relationship and others a complementarity one; in the latter case decomposition may not be very meaningful.

investments not included in the capital figures (mainly in transportation).[1, 2]

[1]This category would more appropriately come under investment but the difficulty of treating public highway investment this way (lack of good time series data; multipurpose nature of the highways) suggest the usual route (exclusion).

[2]Such improvements as quality of farm management (possibly related to education) could not be distinguished. The average educational level of farm heads changes too gradually to allow time series analysis to pick up any possible effects; it may not be the relevant variable anyway.

The evidence suggests that all three have been important; and that their contributions have frequently been intertwined. Overall, crop yield gains accounted for about one quarter of value of output growth for major crops and 16 percent of total value of output growth during 1948-50to 1965-67. Probably most of these were due primarily to biological advance. If one assumed that all were, then associated with a total cost increase due to the use of the inputs of about 250 million pesos would be around 450 million 1958 pesos of additional output.[3] Since the use of the inputs would increase working capital

[3]Estimates of the use of these inputs are weak as are deflators used to convert them to base year prices so thenumbers should be treated only as indicating general magnitudes.

not all (but a large share of) of the increased value added should have turned up in the "residual." If it all had, it would have constituted about 30 percent of the total residual and a greater share of that associated with crops.

The fact that increases in mechanization and new roads have been associated with opening of new areas suggests that part of their positive effects were missed in the production function analysis where it was implicitly assumed that new land was homogeneous with that of older areas. This is tautologically untrue in one sense.[4] And the effect of mechanization

[4]If the land had really been the same it would have already been under cultivation.

in converting land from pasture to crops is essentially the same phenomenon--bringing previously little exploited land into the crop sector -since probably a large majority of the land now used in the commercial crops was previously under pasture. Average value added per hectare would rise by, say, 100-200 percent and value of output by a little more.[1] Meanwhile, capital

[1]The only data permitting a fairly plausible estimation of this magnitude are based on James Grunig's samples in Valle and Meta, and presented by Wayne Thirsk (op. cit., Table II-3,p.26.The value added/land price ratio in Valle was 2.650 for crops and 1.407 for cattle; in Meta the corresponding ratios were 5.16 and 0.87. The differential is thus a little less than two in Valle and almost six in Meta. One might expect some downward bias in both cases if grazing land tends to get "typed"; if it were once switched to crop uses (a switch possibly involving some transition costs) the price might go up. Possibly Valle and Meta are extreme cases with respect to the ratio; Valle has undergone very substantial switching from cattle to crops over time, suggesting relative substitutability between the two. Meta is far from markets and has many disadvantages as far as crop growing is concerned, so a very high value added/land price ratio might be needed before the activity is profitable. Value of output/value added would be expected to be somewhat greater in crops since large farms tend to use a good amount of purchased inputs.

stock per hectare might or might not rise[2] and labor/hectare would rise con-

[2]The capital/output ratio is higher in livestock than in crops.

siderably.[3] One might, then, argue that transportation investments and mechani-

[3]Referring again to Thirsk's averages based on Grunig's data. The man days/value of land ratio is about2.5 times as high in crop as in livestock farming in both Valle and Meta. (See Thirsk, op. cit., Table II-3).

zation were major factors in generating that 45 percent of crop output increase which corresponded to acreage increase. They might thus be credited directly with 30-40 percent of the total increase in crop output and 40-55 percent of the residual (if it accounted for one half to total output growth).

Summary

Overall, then, more new technology has been introduced on large farms, and in particular in the production of the so-called modern crops, most of which have an associated producers' organization. But small farmers are apparently about as ready to adopt fertilizer and pesticides as are the large ones. These pieces of evidence which might appear to be in conflict are consistent with the general lines of the research and diffusion processes. Most research and extension has been aimed at the large farmer, so it is not surprising that he has adopted more change; but new inputs, techniques and/ which also pay off for the small operator are adopted by him, e.g. fertilizers. A crucial question is the possibility of research directed at the small farmer, reasonably cheap extension to him and the nature of his receptivity to change. On the last count, evidence is generally favorable. One of the important innovations in recent years--supervised credit--has as its central idea the provision of a lever to promote technical change through the giving and withholding of credit.

We next consider the characteristics and mechanisms, past performance and present possibilities of research and diffusion (including the particular mode of formal extension), with focus on the obstacles to more rapid and better directed technological change.

B.3. Research and diffusion

Research

The variety of technological improvements available for Colombian agriculture at any time depend upon the research carried on in the experimental stations, and on borrowings from foreign countries.[1] As will be

[1] For a discussion of the history of international transmission of agricultural technology in sugar bananas and rice, see R.E. Evenson, J.P. Houck, and V.W. Ruttan, "Technical Change and Agricultural Trade:Three Examples--Sugarcane, Bananas, and Rice" in National Bureau of Economic REsearch, The Technology Factor in International Trade, New York, Columbia University Press, 1970

expenditures by the Colombian government on agriculture noted in Chapter V,/cultural research have been small; some improvements in varieties and practices have been developed (with the aid of foreign expenditures), but the output is inevitably linked to the inputs. Figures cited earlier to the effect that, even in the last 15 or 20 years during which the research effort has been expanded--leading to higher yielding varieties of tobacco, barley, and to some extent wheat and a few others--and some new varieties have been imported or adapted (e.g. cotton and rice), the effect has by no means been revolutionary. A relatively small proportion of output increase even in the last 10 years seems to be a direct result of such improvements.[1] This is about what could be expected. Colombia's research

[1] As observed in Chapter 2, over 1948-50 to 1965-7, about 24 percent of output increase could be associated directly with yield increases. Yield increases in tobacco, wheat, and barley, and corn (though corn yields rose very little) corresponded to about 4.6 percent of the total crop value; increases in sugar, rice, and cotton, on the other hand amounted to 19.5 percent. (As can be seen, very little output increase was due to yield increases of the other crops.)

establishment is relatively new and variety development on a large scale a rather slow job. Thus, while this establishment has during the last 15 years or so matured into a reasonably serious one, no revolution could seriously have been expected of it.[2] Its personnel has not always been highly qualified

[2] Some observers may have been misled by failing to realize that "dramatic" new varieties usually look much less dramatic in the ex post output figures than in yield comparisons and advertising coming from experimental farms.

(partly due to the scarcity of research talent and partly, it must be admitted, due to some nepotism in hiring) and the job--in a country with the tremendous geographic variability of Colombia--is huge.

Some organizational problems have kept progress below potential. The research effort has been divided between the government and several of

the private producers' organizations. Important new barley varieties, for example, were developed primarily by Bavaria, the beer company; they constitute a success story. Sugar research, on the other hand, has languished due to its being left up to the sugar mills. Overall, there has been a heavy concentration on relatively few, mostly cold climate products. The latter bias will hopefully be adjusted by CIAT, the new institution for research in warm climate products near Cali. There has certainly been little attention to matching the research to the needs of small farmers; it has been aimed at the commercial sector (as has extension). These tendencies were natural ones, and as the difficulties implicit in them have become evident, attempts have been made to rectify them.

The Diffusion Process

The effects of useful new technology depend on how many farmers adopt it. This depends on the effectiveness of communication of information (by the formal extension service and by less formal channels such as discussions among farmers) and on the receptiveness of the farmers (affected in turn by attitudes and financial capacity to try something new). One possible indicator of the efficiency of the communication process may be the gap between research station yields and national averages or between yields on a productive group of farms and national averages, the size of the gap being greater the more serious are the problems of communication to the farmer and the less his acceptance of and ability to implement the information received. The latter gap appears to be large for many crops[1] in Colombia,

[1] Currie feels that a considerable part of the difference is accounted for by the use and non-use of machinery.

Table III-31

Average Yield, Commercial (Large) Farm Yields & Small-Farm Yields
(1960 and 1966)

	Average Yield Kg/Hectare: 1960 (1)	Yield on Commercial Farms: 1960 (2)	Average Yield (all of 1966) (3)	1st. Semester (4)	Yield on Farm Size 0-2 Hectares (1st. semester, 1966) (5)	Highest Yield of Any Farm Size (1st. Semester, 1966)[f] (6)	
Perennials							
Coffee	675	1,300	562	474	433	591	(>500)
Sugar Cane	81,750	100,000	5,864[e]	41,940	n.a.[c]	72,428[c]	(200-500)
Panela Cane	42,000	90,000	2,763[e]		26,668[c]	n.a.[c]	
Cacao	386	450	468	255	356	356	(0-2)
Fiber	600	1,000	-				
Fruit	5,000	10,000	-				
Platano and Banana (Domestic Use)	4,600	6,000	6,326[a,d]	7,710[a,d]	7,150[d,a]	8,920[d,a]	(50-200)
Banana for Export	9,995	10,000	12,436[d]	7,240[d]	7,350[d]	8,520[d]	(>500)
Annuals							
Hot:							
Sesame	816	1,100	676	530	474	1,005	(200-500)
Cotton	1,170	1,800	1,299[b]	1,679	1,167	2,090	(>500)
Rice	1,895	3,000	1,943	1,870	1,635	2,367	"
Beans	473	1,000	547	296	255	469	"
Soybeans	1,500	1,600	1,486	-	n.a.	n.a.	
Corn	1,186	4,000	1,005	921	786	1,231	(200-500)
Tobacco	1,780	3,500	1,639	1,027	957	1,523	(>500)
Tomato	12,000	12,000	-	-	-	-	
Yuca	5,000	10,000	5,915	7,491	-	-	
Arracach	6,250	10,000	-	-	7,371	9,853	"
Cold:							
Barley	2,000	3,000	1,727	1,210	806	1,996	"
Wheat	1,230	3,000	1,136	816	-	-	
Potato	14,173	30,000	11,343	5,505	704	1,858	"
Onions, Garlic	1,500	1,800	-	-	4,090	11,421	"
Vegetables	3,000	4,000	-	-	-	-	

Source: Cols. (1) and (2) are from Lauchlin Currie, Accelerating Development: The Necessity and the Means, McGraw Hill, 1966, pp. 169 and 178. Currie considers them more as illustrative figures than precise ones. Col. (3) is from USDA, Changes, op. cit.; Cols. (4)-(6) are from USDA, Agricultural ...., op. cit., p.24, 25.

[a] Platano only

[b] Fibre and Seed

[c] Available yield figures in 1966 do not distinguish between cane for panela and for refined sugar. But the largest farms produce almost exclusively for refined sugar and the smallest ones for cane.

[d] In the 1966 data no separation is made between bananas for export and those for domestic use. The last row here refers to all bananas, the second last to platanos only.

[e] Expressed as weight of sugar; The other figures in those two rows

through the part of the gap due to information problems is by no means clear.[1]

[1] Table III-31 presents data on yield differences between selected productive commercial farms and the national average (1960) and between small farms, highest yielding farms and the national average (1st semester, 1966). Table III-31.5 compares average commercial and experimental yields in the latter sixties. Since modernity has a relationship to farm size, it may be assumed that at least part of the difference observed correspond to differences in knowledge about and availability of modern inputs/---a size related factor. The difference would be greater were it possible to exclude the not so modern farms in the/size group chosen. The large gap constitutes circumstantial evidence of communication problems, non-profit maximizing behavior, input marketing problems, or non homogeneous land. It would not be surprising if most of it were due to the last two (essentially exogenous) factors. It must be borne in mind also that land productivity is not the same as total factor productivi and that the yield gap is likely to overestimate/more relevant ratio from a social point of view, since commercial farms tend to use more purchased inputs and more capital (expensive factors)--their yields must be correspondingly higher for them to have the same level of land / productivity as farms using less of these inputs.

Some features of the setting for the diffusion process have undoubtedly improved over time. The rapidity with which new ideas are disseminated will depend, for example, on the general degree of "communication" in the economy. Forms of communication are the presence of extension workers, contacts of any sort with people from other regions--newspapers, banks, schools, etc. Judging from the stories of the almost complete isolation of certain rural regions in Colombia even now, and much more, some 20, 30, or 40 years ago, it is easy to understand that new technological developments would not spread quickly from one center to another. Then, as the market economy gradually encroached on the primarily subsistence economy it brought with it, along with price incentives to produce cash crops for sale to the rest of the economy,[2] new ideas. The dimunution of

[2] It is worth noting that there seems not to be too much relationship between low levels of income and self-sufficiency in some rural areas of Colombia. Extremely poor farmers often engage extensively in trade, even selling their crops and buying back the same sort of grain some months later, this transaction having been necessitated by their own lack of storage space and/or capital.

the "subsistence economy" is usually regarded as a key element of the development process.[3]

[3] And there is some (limited) evidence that distance from a large city may be a more important determinant of the extent of use of new technology such as improved varieties than such other factors as education of the farmer, size of farm, etc. (See, for example, Herbert Rau, op cit. Feistehausen also noted in Eastern Antioquia that extension went with roads; geographical isolation presumably therefore contributed to isolation from new technologies as well. While use of improved varieties and practices depends in some cases on the availability of complementary inputs (easier near cities) it seems likely that part of the phenomenon has to do with communication.

Table III-31.5

Current Range in Crop Yields and Potential Productivity Under Improved Management

	Yield Range Nation Average 1965-1969 (kgs/Ha)	Range in Yields achieved under proper management[1] (kgs/Ha)	
Annual Crops		Commercial	Experimental
Cotton - fibre	400 - 600	1,100	
Cotton - seed	760 - 1,000	2,700	
Tobacco	1,600 - 1,900		
Corn	1,000 - 1,100	3,500	7,000
Wheat	900 - 1,300	2,800	4,500
Barley	1,560 - 1,950	3,000	5,900
Rice (irrigated paddy)	2,900 - 4,200	4,500	6,000
Soybeans	1,500 - 1,800	2,000	2,500
Sesame	650 - 800		
Beans	520 - 570	1,500	2,200
Potatoes	10,100 - 11,500[2]	40,000	60,000
Yuca	5,600 - 5,900		
Perennial Crops			
Coffee	550 - 600	5,000	
Sugar (Centrifugal)	6,060 - 7,380	10,000	40,000
Sugar (Penela)	2,300 - 2,900		
Cacao	450 - 470	800	1,000
Bananas	11,200 - 13,300		
Plantain	6,300 - 8,100		
Palm oil		3,000	6,000

[1] Data from "La Brecha en la Productividad Agricola en Colombia" ICA 1969

[2] The Ministry of Agriculture - IDEMA series are used here. However, it should be mentioned that Caja Agraria data show a range of 6,900 to 7,300 and the DANE sample shows 6,200 to 7, 100 for the same period. The IDEMA series may be somewhat biased in favor of commercial sales.

The intregration of a region with another larger region is a matter of degree. Measures of that degree include such things as (a) connections by road or other means of transportation to the outside world, (b) schools and churches, (c) the percent of the farmers who grow some cash crops for sale outside the region and (d) the percent of the farmers who deal habitually in terms of money. Limited evidence can be presented on the evolution of some of these indicators for rural Colombia. The study of the transport system done by Parsons et. al.[1] in the early sixties estimated that about 10 percent of

[1] Parsons, Brinckerhoff, Quade and Douglas, Estudio del Transporte Nacional, Ministerio de Obras Publicas, Colombia, 1962.

the rural population had no access to any road (nor presumably to any other form of transportation); another 28 percent or so had access only to tertiary roads, some of which are lettle more than tracks or paths and would not be passable in the rainy season. Since any road constitutes the first big step in access to the outside world and is considered much better than no road at all, at present relatively few Colombians are without access to the market economy for lack of transportation;[2] the ratio was probably

[2] "Access" is, of course, a relative concept. Being located on a road, even a feeder road, is not a necessary condition to trade; products can be moved some miles by donkey, before transportation costs get out of hand, especially for high value crops like coffee.

substantially higher say 30-40 years ago.

The extent of integration as defined by the percent of all farmers who are selling a significant amount of some crop is also difficult to judge. Some crops such as coffee, cacao, cotton, and so on are clearly cash crops and any farm which grows a substantial portion of these is definitely "integrated."[3] Other crops such as corn, sugar, potatoes,

[3] Unfortunately the agricultural census of 1959 does not present the data in a way which enables us to determine for particular farms whether they grow one or another of the various cash crops. One might be able to estimate a minimum number of farms which have such cash crops by summing those producing crops which are not seriously competitive in production, e.g., bananas, coffee, barley, and cotton. But this is not a very precise technique.

etc., are grown to a considerable extent for use on the farm but are also sold in local or more distant markets. In 1968, the Agricultural Sample reported that 35.3% of the farms had "household consumption" as the principal use of output. Only Atlantico (13.6%) and

Caldas (15.5%) had a ratio of below 20%[1] . . Integration depends very much on

[1] Since the frame for this sample is still the 1960 census, problems of obsolesence may be creeping in. I have not seen discussions of methodology employed when a farm in the 1960 frame has changed characteristics in the interum. It seems that the procedure which assumes the number of non-specialized (read "small") farms is fixed, has no way of identifying changing farm size structure. So all ratios like that cited in the text must be interpreted with this in mind.

physical terrain and distances; in the flat Cauca Valley, farmers with 1-5 hectares consumed less than 3% of their output according to one study[2], while groups with

[2] This figure is so low as to raise doubts of it accuracy; but the correct figure is probably quite low.

comparable income in Narino (1957) consumed 15-25% (See Table I-6). The percent of farm output sold in cities is an indicator of "trade with other areas" since trade between rural areas is limited. Unfortunately, where farm size is highly variable and the percent of produce sold differs greatly by size, it is not a good indicator of the percent of farms with good "outside contacts". Commercial farming being, however, a phenomenon of the last 10 or 15 years, such increases in this percentage as occurred before 1950 may be more closely related to the percent of farmers with significant market ties. As of 1925, perhaps 45 percent of agricultural output was sold in a town of at least 1,500 people or exported; in 1962 the comparable ratio was probably above 70 percent, and in 1970, 80% or more, indicating a very substantial development[3] (See Table III-32) in

[3] Note that the share of output sold would be greater than the ratios indicated here since some produce is sold locally. As of 1968, the agricultural sample revealed that 35% of farms had as their principal use of output domestic consumption. One might expect these farms to account for 10% or less of total output. The figure would not appear inconsistant with say 15% of all output being home consumed; this is also consistent with the figure of Table III-32.

this respect.

Beyond the common sense conclusion that diffusion must be a positive function of the general level of integration and communication, it is important to specify how it occurs, what the serious obstacles are, how they can be overcome, etc. This section draws on general information and on the few studies carried out in Colombia to speculate on the relative importance of various channels of communication, the extension service, the

Table III-32

Extent of Trading of Agricultural Output Over Time

	Share of Agricultural Output Exported or Sold in Urban Areas		
	Estimate A		Estimate B
	(1)		(2)
1925	44.8		35.7
1926	44.9		38.0
1927	45.4	45.4	36.1
1928	45.9		36.5
1929	46.2		36.7
1930	48.4		38.4
1931	50.2		43.5
1932	55.5	51.9	47.3
1933	54.5		46.0
1934	51.0		41.6
1935	53.2		44.0
1936	52.9		43.6
1937	51.8	52.3	42.1
1938	51.6		41.8
1939	51.9		42.9
1940	51.2		41.1
1941	54.6		44.9
1942	55.0	54.0	45.3
1943	54.5		44.4
1944	54.9		38.9
1945	55.0		44.8
1946	57.0		47.1
1947	57.9	56.9	48.1
1948	57.7		47.6
1949	---		---
1950	63.6		53.5
1951	66.5		57.8
1952	68.3		59.9
1953	68.0	67.3	59.6
1954	70.1		61.9
1955	68.4		59.6
1956	71.5		63.4
1957	73.0		65.1
1958	71.7	70.5	63.4
1959	68.0		61.0
1960	70.4		61.3
1961	71.4		62.4
1962	70.2		61.9
1963	70.6	71.5	
1964	72.5		
1965	74.0		
1966	74.9		
1967	76.5	76.9	
1968	78.6		
1969	80.3		

Sources and Methodology: Columns (1) and (2) are alternative estimates of the sh of agricultural produce either exported (mainly coffee) or sold in urban areas (defined as towns or cities of more than 1,500 population). Estimate A is based on the assumption that the domestically produced agricultural goods directly or indirectly consumedby the representative urban dweller is twice as much as that of the representative rural dweller. This ratio is a little higher than that estimated by ECLA (op. cit., p. 26) for food product consumption. Estimate B assumes that the ratio of urban to rural per capita consumption is 1.25. It is probablyLbiased down, while Estimate A would be biased up if all the figures used in the calculation were correct.

After these calculations were effected, however, it became clear that urban population was underestimated in them; as a result it appears that

Table III-32 continued:

even Est. A is probably downward biased over the last 20 years. One piece of information pertinent to relative consumption was DANE's estimate that in 1970 average income per employed person in urban areas was more than twice that for the rural labor force. Since average rural income was probably biased down considerably more than urban income, a 2:1 ratio might be about right; since the agricultural product share of all absorption would be higher in rural areas, average absorption would be more than one half that in urban areas. The rural income/urban income ratio was probably lower than 0.5 before 1950 (See Chap. 1) so probably there is little bias in this ratio over most of the period dealt with here.

Est. B is almost certainly biased down over the whole period.

These figures are fairly consistent with estimates presented by McGreevey (An Economic History ... op. cit., p. 122) of the distribution of crop land by use of product among urban consumption, rural consumption, and export. If, for example, in 1960 it is assumed that the third (approximately) of agricultural output corresponding to animal products is all sold in the city, the implication of our 71% of total agricultural output being sold is that 38/66 or about 57% of crop output is sold in urban areas or exported; thus about 43% would be for rural consumption. McGreevey's figure with respect to crop land is 56% used for rural consumption and only 44 for urban (and exports); he assumed (page 143) that land per capita of rural consumers was equal to that for urban consumers, and this appears to be the major source of the difference. If average productivity of land used for rural consumption is lower than that for urban consumption, the figures could be in any case consistent, although McGreevey did not introduce any such assumption. It is not clear whether it would be valid or not.

Regardless of these differences, McGreevey's figures imply a quite high degree of isolation at the turn of the century for example and especially thirty or forty years before (1870) when, according to his figures, only 15% of total crop output moved out of the rural areas. Probably this figure is downward biased, as those for later years appear to have been, but it gives an order of magnitude.

behavior pattern of farmers, and other features of the institutional setting in determining the pace of technological change. We consider first the behavioral characteristics of farmers (or groups of farmers) which apparently affect the rate of diffusion and the appropriate selection of new ideas. Though the diffusion process has been studied by anthropologists and sociologists in Colombia, and in other countries, the scattered pieces of evidence do not yet add up to a very clear picture of the mechanism, either for farmers as a whole or for specific groups of them. But as judged by results (and whatever the mechanism) the barriers to diffusion do not appear to have been overwhelming. Whenever conditions have been propitious, either because a good extension effort has been mounted or through other channels, it appears to have been fairly rapid and successful; effective dissemination has most commonly occurred under the aegis of a crop growers' institution or, as in the case of barley, a using firm interested in the spread of appropriate varieties, techniques, etc. Thus, in the 1950's Funza barley almost completely replaced the previous varieties within four or five years of its introduction.[1]

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[1] Just what made this such an apparently successful case would be an important research topic. Was it more extension, better extension relative to each item of technological change, a more integrated "package" approach (new seeds, machinery rental, stable prices)? And was it something the government could replicate successfully for other crops?

Judging from the relatively high yields of tobacco in Colombia compared to other countries (see Table IV-18), the technology would seem to be relatively good. A rapid increase in yields occurred in the 1950's, especially after the formation of the Tobacco Growers Institute (Instituto Nacional de Fomento Tabacalero) in 1954.[2] By itself the high current yield would not be persuasive evidence of the use of

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[2] Average yield for the country rose from a little over 1.0 thousand kilos per hectare in 1951 to about 1.2 thousand in 1954, 1.4 thousand in 1955, and 2.0 thousand in 1962.

improved varieties, since the labor/land ratio is very high;[1] the rapid yield

[1] As of 1953 it was about three times as high as in the United States; see ECLA, op.cit., p. 200.

increase does, however, suggest technological change--labor use did not increase significantly over this period. Since most tobacco is grown by share-croppers on very small plots, there is an issue whether such change was facilitated by or even due to the fact that the seed, fertilizer, etc., are supplied by the land owner rather than the small farmer.

The rapid spread of hybrid corn in the department of Valle, already referred to, exemplifies the relative ease of diffusion in the large-scale, modern, commercial sector.[2] Cotton, a great success story in terms of the

[2] It must be borne in mind here, as before, that diffusion and beneficial adaption are different things and may be to some extent determined by different factors.

import substitution carried out over the last two decades, fits the same pattern. Average yield more than doubled over the period 1951-1963; during this period the output went up 10 times. By 1960, 95 percent of all the cotton was an improved variety known as "T". According to a study by Planeacon, all 4 of the major new varieties introduced (up to 1968) had come from the United States and simply been tested in Colombia, with relatively little research (i.e. adaptation) being required, in comparison with some other crops. The Cotton Development Institute (Instituto de Fomento Algodonero) began extension work only in 1959; by that time yields had already more than doubled from the level of the early fifties. The cotton case suggests that little extension work is required to achieve adoption by modern commercial farmers, though in some cases these farmers (especially the partially or wholly absentee ones) are less than adept

at seiving the new alternatives and taking maximum advantage of them. Cotton, perhaps more than any other crop, is grown on land rented in large plots. In the interior of the country (Tolima, Huila, Cundinamarca, Valle, are the chief producing departments), even on plots of 50 hectares and up, one-half of the area planted in 1961-1962 was rented. For smaller farm sizes the rented/owned ratio was higher.[1]

[1] Instituto de Fomento Algodonero, Colombia: Su Desarrollo Agricola: Algodon y Oleaginosas 1961-62, Bogota, 1961, Table 17.

Growers producing commercial crops on a large scale are the ones most likely to form a producers' organization in the first place.[2] Any research and extension

[2] It is true that most coffee producers are small farmers, but the industry is so large that there are many large ones also; the larger ones do have a disproportionate influence on the Federation's policies.

carried on by the organization gives them a further advantage. Except in the case of tobacco (whose organization, unlike the others, is semi-public), most of the farmers in the major producers' organizations are large-scale operators The implications of farm size and factors typically related to it for the success of technical diffusion will be pursued further in Chapter IV.

Extension

The most formal channel by which information developed at the research stage reaches the farmer is the extension system. It has become part of the conventional wisdom in Colombia that it, rather than research, has constituted

the major bottleneck to technical change. Extensionists counter by pointing out that much of the problem lies with the farmer, who is alleged to be uninterested if he is absentee, wealthy or large and unable to incorporate new technologies if he is a small (often uneducated) operator. There is unquestionably some validity in each of these positions, but it seems likely that a major weakness of the extension process has lain with the extension service itself. It is true for example that small farmers tend to show distrust and uncertainty with respect to new technologies; but it is also true that this distrust is often well justified by previous bad experiences, and that an effective demonstration may be all that is required to change it into willingness to experiment.

The extension task is complicated by the highly varied climate and topography. As Lauchlin Currie points out, Colombia has no large relatively homogeneous areas like the middle western U.S. states. Many experienced farmers in Colombia have with reason made no use of agronomos.

Over the long run, the major factor in the weakness of the extension services, both in quantity[1] and quality, has been governmental disinterest--

[1] Colombia's ranking in terms of the "extension worker/farming population" ratio has been poor. A calculation by CIDA (Comite Interamericano de Desarrollo, Inventario de la Informacion Basica para la Programacion del Desarrollo Agricolo en la America Latina: Colombia, Washington D. C., 1966) showed Venezuela with a ratio of 1,000, China 1,500, India 1,500, Philippines and Malaysia 2,500, Turkey 3,000, Korea and Argentina 3,500, Chile 8,000, Ecuador 9,000, Colombia 10,000, Paraguay 12,500, and Thailand 17,000.

disinterest reflecting itself in low salaries, lack of organization, etc. Lack of rural education which might furnish more condidates with rural backgrounds for advanced studies in agronomy has also been a contributing factor to problems in all institutions dealing with the agricultural sector. The agronomists and

extension workers have typically been raised in the city[1] (as in many other countries; see Table III-34), have often been mediocre students who could not handle other courses, and have often been only marginally interested in agriculture. (This contrasts with the more successful extension services in countries such as the United States and Canada,[2] where most of the extension workers are originally farm boys, with a deeper interest in and understanding

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[1] Partly inevitable given the sorry state which has characterized rural primary schools.

[2] These services could be considered to have been more successful in that they made a greater flow of relevant alternatives available to a higher share of farmers. The difference is one of degree, though; in the U.S. too it appears that the advice was not infrequently bad. Farmers frequently spurned it, with reason. Bad advice seems to have resulted sometimes from reacting to a once serious problem which was so no longer (e.g. emphasis on diversification after the depression) and sometimes from a desire to do things well in an engineering sense (e.g. the concept of conservation) rather than in an economic sense. (I am indebted to Mr. Robert Evenson for some of these ideas.)

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of the soil, who then go on to study agriculture in college.) These characteristics have undoubtedly led to a limited ability to suggest wisely to the farmer, and to empathize with the smaller farmer. The extensionists have often been unable to convince the relatively uneducated and small-scale farmers of the worth of their programs, and have sometimes been looked down on by the larger-scale (and sometimes higher class) farmer as being his social inferior. Poor pay and poor equipment have been part of the package.

The quality of students going into agronomy appears, however, to be gradually improving. Dale Adams noted in 1965 that in the Bogota and Medellin colleges of agriculture the students may have been above the average quality at their respective universities, and that the pay for agricultural engineers was relatively high, encouraging higher quality students to take up the career.

Nevertheless, the quality of students remained low in the other six or seven agricultural colleges in the country. And there seems little sign of change towards a more rural background type of student.[1]

[1]The CIDA data of Table III-34 refers to 1953. In 1964-5 Adams (Dale Adams, "Leadership, Education..." op.cit.) sampled several hundred students in the Agricultural Colleges in Bogota, Medellin, and Ibaque, finding that only 26% had lived in a rural area for more than 4 years, 10% had had occasional contact with rural people and, overall 11% had had sustantial contact with agriculture outside college training.

Table III-34

Origin of Agricultural Students and of Agronomists

Persons Questioned	Number of Replies	Rural or Urban origin (percentages) Rural	Small Cities	Large Cities
Students, 5 countries 1956[a]	164	35.3	19.4	45.3
Agronomists, various countries, 1955[b]	116	21.5	33.6	44.9
Agronomists, Colombia 1953[b]	394	24.7	33.2	42.1
Agronomists, Mexico 1954	1,192	25.0	29.0	46.0

[a]Percentages refer to place where students spent their childhood.

[b]Classified on basis of place of birth.

Source: Comite Interamericano de Desarrollo Agricola (CIDA), Inventario de la Informacion Basica para la Programacion del Desarrollo Agricola en la America Latina: Resumen, Washington, 1966, p. 89.

Extension services seem to have been improving over time (starting at close to a zero base (as of the late forties) in quantity, quality of the individual and quality of the institutional organization.[1] Comparable

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[1] CIDA's observations as of 1962 are of interest. (Their breakdown of extension workers by organization and type for 1962 is presented in Table III-35.)

> Colombia ... has several different agencies engaged in extension work. It is, however, difficult to separate completely the personnel and expenditures for extension from those for research or other activities.
>
> The principal Federal extension agency is the Servicio de Extension of the Ministry of Agriculture. The largest number of extension workers, however, is employed by the Federacion de Cafeteros. Extension work is also done by the Instituto de Fomento Algodonero (cotton), the Instituto de Fomento Tabacalero (tobacco), the Corporacion Autonoma Regional del Cauca (CVC) and the Secretaria de Agricultura de Antioquia. In addition to these the Federacion de Arroceros (rice) has a small extension section, and work of an extension nature is carried on by some private agencies such as CICOLAC (milk products) and by firms that sell herbicides, fungicides and insecticides.
>
> Most of the personnel listed [in Table III-35] have had some training in extension methods, but few of the home demonstration agents have had professional training in that subject. In general it may be said that the quality of service rendered by the autonomous agencies is good. The Ministry of Agriculture and the Secretaria de Agricultura de Antioquia, however, are victims of insufficient funds. The salaries which they are able to offer are low and there are a number of vacancies and considerable turnover of personnel.
>
> There is also danger of duplication. The agencies have coordinating committees in some of the Departments (provinces) to reduce such waste of funds, but it may not be great since it is said what relatively few farmers ever see an extension agent. This is caused partly by the bad roads, which discourage travel by the agents, and by the insufficient number of vehicles available to them.
>
> It has been noted that one disadvantage of extension work done by specialized agencies such as the Coffee Federation, Cotton Institute, Tobacco Institute, Rice Growers Federation, etc., is that their emphasis on specific and individual crops tends to perpetuate monoculture.

numbers of extension agents at different points of time are hard to come by, but it seems clear that the number has risen rapidly over the last two decades, being in the low hundreds around 1962 (see Table III-35) and probably in the high hundreds (see Table III-36)[1] by the end of the decade.

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[1] Judging by the more reliable figures on total professionals engaged in agriculture. (CIDA noted, in connection with the figures presented in Table III-35 that it was really not known how many people were actually engaged in extension.)[I.e. judging from the estimated increase of public sector professionals from a little under 1000 in 1961 (according to Table A-69,1) to 2,400 in 1968 (Table III-36).]

Referring more generally to professionals and technicians engaged in agriculture, the 1951 population census reported a grand total of 303--veterinarians, agronomists, et.al. (This is fairly close to the number of agronomists and students cited in Table III-34). The 1964 census reported 1679. It also reported 1327 "degree" agronomists, of whom 892 were exercising their profession, and 552 degree veterinarians of whom 437 were practicing. (A few of the nonpracticers would be retired but most would be in other pursuits.)

In 1970, ILO reported that including all agencies in the country there were about 1,500 professionals and the same number of "practicers."; most of these served the modern sector.

With the recent reorganization of many aspects of the agricultural establishment in Colombia and with the passing of much of the extension operation to ICA and INCORA, what has been said of the past can no longer be directly applied to the present and the future. Improvements in wages have been obtained, and the total number of tecnicos of one sort or another working in the country has gone up substantially, as suggested by Table III-36. Still, the quality of practicos leaves much to be desired in technical knowledge and recent World Bank funds to extend the system were made conditional on an associated training program.

Table III-35

Colombia, Employment of Extension Personnel, 1962

	Administration and Specialists	Extension Agents	Home Demonstration Agents	Assistants	Total
Ministerio de Agricultura	31	18	39	36	124
Federacion de Cafeteros	27	66	88	302	483
Instituto de Fomento Algodonero	4	22	5	-	31
Instituto de Fomento Tabacalero	6	13	5	-	24
Secretaria de Agricultura de Antioquia	2	9	10	9	30
Corporacion Autonoma Regional del Cauca (CVC)	8	14	12	14	48
Total	78	142	159	361	740

Source: Comite Interamericano de Desarrollo Agricolo (CIDA), Inventario de la Informacion Basica para la Programacion del Desarrollo Agricola en la America Latina: Colombia Washington, 1966, p. 51 (originally from unpublished manuscript of Dr. Luis Cruz Riascos.)

Table III-36

Personnel Rendering Technical Services in Colombia, by Agency - 1968

Institution	Number of Professionals	Number of Sub-Professionals
Incora (land Reform)	139	391
Caja de Credito Agrario	85	152
Banco Ganadero (Livestock)	31	21
ICA (National Research & Extension Institute)	78	250
Secretaries of Agriculture	80	45
C V C (Regional Development Corp.)	20	100
Fenalce (Cereals)	10	1
Fedealgodon (Cotton)	70	67
Fedecafe (Coffee)	55	292
Fedecacao (Cocao)	11	10
Intabaco (Tobacco)	18	58
IFA (Cotton and Oil Seeds)	42	-
Fedearroz (Rice)	61	1
Individuals and Companies	300	-
Total	1,022	1,390

Source: "Los Problemas del Credito Agropecuario y El Desarrollo Economico en Colombia" - Oct. 1968.

Many studies have demonstrated the small direct contact the typical small farmer has with the extension service. In 1959 Ternent and Vergara found that only about 12 percent of the people they interviewed in Tolima had ever received technical help;[1] at the time of the interviews only

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[1] James Anthony S. Ternent and Alfonso Vergara Samudio, Problemas del Pequeño Agricultor en Climas Calidos del Tolima, Monografía No. 9, Centro de Estudios Sobre Desarrollo Economico, Universidad de Los Andes, Bogotá, 1960.

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5 percent were receiving it. Almost 90 percent of the interviewees listed plagues as one of their serious problems and at least 30 percent did not know how to combat them; in such a situation technical assistance would seem to have had a substantial payoff.[2]

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[2] Ternent and Vergara, op. cit., p. 14. Some of the other problems mentioned in this study were rather inevitable concomitants of an underdeveloped state. Thus 44 percent felt that seeds were a serious problem, primarily on account of their high price. Inability to get credit for the purchase of machinery was frequently mentioned; 64 percent of those who owned machinery did not get credit to help finance it; this led to a high frequency of rented machinery. Water supply was a problem for one-half of the farmers and of those two-thirds did not know what to do about it. It is interesting to note that about 90 percent listed the lack of medical help as a major problem.

But there were other problems where technical assistance could have paid off. Only 8 percent of the interviewees used fertilizers. High prices seemed to be one bottleneck, and some farmers commented that they did not use fertilizer because their neighbors had told them it was bad for the soil. The link between lack of credit and widespread use of rental machinery raises a fascinating question; has some of the ample credit directed towards machinery purchase in the 60's led to unnecessary excess capacity of a form of capital which must be imported?

Although extension is more widespread than before, probably less than one-fifth of Colombian farmers receive benefits from extension ser-

vices.[1] The national extension service was taken over by ICA in 1968 but as of 19 it had just 100 extension workers. There are about 20 private

[1] In 1970-71, the Ministry of Agriculture claimed that ICA agents attended 73,000 families (via 59 agencies) which would be something less than 5% of all farm families--about 5% of those with some land, and probably 7-8% of those with two hectares or more. (See Ministerio de Agricultura, 1970-1970, Bogota, 1971, p. 31.) Other agencies like Fedcafeteros of course extend their services to other farmers.

groups of agronomos to provide technical advice to farmers; these provide much of the technical assistance required in connection with loans

made under the Fondo Financiero Agrario; they work almost entirely with the commercial farm sector. There is little connection between the extension service and the supply of inputs except in the case of INCORA and some of the specialized entities such as IFA, Tobacco Institute and the Coffee Federation.

Rice's Evaluation of the Extension Service

One detailed history and evaluation including Colombia has been carried out by Rice on the extension services in the Andean countries; it generally comes to a negative appraisal.[1]

Rice notes that early extension initiatives were closely associated with U.S. assistance, extension being a ubiquitous part of the assistance programs and during the 1950s the centerpiece of most U.S. rural development and country strategies.[2]

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[1] E. Rice, Extension in the Andes: An Evaluation of Official U.S. Assistance to Agricultural Extension Services in Central and South America, AID Evaluation Paper No. 3A, April 1971.

[2] The first permanent teams of official U.S. agricultural technicians working in foreign aid programs arrived in Latin America in late 1942. Three ad hoc teams of experts were sent to Colombia in response to special requests by 1950. U.S. technicians working on extension in the Andean countries, excluding Chile and Argentina, reached a high of about 60 between 1955 and 1960 and was down to a little over 10 by 1965. After 1958 the influence of the extension philosophy on U.S. assistance strategy waned as critics pointed out the sluggish agricultural performance and underpowered ancillary government rural development programs. Still, in all the countries Rice studied except Colombia and Chile present services are lineal descendants of the organizations built with official American help.

The U.S. assistance was formalized in Colombia in STACA (Servicio Tecnico Agricola Colombo-Americano). The Boyaca reas was selected by STACA for a pilot extension project partly because the area was so poor and partly because Rojas Pinilla--president at that time--was born there. It was a pure extension project[1] with an American extension adviser and project director during the first four crucial years; and the thrust

[1] I.e. little attention was given to rural organization, propagandizing, and so on. See the discussion below.

was toward the creation of an extension organization and the emphasis of the training program for Colombian agents was on extension methods, not technology.[2]

[2] Rice, op.cit., p. 141.

A national extension service was created in 1958 out of these beginnings but was in financial difficulties almost from the start and later died--the only U.S.-built extension service not to survive--it was apparently never really transformed from an American initiative to an indigenous program.[3]

[3] Meanwhile the government of Boyaca did not want the project to continue in that department after phaseout of STACA activities--or at least gave it very low priority--and an agreement left extension there entirely in the hands of the departmental government, which two years later closed the agencies and dispersed the vehicles to other units. Between '62 and '68 when ICA moved back in, there were extension agencies everywhere in Colombia except Boyaca.

One lesson coming out of the Boyaca experience is that local governments must be vigorously wooed.

Since 1968 extension in Colombia has been taken over by ICA; it is one of the few such services in Latin America which is not poverty stricken at present. There were 24 agencies in 1967 but the number jumped to 50 in 1969 and dollar costs per agency also rose from $8.3 thousand in '67 to $34.7 in '69.[1]

[1] Rice, op.cit., p. 100.

To evaluate the extension operation during the period of American involvement, Rice studied nine small farmer areas in the highlands of Boyaca where extension was active and progress occurred, trying to see to what degree the extension was responsible for the progress. (There are now two agencies in the study area but during the 50s the Americans established eight agencies in a pilot program.) At the regional (municipal) level, there does appear to have been some (not dramatic) positive correlation between the extension visits and municipio progress,[2] though the relation is not tight. In Facatativa there was no relationship

[2] Rice, op.cit., Evaluation Paper 3A, p. 218.

between the two variables--when the comparison was made at the village level. Rice's interpretation in Colombia and in the other countries studied, was that the evidence of positive results from extension was small.[3]

[3] The nine major studies of rural districts within six countries carried out and the briefer survey of a number of agricultural development projects in four other countries failed to reveal any strong effects of the work of the national extension services in the cases of alleged progress in farm productivity. The list of villages identified as progressive in 1969 did not correlate well with the list of villages favored by the extension services in the last two decades. There was no evidence that extension services were instrumental in promoting improvements in farm technology and some clear evidence that other inputs were. At best, the services can be said to have played a minor role in overall development of agriculture within the study area. There are very few examples of extension service activities which appear to have triggered a diffusion process; the extension service has not played the role of the catalyst. (Rice, op.cit, p. 85.)

Although six Colombians who had worked with STACA in Boyaca felt that before their arrival the farmers were not familiar with chemical fertilizer and pesticides, the major credit for introducing these was not, in the author's judgment, due to STACA.[1] The author notes that growth of fertilizer

[1] Ibid, p. 285.

sales began years before STACA's arrival--it could have been due to the older pre-STACA extension service but this had a rather disrupted work--and concludes that STACA's role probably was not crucial. Fertilizer use was at least as extensive or more so in Cundianamarca as in Boyaca.[2] Extension workers and professions in all the institutions studied by Rice tended to feel that they had laid the groundwork for the success of later institutions, i.e. they conditioned. But the author feels that this conditioner role is exaggerated.[3] Still, the extension services do appear

[3] Rice, op.cit., p. 85.

to have played a "useful" (as opposed to "key") role in speeding up the development process; professional expertise must be introduced into the system to bring the farmers the optimum level of known technology the extension services would have been missed though their absence would not have precluded success. Where the environment was hostile, they played no role.[4]

[4] Rice notes that these relatively negative conclusions appear inconsistent with the findings of a Michigan State three-continent study, which found that contacts with change agents correlated more highly with progress then did any other explanatory variable tested in a large interview program. (See Everett M. Rogers, Joseph R. Ascroft and Niels Roling, Diffusion of Innovations in Brazil, Nigeria, and India, [East Lansing, Michigan State University, Department of Communications, 1970]).

continued on next page

Footnote 4 continued:

Rogers concluded that the change agent context seemed to be a necessary condition for diffusion in less developed nations. The analysis focused on communication and sociological factors, but tended to omit the impact of profitability on the rate or degree of adoption. And the only villages included were ones where change agencies identified that they had people working; so numerous villages with little contact would have been missed. Rice feels that Rogers has unresolved problems of collinearity; the farmers were probably enjoying simultaneous infusion of other inputs in favorable environmental conditions. The study probably measures the desirable effects of including a change agent in the action program, not the effects of dispatching extension agents to every community. (Rice, p. 87.)

The author finds credit and market conditions better correlated to success or failure than extension. The relationship between fertilizer sales and credit is particularly striking. Without credit, extension services tend to be frustrated. The evidence suggests that significant improvement over current yields will only be achieved through the introduction of new inputs unavailable on the subsistence farm and most of the successful diffusion processes depend on a strong market and relatively stable prices. Where markets are available to two groups, but only one takes advantage of them, the difference seems frequently to lie in the level of management of the diffusion process, with good management often provided by a producers' guild or co-op, offering the farmer help throughout the production and marketing cycles, and sometimes even making the important decisions for him. Contracts may provide a useful security at the start of the diffusion process, though in the long run they may not be productive.

Rice pinpoints two reasons for what he judges to have been a low total

impact from extension.[1] First, the input of research services into the

[1]This is not to say that the benefit/cost ratio was a low one. Both benefits and costs were low in his estimation.

progress stories he did examine was meager, as distinct from the miracle wheat and rice programs in Asia. This suggests a view-associated with USDA during a 1950's debate--that technologies appropriate for Latin America had still to be developed. Ex post, this view is now widespread. Second, the extension services did not try nor were they forced to coordinate with the institutions providing or controlling the other factors. Sometimes they even pulled out of an area when the other contributing institutions entered it, seeming in retrospect to have been seeking an environment in which they would be least effective. This avoidance of linkages by the extension directors and agents is presumably due in part to the element of pride and "ambition for empire," due in part to the fact that many of the agents were young and inexperienced and found it difficult or were shy about calling meetings with other groups, and finally because the "pure-extension" model does not imply a great importance for most of the possible linkages . . . . The major missing link has been that between extension and research;/in the extension agent training programs a disproportionate amount of time is devoted to extension methods at the expense of technology.[2]

Rice argues that

[2]In the "servicio"-the original institution/base for the American technical assistance--extension was linked to research, credit, and promotion divisions within the servicio, to the extent that the divisional chiefs (who were American at first) coordinated their activities and forced their staff to do so as well. Some did and some did not. The real problem came on the transfer of the extension services out of the cooperative servicio environment into a ministerial structure, including some functionally competitive divisions, some hostile bureaucrats, and very few officers who understood or sympathized with the extension doctrine. The institution builders did have a clearly defined doctrine and a set of programs consistent with it. There was insufficient emphasis on evaluation and feedback and the program was at fault for not sufficiently emphasizing training, a really severe problem.

Rice argues that the extension services ought to consider training their agents to play a role of manager, a partial retreat to the old *fomento* organizations which in some countries the extension services replaced. The conventional U.S. extension model forbids the agent from applying elements of coercion and reacting to anything but the felt needs of the farmers and pretends that there is a choice between education and promotion.[1]

[1] In the U.S., field demonstrations of superior farm practices have grown to be the cornerstone of extension activity, but the philosophy has extended to one of strengthening families in rural societies as much as improving farm practices, and there is reason to argue that the conventional model has never been representative of extension in the U.S.--the job was always bigger than information delivered. (For a general discussion of types of education, see Arthur T. Mosher, Varieties of Extension Education in Community Development, Comparative Extension Publication No. 2, Ithaca, Cornell University, Rural Education Department, 1958.)

Yet farmers do learn new practices under programs involving some coercion or especially productive economic environments; diffusion occurs more rapidly and behavioral changes are demonstrably permanent. The extension schools' own methods, unless carried out within a fomento program, are--Rice argues--quite unproductive in the typical subsistence cultures of Latin America. The massive demonstrations of the type needed to get widespread adoption ... are really a fomento activity." Farmers are unlikely to ask for a dwarf wheat to solve their loding problems." (Rice, op. cit., p. 127).

Rice points of view on the dispute as to the relativements of an extension on which lays out the alternatives and one which tends to push and manipulate farmers are, of course, not shared by all observers. They may well be applicable at certain stages of evolution of rural society and not at others, or to certain groups of farmers and not to others. And the relativements of the two approaches at a given time and place may depend as much on the characteristics of the agents as those of the farmers. Rice's study is the most detailed to date in Colombia, and his arguments persuasive. For the moment, at least, they must be taken tentativel

as valid, or at least "in the ball park."

The Setting for the Diffusion Process: Information Channels: Farmer Reactions, etc.

Even if the relevant information and/or seed is available and receives some distribution by an extension service, the total dissemination[1] depends

[1] We should more appropriately refer to "effective dissemination," i.e. allow for the fact that not all change is beneficial; the quality of the information passing channels will help to determine how well non-beneficial adoptions are avoided.

also on other information channels; and the farmer may be prevented from undertaking possible improvements because of a lack of credit or the existence of risk in the new technology. Living close to the subsistence margin, peasant farmers tend to be (to some extent are forced to be) risk averters. Further, lack of knowledge and understanding of scientific principles may bring general skepticism with respect to change. While this can be overcome--sometimes rather easily--by successful demonstration, there are cases in which the complexity of the technology creates difficulties, e.g. hybrid corn (this has been a problem in Colombia) whose high yields can only be maintained if new seed is purchased each year; this out-of-pocket expenditure is avoided by the farmer if possible, and the resulting poor crops in the second year may then be blamed on the agricultural extension workers, with subsequent skepticism about other programs they may suggest. The low levels of education in the rural areas are partly to blame for this skepticism, and in general for the inability to comprehend scientific principles.

Among the phenomena relevant to the diffusion process (and which must be understood before a good extension and communication program can be mounted) are the following:

a) What attitude do farmers have to change, to change agents, and to risk? How do these vary by group of farmers? How rigid are they?

b) What factors determine these attitudes, as among such possibilities as education, general outlook on life, communication with towns, etc.?

c) What are the important sources of information with respect to specific items of technological change; in which sources does the individual place most confidence as among friends, local leaders, large-scale farmers, mass media, etc.?

d) What complementary services are most important in making technological change desireable and feasible for the farmer? (e.g. credit?)

e) How well can the farmer distinguish useful and non-useful changes?

A good understanding of these factors would permit calculations of the costs of promoting technological change (necessary in any estimate of how fast it should be pushed and in what directions), the best devices to use, and the all-important question of whether the small farmer as well as the large one can be successfully reached. Opinions as to whether the achievement of good adoption requires more than simply presenting objective information to farmers have varied and still vary considerably among students of the problem.

Attitudes of Farmers to Technical Change: Their Determinants

It has been noted that some farmers, especially small-scale ones, are likely to be fatalistic in outlook and risk averse. In Colombia the prime candidates for this characterization are the highland campesinos--usually mestizos. The attitude is cited by Fals Borda in his 1950 description of the peasants in the municipio of Saucio (Cundinamarca).[1] (on next page)

[1]Fals Borda, Orlando, Peasant Life in the Colombian Andes, A Sociological Study of Saucio, Gainesville, University of Florida Press, 1955.

He notes that various of the psychological traits of the typical Saucio peasant have implications for his economic behavior. One is the considerable fear and respect developed for the father, via a harsh, punitive upbringing. The tendency to question ideas with respect, for example, to agricultural techniques used by the parents is gradually cultivated out of the child, along with his general curiosity, which although high at the outset soon drops. Resignation to his difficult fate is an outstanding characteristic of the Saucio peasant.

> "The generally resigned attitude which prevails in the community has been bred through a long period of tribulations, and exploitation, where the campesino's best defense has been to retire into himself, and not to try to alter the world around him. What they strive for primarily is pride and self-respect. The individual lives a quiet, austere agricultural life, disturbed only by events related to religion and politics. He does not seem willing to risk much in life, and this is perhaps one of the reasons why he achieves so little.[2]

[2]Fals Borda, op.cit., p. 213.

In a later commentary on the same general region, Fals Borda concluded that even quite small-scale farmers could be won over, though not as simply as in developed countries; his study exemplifies nicely some of the barriers which must be overcome in the process.[3] He cites the experience

[3]Orlando Fals Borda, "La Dinamica de la Extension Agricola en Colombia; Observaciones Sobre el Cambio Social Inducido," Agricultura Tropical, XIV, No. 4, April 1958.

of the Servicio Tecnico de Asistencia Colombo-Americana (STACA) which began in 1953, and was as we have seen, based on the type of extension service established in the U.S. and Europe. Boyaca (of mestizo culture with strong Indian influence and prevalence of fatalism) was the pilot area. The boyacenses reacted with lack of confidence and resistance to the first efforts of STACA interpreted by some as threatening change in a culture with which they were "satisfied".[1] At first there were wild and malicious charges

[1] A rather rigid one, which had laid down rules of living in great detail, for example, in questions such as dress.

against the extension service; there were rumors that the Americans involved were making sausages of the boyacense children, after taking them from Boyaca to the U.S. through a tunnel; Catholic priests thought that the whole thing was a Protestant attempt to proselytize. Most of these ideas (except the last one) disappeared within a year.

Fals Borda felt that by 1958 STACA had gradually learned something about the introduction of change; it was impossible to do it impersonally as in developed countries; the Church, government and school all had to be used. The personal characteristics of the carriers of new ideas were very important. But where demonstration really showed big advantages to change, the following was good and even enthusiastic. Young people were particularly important. Middle class families appeared to be among the early acceptors of such things as fertilizers and sprays. Dissemination of information seemed quick, and the real questions determining acceptance were trust of the extension worker, availability of funds and degree of consistency with the Boyacense culture.

In some other areas of rural Colombia, more favorable initial attitudes have been recorded, usually/more recent studies; possibly/this reflects an evolution towards modern attitudes. For example, in 1962 the typical farmer interviewed in the municipio of Subachoque,[1] a region of primarily small farmers, considered technification an important avenue in improving his condition, physical and cultural. This interest was present despite the near absence of agricultural extension.

[1] Hanneson, et.al., op.cit., p. . An interesting aspect of technological change noted in this study is the increased complexity of calculations required for the use of new inputs; it increases the felt need for education so that farmers will send their children three or four kilometers to school. But often the teaching quality is too low to satisfy these aspirations, and the experience winds up being only a cause of emigration. (High quality education might bring about the same result however, even if for different reasons.)

Risk appeared, at the same time, to be an important factor in determining both selection of which crops to produce and selection of technology. The authors describe the medium size Subachoque farmer as being in transition from the stage of the rudimentary plow to the metal plow; all stages are seen. In the case of potatoes the transition appears to be from hoe to rudimentary plow; the authors explain this special case as due to the fact that the potato market is much less secure than those for wheat and barley, so it does not pay to invest heavily in their production. Overall, the impression is one of awareness of technological possibilities and careful weighing of alternatives. Larger scale farmers tend to be in a different situation, in a number of respects, as discussed elsewhere.

Investigation of the attitudes of broad groups of farmers with a view to isolating the correlates (whether causes or not) of innovative behavior has been attempted through several sample surveys.[1] The results are

[1] Unfortunately, but understandably, there has been less focus on whether the innovations were successful or productive.

useful in understanding the diffusion process, and doubly so if they show that some of the determinants of speed of diffusion can be affected by public policy.

Sociologists have attempted to relate innovation to "achievement motivation" and have recently carried out a number of studies of the determinants and effects of the latter characteristic. One of the early field analyses of achievement motivation among the peasantry was carried out in Colombia in 1964.[2] It was found, in general, to be positively correlated

[2] Everett M. Rogers and Ralph E. Neil, Achievement Motivation Among Colombian Peasants, Diffusion of Innovations Research Report No. 5, Michigan State University, East Lansing, Michigan, July, 1966. The study was plagued by a number of technical difficulties, and inconsistent results, due in part, no doubt, to the fact that it was a "first" of its type. A sophisticated statistical analysis proved very difficult, and the authors resorted to simple correlations between independent variables and the dependent variable. The analysis was carried out in six different areas, coming from three widely separated regions of the country; this diversity was designed to check for cross-cultural consistency.

to social status, level of living, and opinion leadership, consistent with the basic presumption of the analysts that it would, other things being equal, be associated with higher productivity and a higher level of living.[3]

[3] Demonstration of the existence of the relationship leaves the direction of causation (if any) in doubt, however. It is quite plausible that a high level of living would lead to achievement motivation on the part of the same or the next generation. Even though the direction of causation may remain in doubt, the relationship happens to be interesting, since it says either that motivation is important in getting ahead or that having a good start is important in providing motivation. To know that one of these is true is obviously better than having no knowledge at all.

In general, enough of the economically relevant indicators (such as agricultural innovativeness and home innovativeness) are positively related to achievement motivation to make its own determinants a subject worthy of study. A variety of interesting hypotheses were tested. In a multiple regression analysis empathy was the most consistently important of the variables, with literacy next most important. Mass media exposure was very important in two communities in Narino, explaining about half of the variance in each case.[1] If education and mass media exposure are important

[1] The range of results among the six communities studied is indicative of the need for more detailed research, as is the difficulty in pinning down the direction of causation between a number of the variables.

determinants of achievement motivation, there are clear implications for public policy.[2]

[2] One might guess that contacts with extension workers would, like education, have a positive effect. But here the results were mixed; the relation was highly significant in one area but negative in two and positive but not significant in two more.

The study was, unfortunately, less conclusive in sorting out the effects of achievement motivation than its causes. Some relationship was found with a variety of indicators of high quality farming, especially in the two most traditional communities (Nazate and La Canada in Narino). The authors interpreted this as due to a wider "range of talents" of the different farmers in these traditional communities than in some others, making it statistically easier, with measurements of a given level of

precision, to isolate a relationship.[1] The tendency to agricultural innovativeness, for example, was very closely related to achievement motivation in these two communities,[2] while in three of the other four communities it

[1] Alternatively, one might expect that the differential (e.g. in productivity) associated with achievement motivation be greater in these communities, because imitation is less likely to occur and decrease the innovations initial advantage, than would be the case in a better-off community.

[2] It was significant at the 5 percent level in one and at the 1 percent level in the other.

was rather insignificant, and in one the relationship was even negative. Home innovativeness was positively correlated to achievement motivation in all six areas, and significantly so in two, one of these being Nazate. The attitude toward innovators was closely related, being significant in three communities, including both of those in Narino. No relation between farm size and achievement motivation was observed in the study (even when farm size was measured in terms of labor inputs[3]) although the desire to increase farm size was positively related in the two Narino communities where the test was made.[4]

[3] Farm size in area terms is not a good measure of the amount of "effective land," But a high labor input would imply either a lot of effective land or an intensive use of the land and both of these would seem to be likely concomitants of achievement motivation. A relation with intensity of land use was tested for separately and none was found.

[4] In one community the relation was significant at the 1 percent level. Its existence is not inconsistent with achievement motivation's helping a man to get more land, since historically many large farms have been owned by people whose cultural orientations and high incomes led them not to take farming too seriously. Their presence could prevent a relation from showing up.

focusing directly on

One of the few quantitative studies of the adaptation of new ideas in agriculture is that of Whittenbarger and Maffee[1] in the municipio of

[1] Eugenio Maffee and Robert Whittenbarger, "Innovativeness and Related Factors in a Rural Colombian Community," mimeo, No. 21 of the Land Tenure Center, University of Wisconsin.

Contadero, Narino. The five correlates found to be related to innovativeness were "information seeking patterns, general knowledge, credit acceptance, income ,and area exploited;"[2] these explained a little less

[2] More detailed probing would be required to discover whether innovativeness might not be a cause of high income and area exploited as well as or rather than a result.

than one-half of the total variance. The authors had hypothesized a relation between education and innovativeness but it did not appear.[3]

[3] The authors explained the lack of such a relation in terms of the very small amount and the poor quality of the education received. The variation in amount of education received by different individuals was very small and they felt that the real effects would become apparent only when more education was available. It does seem plausible to expect that educational level, as well as extent of communications, be related to innovative activity. They are generally also related to each other. The percent literacy in the rural areas appears to have increased only very slowly since the 30's partly due to selectivity of out-migrants by level of education.

In Tamesis, the most important factors contributing to early adoption of an innovation (as opposed to eventual adoption) were observations of model systems, participation in voluntary associations, general knowledge, and number of sources of communication.[4] Less related but still positively

[4] Havens, "Tamesis...", op.cit. p. 145.

so, were the size of the farm, age of the farmer, and level of education.

In Subachoque the level of communication was, strangely, negatively correlated to adoption while the standard of living was positively related; these were the most important determinants. Size of farm was unimportant. There seemed to be a general receptivity to technological change.[1]

[1] See op.cit., pp. 58-9. The statistical analysis in this study appears a little weak, and detracts somewhat from the confidence which can be placed in the conclusions.

A recent study sheds some light on the process of modernization in the production of potatoes.[2] Andrew studied a sample of producers in

[2] Chris O. Andrew, Problemas en la Modernizacion del Proceso de Producion de la Papa en Colombia, ICA, Departamento de Economia Agricola, Boletin Departamental No. 6, March 1970.

Cundinamarca, Narino and Boyaca. A high share of all farms use such modern practices as fertilizers, pesticides, manual sprayers and classification of the potato at time of harvest.[3] Often the larger farms tend to use

[3] A number of produeers in fact apply more fertilizers than suggested by the ICA specialists.

improved seeds and mechanization. The greater tendency of the larger farmers to use improved seed is probably associated in part with the fact that improved seed was available in many less municipalities than the other modern inputs, ranging from 29 percent in Cundinamarca and Boyaca to 55% in Narino. (Nevertheless, usage is highest in Cundinamarca and Narino,) The improved seed sown is probably less than the producers would

like to sow.[1]

[1]There is a problem of supply of improved seeds, as producers prefer the less thin and stabler consumer market.

Large farms had better luck with the improved varieties than ones with smaller plantings; the yield differential between farms with plantings of 0-2,4 hectares and ones with 20 hectares or more was only 10 percent on average for the unimproved seed and almost 20 percent for the improved seed. Possibly better management or mechanization explains this.[2]

[2]Andrew, op.cit., p. 8.

The main source of information in Andrew's sample was family and friends in all cases with the Caja Agraria second and agronomists relatively unimportant. The two stage information flow process works, with ICA and Caja Agraria and other agents of change bringing the information to the most advanced agricultural producers who, in turn, communicate informally with their neighbors.[3] Probably the use of modern

[3]This process is described among others, by Everett M. Rogers, Peasant Modernization: The Impact of Communication, New York, Holt, Rinehart adn Winston, 1968.

inputs in production has been stimulated more by the availability of credit than by the influence of extension.[4]

[4]Andrew, op.cit, p. 6.

(continued on next page)

Footnote 4 continued:

The Caja seemed to be busy in the regions studied. The sample is probably biased towards credit users; in any case only a maximum of 25% in Narino (of the three departments) did not use, and of those who did not, 37-59% by department felt they did not need credit, with most of the rest feeling that it was too risky or noting that it was impossible to obtain it. (Andrew, op.cit., p. 19.) The riskiness was associated with price instability. The majority of credit receivers would pay 15% rather than going without; at present the rate on first loan is between 10 and 12% according to the department, on average.

The great majority of the adopters felt fairly sure (beforehand) that their profits would be increased, a maximum of 12.5% in Narino indicated they were not sure about profitability. Seventy-three to 85% said that they "felt" the practice was profitable, and 4-24% that their neighbors said that the practice was beneficial--this latter category is somewhat difficult to interpret. Andrew notes that the method of calculating yield as output over seed input would suggest that the farmers think of land and labor as cheap inputs and the seed as the scarce one. This raises a tricky point of interpretation, since the general consensus is that land is a scarce resource, along with capital. Andrew feels it is possible that the extension of cultivated land is the cheapest way to increase production for many producers. On some of the mountainous land the alternatives may not be very profitable. The producers on larger amounts of land, and who usually did rent some land, had the highest yields per hectare. And sometimes practices are dictated to renters or sharecroppers by the owner, who may not know what the optimal practice is. "At present there is no good evidence to evaluate the decision-making ability of the producers." (Andrew, op.cit., p. 36.)

No simple generalizations emerge from the above discussion. The evidence is not inconsistent with information being rather quickly diffused and (at least in a good part of the country) well received by most farmers; adoption seems more related to credit, farm size etc. than does, for example, achieve-

ment motivation--this is plausible if adoption is a riskier act for low income farmers. Information is in general at least as important as income-size of farm-standard of living type variables, a good omen with respect to the payoff of an extension system which can successfully diffuse ideas.

What are currently important channels of communication and the important proximate and original sources of information in the change process? Havens study in the municipio of Tamesis, Antioquia,[1] found that

[1] A. Eugene Havens, Tamesis, Estructura y Cambio, Ediciones Tercer Mundo, y Facultad de Sociología, Universidad Nacional de Colombia 1966.

the most important sources of information on new technology were neighbors and friends. Studies in the United States have shown that neighbors and friends are important when a farmer is at the decision stage with respect to an innovation, but before this (i.e. in gathering preliminary information on alternatives) he relies extensively on the mass communication media such as radio and newspapers. This pattern does not seem to hold in Tamesis. For the 10 rural communities studied, the author notes that the radio is never mentioned as an important source of information. In the particular case of the selection of a new coffee variety, extension agents were frequently mentioned. This was not true for other innovations.

Diffusion always involves the introduction of an idea from the outside into a given region or community. The rapidity of its adoption, once it enters the community, depends importantly on the interaction among individuals in the community, especially on whether those people who are looked up to and whose patterns are most likely to be copied tend to be innovators. Rogers and Es, studying this and related questions did find that opinion

leaders scored relatively high on agricultural and home innovateness [1] and

[1] Everett M. Rogers and Johannes C. Van Es, Opinion Leadership in Traditional and Modern Colombian Peasant Communities, Diffusion of Innovations Research Report No. 2, Michigan State University, Department of Communications, p. 1. "The success or failure of most programs of directed social change depend ultimately on the ability and cooperation of local leaders at the community level. Yet little is presently known about the nature of this informal leadership and its role in the process of bringing about community development and social change, especially in developing countries like Colombia." (p. 42.)

also on social status and knowledge of public issues. Ease of communication appeared to be considerably less in the relatively traditional communities studied than in the more modern ones. This difference was, apparently, related to the fact that information did not flow between individuals differing very widely in their attitude toward innovativeness in the traditional communities. A priori/one might not expect people seeking advice to go to persons who differ markedly from them in social status, wealth, or possibly even in levels of sophistication and knowledge with respect to agricultural technology, etc. This may imply that the process of diffusion can break down in situations where technology and an innovative attitude is something of a monopoly of a relatively wealthy and sophisticated group of farmers; even if these farmers would be willing to pass it along to the rest of the farmers--the latter may not be willing to approach the former. Rogers and Es did find that seekers tend to obtain information from and be influenced by individuals who were (a) generally similar in relevant characteristics[1] and (b) more expert or superior to the speaker in relevant

[1] Where relevant refers to attitudes, status, technical competence and such.

knowledge or characteristics, i.e. they tended to seek information from people higher on the scale of innovativeness, and also in social class, but were in general less willing to go to people of a social category far different from their own. The tendency not to reach too far from one's own status or innovativeness category was summed up in measures of resistance to communication flow; on quantification the authors found these to be higher in the two traditional veredas than in the three modern ones. A more significant difference between the two types of communities was that the sociometric choices in the modern communities tended to go to more expert individuals, while in the traditional communities farmers were slightly more likely to seek opinion leaders who were less innovative than themselves. This is a very striking and possibly significant conclusion. With respect to social status, the direction of socio-metric relationships was the same for the two types of communities, but seekers were more likely to seek those of higher social status in the modern communities than in the traditional communities. It thus appears, "That social class differences are a somewhat less important block to the flow of communication in the Colombian communities studied than are differences in the adopter category."[1]

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[1] Rogers and Es, op.cit., p. 47.

A further relevant difference was that less respondents in the traditional communities than in the modern ones mentioned other people to whom they would turn in search of information on the range of topics considered. This

corroborates the reasonable hypothesis that channels of information between persons are less highly developed in the relatively more backward communities.[1]

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[1]Another interesting sidelight in this study was the fact that whereas one of the two traditional communities (la Canada) in Narino had a higher percentage of informants with formal education than did one of the more modern communities, the measure of functional literacy put the modern community ahead of the traditional one. This illustrates the fact that when not enough access to newspapers, magazines, etc., is present the formal education received tends to be lost and the individual lapses into functional illiteracy.

The same study by Rogers and Es attempted to ascertain the characteristics of opinion leaders in the three relatively modern veredas and two traditional ones. They were in part trying to test the hypothesis that a different type of opinion leader would emerge in more modern as compared to more traditional communities; Homans[2] and other sociologists have argued that leaders are more conformist to salient group norms than are non-leaders. Consistent with the hypothesis was the fact that the opinion leaders tended

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[2]George C. Homans, Social Behavior: Its Elementary Forms, London, Routledge and Kegan, Paul, 1961, p. 339.

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to be below average age in the modern communities while they were above average age in the traditional communities. But they found the opinion leaders "to be" about average in most of the indicators of modernity, both in the modern communities and in the traditional ones.[3] The opinion

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[3]This was true with respect to formal education, levels of literacy, size of farms, farm and home innovativeness, mass media exposure, newspaper reading, and several other characteristics.

leaders in all communities, including the traditional ones, had higher than average scores with respect to education, literacy, etc., not surprising since in any region one would expect opinion leadership to be at least in some measure associated with social status, and social status would usually be associated with these variables. They also had more communication links with the outside world.

The variables most tightly related to opinion leadership in a multiple regression equation used by the authors were, for the modern communities, farm innovativeness and social status, and in the traditional communities, knowledgeability of public issues.[1]

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[1]There was considerable difference in the relative importance of the independent variables across the various communities, but the above generalization retains some meaning.

Rather surprising was the fact that opinion leaders tended in both types of communities to have lower than average achievement motivation.[2] Encouragingly, in the traditional communities (found in the department of Nariño) the opinion

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[2]One wonders whether this reflects a correlation between status, high income, and low need to strive.

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leaders scored higher than followers with respect to agricultural and home innovativeness. This could mean that even in these "traditional" communities the general attitude towards change is not so negative as to imply that an opinion leader must be in some sense a preserver of the traditional norms of the society, even if his achievement motivation does not appear high (as was the case here).

It is frequently hypothesized that opinion leadership in traditional

communities is relatively monomorphic, i.e., a single leader is sought for information and advice about a variety of topics. This characteristic was found in all five of the communities studied, with no observable difference between the modern and traditional communities.

Various other studies have indicated that rural leaders are important in technical change; some have pointed to the existence of two stages in the diffusion of ideas, the first from the extension agency to middle and large size farmers and informal leaders and the second from these to the small scale farmers and sharecroppers.[1]

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[1] A pattern consistent with the findings of Rogers and Es in that they would expect these channels to work well under some but not all conditions.

The rural leaders in the Subachoque study[2] were found to be more alert, literate and self-confident than the typical farmer; they were usually between 45 and 60 years of age. (Unfortunately this is the age at which innovations are not, apparently, as eagerly accepted.) The informal "small

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[2] Facultad de Sociología, Universidad Nacional de Colombia, Factores Sociales Que Inciden en el Desarrollo Economico de la Hoya del Rio Subachoque, Bogota, Febrero, 1963, p. 89.

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farmers" leaders showed themselves to be well aware of human psychology; for example, in exercising persuasion they would try to make their neighbors think the ideas were their own, etc. These leaders of the small farmers had less social talent than middle and large scale farmers; their leadership appeared to be based more on their economic position than on kinship. These informal leaders always (i.e, even if they are important leaders)

maintain their status as campesinos, which can be a disadvantage in limiting their prestige in the eyes of city or town people and hence their success in the representation of the interests of the vereda before such people.

The Relative Situation of the Small Farmer: Summary

The authors conclude in general that the minifundistas receive technical information at a second stage but usually adopt it before long if the pay off is clear, so that in terms of seeds, fertilizers, insecticides, etc., which have been available for a moderate period of time, there is not a great deal of difference between the small and the larger farmer. That access to information is more difficult for the former is indisputable; but that time leads to diffusion is also indisputable.

Probably all of the following factors tend to produce a differentially slower rate of technological change on smaller farms.

(1) Research is oriented more towards products characterizing the larger farms (as is adaptation of foreign varieties.)

(2) Extension reaches the (interested) large farmer first--and is in any case likely to be more relevant for him.

(3) Credit is less available to the small farmer.

(4) The risk of loss implicit in change is more of a barrier for the small farmer.

(5) Some small farmers (especially some older ones) have reached a stage of apathy inconducive to innovation.[1]

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[1] As discussed by Grunig, op.cit.

(6) Many small farmers are relatively isolated; although large scale cattle farms may also be isolated, a predominant feature of large crop farms is closeness to transportation, cities, etc. Since modern inputs, extension, etc. all follow the transportation links, this implies, per se, an advantage for the large farms.[1]

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[1]Consistent with this are the results of Rau. (Herbert L. Rau, The Agricultural Land Use in Settlement Patterns on the Sabana de Bogota, Colombia, Ph.D. thesis, Northwestern University, 1958.) Some aspects of the intensity of land use patterns which he studied on the Sabana de Bogota suggest that technical diffusion is in considerable degree a function of closeness to the experimental station and in general closeness to large cities with their presumably more concentrated communication networks in the surrounding areas.

The greater incentive (due to low income) characterizing some small farmers is not enough to outweigh these factors, if one may judge degree of technological advance by yield increases.[2]

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[2]As explained in Chapter IV, higher yields on large farms do not per se imply higher value added per hectare, since these farms have higher purchased inputs per hectare. But the yield differentials are so substantial that the value added differential is almost certain to be in the same direction.

It is clear that some of the problems constituting barriers to technological change in small scale agriculture are due to the lack of information reaching farmers and their lack of understanding; another major group of problems has to do, in general, with the lack of complementary factors such as social infrastructure, etc. The relative importance of these different barriers is and how they are related to one another are clearly important questions. An interesting comparison has been carried out between a sample of 37 small farmers on the hillsides of the municipio

of Pitalito in Huila and a group of small farmers in a relatively backward region of the Netherlands.[1]

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[1]Herman Felstehausen, Economic Knowledge and Participation in Farmer Decision Making in a Developed and an Underdeveloped Country, Centro Interamericano de Reforma Agraria, mimeo., No. 82, April 1967 (restricted). The Colombian farmers are near the subsistence level, with the average family gross income calculated as about 400 U.S. dollars, while their Dutch counterparts earn about 10 times as much. The Colombian farmers were not randomly selected, but were all receiving credit from INCORA or judged to be prospects for credit. In other words, the sample is in some sense a better than average group of small farmers in such an area. The expected differences in education (average two years in Colombia and 7 years in Holland, with the two years in Colombia being spent in many cases at alternate schools [boys one day, girls the next] so that really the number of days in school would correspond to one year), degree of communication with the outside world in the form of newspapers, telephones, etc., were all present. And the accessibility to a road was available for only 30 percent of the Huila farms but for 100 percent of the Dutch farms.

Feltehausen notes that the extent of communication with the outside world is different in the extreme between the two cases in question, and there is also a great difference in the number of organizations to which the typical farmer belongs. The Colombian farmers not living on a trunk road (about two-thirds of them) had from one to five kilometers on mountain trails before reaching a bus stop. Their farm produce was either carried by themselves or by pack animals. A number of farmers indicated that they limited their farm production specifically to the amount which one or two pack animals could carry, since additional animals, although they could be rented, were not profitable for distances exceeding four kilometers. This conclusion gives credence to the argument that in such areas the lack of roads is a major factor restraining increased output. A substantial proportion (13 of 37) of the farmers had been visited by an extension agent or technician in the last year. (This was above the Colombian average,

due to the presence of INCORA in the region.) Despite the relatively high contact with credit institutions, transportation and information were generally bad and only four of the farmers were using fertilizers, 12 insecticides, and none weed sprays. None owned any machinery except hand spreaders and small sugar cane presses. Human labor was the only form of energy.[1] Felthausen argues that the general technological and informational

[1]One result of the remoteness and lack of information in this area, as in other similar ones in Colombia, was a serious health problem. The only medical facilities in the region are in Pitalito and two of the smaller villages. The only fee is a token one, but as a result of the lack of access to the doctors the 37 farmers reported an average loss of 53 work days in the previous year becuase of sickness. The major ailments are due to internal parasites, with respiratory diseases and tuberculosis being next in seriousness.

situation in this region is fairly typical (at least not above average) for the rural areas of Colombia; this seems credible given that some services, such as credit, are relatively more available here than in most regions.

Feltehausen feels that the social context or infrastructure is equally important; he argues that many economic concepts take on meaning only as a result of the individual's participation in the groups and institutions where the concepts are used.[1] In Pitalito both information and the

[1]Thus a person may, through some medium, be familiarized with a term but may not really understand it. This was substantiated by comparisons between farmers with not too much education and high school students with substantially more formal education in Holland. The former scored considerably better on economic concepts which they had developed in their farm management experience and from participation in local programs. This even involved some fairly complicated economic concepts. But where participation was less possible, e.g., re questions about the organization and purpose of the European economic community, students scored better.

participation were scanty. Postal service to the farms was of course impossible; it was irregular even to Pitalito; less than one-half of the families had received any mail during the last year and the others had received only a small

amount. The opposite was true for the corresponding area studied in Holland. Transistor radios were the most common form of communication in the Pitalito region, but the possibilities for effective use of this medium were not realized there, nor have they been generally realized in Colombia, according to Feltehausen. The programs consist mainly of music and advertising. In Pitalito the station is owned and managed by several wealthy families of the area. Only a few potentially useful programs are presented. Newspaper reading is similarly very limited, and is primarily of the newspapers from the capital. Accion Communal does present some interesting new possibilities for group participation in problem solving.

Supervised Credit as a Way Out

If one believes that the farmer (especially the small one) is typically too risk-averse for his own good, or does not find out about technical changes which would benefit him, or cannot put such changes into action without more capital (and the above discussion suggests that all of these play some role) then it is natural to consider the potential of a program of supervised credit, i.e., a system whereby credit is tied to technical change. Some such system has been operated by one institution or another for over a decade now in Colombia, and some evidence is available on its effects.[1]

[1] See Dale Adams, Antonio Giles and Rodrigo Pena, Supervised Credit in Colombia's Agrarian Reform: An Evaluative Study, CIRA, Bogota, 1966. This study focuses on two municipios in Tolima where, by 1965 the program had reached 800 campesino families, mostly small owners, in Espinal, Guamo, and Purificacion. Much of the area is part of the irrigated district. The authors cite earlier initiatives in the supervised credit field. The Instituto de Fomento Tabacalero has had a supervised credit program in a parcelization in Santander since 1959; banks of the area provide the credit with IFT entering as co-signer where necessary and providing close supervision. The Federacion de Arroceros in Tolima had a similar scheme in collaboration with the Caja Agraria. At the beginning of 1963 INCORA received a 10 million dollar loan from AID to begin to develop a program of supervised credit, based on the favorable results of an earlier STACA pilot program in Tolima.

Although a number of studies have dealt with supervised credit, its effects on output and farm income are not yet much understood; but unlike some ordinary credit, where there is doubt as to whether any reasonable increase in agricultural output results at all, the evidence generally points to definite increases in farm output and income with supervised credit. The issue is whether the rise is enough to match the cost of the program.

The increase in income or such measures of income as consumption of various products has been documented in a number of studies. CIRA's study of supervised credit in Tolima[34] concluded that about half of the borrowers

[34] Estudio del Credito Supervisado en el Departmento del Tolima, Centro Interamericano de Reforma Agraria, mimeograph No. 37, November 1965, basado en un curso interdisciplinario con el Professor Dr. Antonio Giles.

increased their consumption of milk and eggs (as stocks of cattle and poultry were increased), whereas a control group of non-borrowers had no increase in consumption of milk and only a small one in eggs. Some, but not as great, an increase in meat consumption was recorded. Franco's study of supervised credit in part of Caldas reported changes in stocks of animals, use of fertilizers, and coffee yields moved more favorably for borrowers than for non-borrowers.[35] But there appeared to be an inconsistency in the

[35] Alberto Franco, Aplicacion y Efectos Socio-Economicos del Credito Agricola en Caldas, Colombia, Centro Interamericano de Reforma Agraria, mimeo., No. 65, Bogota, October 1966. Franco found that the borrowers increased the average number of pigs from 1 to 1.6 over the period while the non-borrowers had a slight decrease from 0.6 to 0.4. The number of hens more than doubled from 50 to 114 for borrowers while decreasing from 13 to 6 for the non-borrowers. The head of cattle grew by about 1 for both borrowers and non-borrowers, in the former case from 1 to 2, in the latter from 2 to 3. Coffee yields fell on both types of farms, a little faster on those which did not borrow. The percent of farmers increasing use of fertilizers and herbicides was over one-half for the borrowers and only 21 percent for the non-borrowers.

(continued on next page)

The credit in the area researched by Franco was aimed partly at diversification away from coffee. He notes that for both borrowers and non-borrowers the percent of farmers who used more than 30 percent of the surface of their farm for coffee went up between 1963 and 1965; it is true that the increase was slightly greater for the non-borrowers but not sufficiently so to draw firm conclusions. The author believes that in this region coffee is substantially superior to the alternatives because of the small risk, and the still adequate prices.

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results of the study in that in answering a question which should have reflected a summing up of all of the changes on the production side, about the same percent (43 to 45) of the two groups said they were in a better "social condition" in 1965 than in 1963. Given the weaknesses and possible biases in such surveys, not too much can be concluded from them.[1]

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[1] It is not clear whether this "condiciones sociales generales" was supposed to refer to standard of living or not. One could assume that levels of income have risen if all of the answers having to do with output changes for specific products were true, but the author cautions that since most of the questionnaires were effected by the credit supervisors there may have been a bias. He also feels that the campesinos are not well informed about many aspects of their operations.

Of as much interest as whether output rises are changes in factor utilization associated with the increase; increased use of labor should have lower social cost than increased use of capital. Results on this issue are still open to discussion. The Adams, et. al. study in Tolima found some change in the intensity of work in 1964 after one year of the program's being in operation. There could be little change in the amount of work put in by the farmers themselves, because most were full time anyway; 6 percent worked more days per month during the supervised credit period than before. The major form of hired labor in this area was occasional workers and the authors concluded that there was a considerable increase in hired part-time

labor as a result of the credit.[1] Franco's study in Caldas indicated about

[1] Estudio del Credito Supervisado, op.cit., p. 20.

a 20 percent increase in man days of family labor for the people who received credit between 1963 and 1965, while the man days stayed the same for the control group who did not receive credit.[2]

[2] Franco, op.cit., p. 14.

The overall effects of supervised credit to date have presumably been possitive but probably not overwhelming. Recently ILO reported that with the recent reorganization of the extension service and the increased tieing of credit to supervision even for commercial farmers, a greater effect on total output may be expected.[3] But the major potential contribution

[3] In the context of the recent re-organization a combination of public and private technical assistance programs have been developed, with private individuals and firms now providing an increasing share of technical assistance on a contract basis with the producers. This arrangement is best developed in the production of cotton; all cotton is produced under the supervision of individuals rendering private technical assistance; this is a condition for receiving seed controlled by the Instituto de Fomento Algdonero. The producer makes a contract with one of a list of agronomists provided to him and the agronomist visits the farm each five days during the growing season. This system, originally developed in IFA, was transferred in September 1968 to ICA, which currently plans to offer training programs for technical assistance personnel as a prerequisite to certification as a practicing private agronomist.

Services rendered by the personnel of the various public extension agencies are similar; farmers with investments above $5,000 pesos are not eligible for free extension assistance.

A group of private banks have formed an organization, Agro-Credito, to coordinate commercial bank loans to agriculture; they also require that producers use private technical assistance. Currently (1969) private technical assistance apparently is almost non-existent except in the cases of cotton and the clients of Agro-Credito, The surveys of producers under the new system suggest they are quite satisfied with it though such surveys are obviously open to question due to their nature.

in welfare terms is in raising the income of the small farmer, even though the related output increases may not loom large in total agricultural production. Here a number of problems, some of them of the nature of growing pains, appear to have afflicted the program. Some are organizational and bureaucratic, others technical. The jury will be out on the overall success of this program for some time yet.

Summary

A more detailed look at the sources of growth is in general consistent with the conclusions reached in Chapter II. Before about 1945 or 1950 most of the growth of output must have come simply from increases in the quantities of land, labor, and some forms of capital (but not machinery). Then something of a revolution occurred. Mechanization expanded very rapidly in the decade 1946 to 1956 in conjunction with a shift of many crops to flat tractorable lands of Valle, Magdalena, Meta, the Sabana de Bogota, etc. This form of capital formation brought with it important technological change,[1] as starkly attested by a comparison between the old (hoe or machete) and the new (modern tractor and implements). Mechanization was accompanied (and probably aided considerably), by a rapid increase in credit during the same decade. This seems most likely to have followed from the general buoyancy of the economy as it used up the international reserves accumulated during the war, and then rode the boom generated by the large increase in coffee prices of the early fifties. The credit assisted in, and the mechanization was a sign of, the growing commercialization of certain segments of agriculture, in particular the production of such cash crops as cotton, rice, barley, to some extent corn, and a few others. The regional shift of crop producing was associated with the transport revolution following in part on the recommendations of the World Bank Mission of 1949.

[1] Not all of the change was necessarily good, but for the most part it did lead to increases in output. See the discussion of mechanization in Chapter VIII.

Although the sources of output growth have changed in relative importance

since 1949-50, output has throughout grown at something not too far from 3 percent. Land under cultivation and labor employed in agriculture have risen less rapidly since 1945, but mechanization and technological change have occurred more rapidly. There is presumably some connection between the falling absolute contribution of land and labor to the rate of growth of output and the rising absolute contribution by machines and technology,[1]

[1] As the previous sources of growth ran out, the profitability (from either a private *or* a social point of view) of making more use of the new ones would increase. The old sources were in fact not sufficient to prevent a rise in the relative prices of domestically consumed agricultural goods. Since the mid-fifties, such a constancy has been maintained.

but the offset which has occurred seems to have been at least in part coincidental. As the country became more densely settled, land increases were harder to achieve. But this was not an important cause, for example, of the credit increase. The growing difficulties of expanding output in the traditional ways made the use of machinery more profitable, but a more important consideration in its expanded use was perhaps the balance of payments ease of the time. The coffee boom seems thus to have occurred at a good time to avert what might have been substantially higher food prices, or a slower transfer of resources out of agriculture.

Within the postwar period, an analogous offset among sources may have occurred. The first decade (1945-1955) saw very rapid mechanization.[2]

[2] Although it was rapid throughout the post 1945 period.

Research, extension and technological change (except for that associated with the mechanization itself) were still in their infancy. But they have matured considerably since then. Several crops, including cotton, tobacco, barley,

and potatoes have shown substantial and sometimes dramatic increases in yields.

Private investment in agriculture has at no time since 1925 been dramatically high in relation to output, land, or labor. But it has proceeded more or less continuously, with a few troughs. The manner of its financing in the aggregate is not yet worked out. Savings studies, mostly in the mid fifties, showed rates somewhat higher than the aggregate investment figures; the short run cross-section marginal propensity to save appeared high. At the same time small farms have higher capital/land ratios than larger ones.

The key form of public investment has been roads; extensive investment since 1950 has contributed substantially to internal trade, it would seem, and some of roads / have clearly released substantial agricultural potential. The overall balance has not been analysed; the criticism is frequently heard that too much attention has been directed to big expensive highways and too little to feeder roads.

Who adopts new technology "best" is a frustrating issue; related closely to how the private profitability/ and social benefit are related for various technologies. Commercial farmers adopt fast, but the most financially successful appear to use less labor than their peers; there seems little evidence of slow adoption for any important group in the absence of serious limiting constraints. But research has produced useful results only for one set of products, and extension has not been generally successful. Communication may have been an important constraint, though this remains to be demonstrated. In some areas, the small producer seems to have been losing ground in spite of a certain amount of technological advance.[1]

[1]Haney's account of the nature of the change in Fomeque is fascinating.

> "Although the introduction of intensive commercial enterprises (such as green beans, peppers, onions, flowers, as well as tomatoes) has resulted in a greater output per unit of land, population pressures have caused a continual decline in the average farm size. Much of the land formerly planted to subsistence crops has been shifted to commercial crop production; however, the depletive techniques used in the cultivation of these intensive enterprises reduce the capacity of the soil to produce subsistence crops which are traditionally grown without improved fertility practices. Increasing amounts of chemical fertilizers and pesticides are required to maintain constant yields, to say nothing of improving them. Because of a diminished land base for the production of subsistence enterprises and because of a decline in former artisan crafts, peasant families must purchase a greater portion of their family needs...
>
> Yield-increasing technology such as improved livestock breeds, new crop varieties, chemical fertilizers and pesticides has generated additional employment opportunities in the past...
>
> A great potential exists for a further expansion of production and employment through an extended usage of agricultural chemicals and genetic improvements in combination with improved soil and water management techniques. Labor-intensive conservation practices and irrigation schemes are presently used to great advantage on the more progressive farms of the community. For most commercial crops, yield differentials between the lowest and highest producers are greater than tenfold...
>
> Unless changes are made in the institutional structure, however, the possibilities for augmenting the productivity of the community's human and physical resources are not bright. On the one hand, the effective demand for new inputs is reduced by heavy liens against the peasants' production, unstable product prices, a high incidence of natural calamities, and restricted opportunities for acquiring new knowledge and skills. Under these constraints, incentives for seeking out and adopting relevant high pay-off combinations of new technology is dependent upon a grossly inadequate and outmoded agricultural service structure. Unlike the more progressive farmers of the community who have access to the country's major agricultural research stations, supply agencies, and financial institutions, peasants must rely upon local sources of information and physical inputs."

If one asks the big question, "what would have had to be different to permit faster development in the sector? the only obvious hypothesis is--

greater equality of land distribution. It seems unlikely that progress could have been really fast unless "the farmer" as defined by the political system wanted technological change, could push and help the system to generate that change for him, and then could apply the new modes effectively. The discussion of Chapter I has hopefully explained the senses in which this was not true.

CHAPTER IV

A Cross-Sectional and Micro Approach to an Understanding of the Productivity of the Agricultural Sector

Some tentative conclusions on the sources of growth of output were derived by the historical analysis of Chapters II and III. These are limited by weaknesses of the aggregate data over time. And many factors such as land tenure, farm size, etc., either do not change rapidly over time, have not been quantified over time, or have effects which are lost in the confusion of other determinants of output over time. In some cases some idea as to their importance may be gained by employing either a cross-sectional macro-economic approach at a given point of time, or by using micro-economic evidence. This chapter makes use of these two types of evidence.

A. A Cross-Departmental Production Function Analysis

Relatively complete information on agricultural production by departments can be gleaned from the agricultural census of 1959, with some adjustments. This establishes a base for a crude cross-departmental production function analysis involving the variables output, labor, land in crops, land in fallow, pasture land, and capital in the form of machinery and equipment, livestock, and tree crop plantations. It is impossible without more detailed information to introduce the quality of land, which does differ widely between departments, other forms of capital, levels of technology, or any of the many other possible determinants of outputs; hence, interpretations of the coefficients must be made with great caution. Fortunately, there is good impressionistic evidence on relative land qualities and levels of technology in different departments, so it is possible to make informed guesses as to what the various coefficients are really picking up. But

a cross-departmental production function cannot be expected to answer any of the commonly discussed "big questions" relating to the agricultural sector such as the value of the marginal productivity of labor.

Even if all of the inputs could be measured precisely, the regression coefficients would not have any "real" meaning unless the correct production function were specified,[1] and they might be misinterpreted if variables which were included were only spuriously correlated with the dependent variable, which was in fact acted upon by some other excluded independent variable related to the one which was included. But all of these caveats tell us only that interpreting coefficients is difficult. They do not mean that it is valueless to find, for example, whether the coefficient of labor is highly positive or highly negative. Each of these results would suggest a number of hypotheses, further study of which might be fruitful.[2] It is in this very modest sense that the usefulness of the "production function" presented here is interpreted.

Most of the data on which the production function is based (see Table IV-1) are for 1959, a year of relatively high agricultural output, whose by crop composition was not very different from that of the previous and succeeding years.[3]

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[1] If there were perfect mobility of a factor between departments, its marginal productivity would be equalized for the country as a whole. But lack of this mobility would not imply any analytical problems.

[2] But given the difficulties which would have to be overcome to carry out a revealing macro-economic production function study of the agricultural sector of a country like Colombia, it appears that the astute use of micro evidence would be the best way to learn the inner workings of the sector. Only because of its low cost has this low benefit macro analysis been carried on here.

[3] The census was taken over a period of time; the result is that in fact the figures for output refer to 1959 while those on land directed to each use and the various forms of capital refer to the moment at which the census was taken,

TABLE IV-1

Data for Cross-Departmental Production Function Analysis
(1959)

Department	Output Total (millions of pesos) (1)	Crops Only (millions of pesos) (2)	Land (thousands of hectares) Cropped (3)	Cropped & Fallow (4)	Pasture (5)	Total (6)
Antioquia	908.50	604.72	375.0	547.1	1,201.4	1,748.5
Atlantico	44.03	17.28	19.0	34.9	143.4	178.3
Bolivar	442.00	160.49	113.4	202.0	1,107.9	1,309.9
Boyaca	565.06	326.32	269.6	423.3	2,723.3	3,146.6
Caldas	804.71	699.84	323.1	379.2	508.1	887.3
Cauca	439.25	289.72	186.8	243.2	417.1	660.3
Cordoba	355.82	128.93	81.4	177.3	938.1	1,115.4
Cundinamarca	774.21	523.53	315.2	478.7	647.8	1,126.5
Huila	208.68	129.03	116.2	157.8	579.4	737.2
Magdalena	528.26	254.43	219.4	404.3	1,505.7	1,910.0
Narina	330.87	236.55	231.7	298.5	174.5	473.0
Norte Santander	258.26	179.58	184.0	250.2	267.0	517.2
Santander	404.95	252.34	285.1	485.2	699.2	1,184.4
Tolima	725.42	603.19	323.8	442.2	791.4	1,233.6
Valle	829.49	660.24	331.4	353.1	576.1	929.2
TOTAL	7,619.51	5,066.19	3,375.1	4,877.0	14,606.0	19,483.0

TABLE IV-1 (Con'd.)

	Labor (thousands) (7)	Capital in Machinery & Livestock, and Plantations (millions of pesos) Machinery (8)	Cattle (Livestock) (9)	Plantations (10)	Total (11)
Antioquia	257.3	14.48	580.9	273.9	869.3
Atlantico	34.0	5.54	77.0	2.2	84.6
Bolivar	123.4	17.84	903.7	18.4	939.9
Boyaca	203.1	22.68	466.1	63.6	552.2
Caldas	215.8	14.99	188.7	421.7	625.4
Cauca	120.9	21.58	353.7	147.2	522.7
Cordoba	99.3	18.92	406.9	13.9	639.7
Cundinamarca	224.7	79.54	287.9	164.5	532.0
Huila	55.8	16.22	171.3	104.5	292.1
Magdalena	144.0	29.98	794.6	78.3	902.9
Narina	131.4	9.45	238.8	111.3	359.6
Norte Santander	77.7	10.73	177.3	123.6	311.6
Santander	163.2	14.66	243.0	128.3	386.0
Tolima	140.8	51.79	248.9	247.3	548.0
Valle	176.5	70.61	282.5	252.6	605.6
TOTAL	2,167.9	399.01	5,422.3	2,200.0	8,171.6

SOURCES AND METHODOLOGY: Output figures [Columns (1) and (2)] are the author's estimates, based on central bank and agricultural census (1959) sources. Land figures [Columns (3) to (6)] are from the 1959 agricultural census. The labor estimate [Column (7)] is an interpolation between the 1951 and 1964 population census figures. It has a considerable possible error, however, since at the moment the estimates for agricultural labor force are not yet available for 1964, and an adjusted "rural population" figure had to be used as a proxy. The capital figures are the author's estimate based on a variety of sources including the 1959 agricultural census, a study of mechanization of agriculture carried out by the Caja Agraria in 1962, Banco Ganadero estimates of cattle population by departments and others.

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Thus the distribution of agricultural income by departments, at least insofar as it is related to good or bad years for specific crops, was probably fairly typical.[1]

Both a Cobb-Douglas type of production function and a linear function were used; both may be poor specifications, but the computations are difficult or impossible to carry out for other, probably superior, ones.

When only the complementary factors are included (e.g., land, labor, and capital), one would expect the Cobb-Douglas form to give better results, as it does here. Using only cropped land, labor, and capital, the following equation was derived:

$$\log O = -\log 0.397 + \underset{(0.129)}{0.356} \log C + \underset{(0.209)}{0.421} \log L + \underset{(0.136)}{0.497} \log Cap. \quad \text{(Equation 1)}$$

$R^2 = .978$ 11 degrees of freedom

Where O is output, in millions of pesos
C is cropped land, in thousands of hectares
L is labor, in thousands of people
Cap. is capital in the form of machinery, livestock, and plantations, in millions of pesos.

The equation suggests a marginal productivity of labor equal to 1,500 pesos. Unfortunately no annual wage figures are available to allow a comparison of this marginal productivity with actual renumeration. In 1959 the average daily wage recorded for the country was about 5 pesos. With a working year of say 250 days, this would imply an annual salary of 1250 pesos, somewhat below the above estimate of the marginal productivity of labor. Such a discrepancy might be expected due

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(continued from preceding page)

anywhere from mid 1959 to mid 1961. This lack of timing is probably one of the less serious problems afflicting the analysis. Our estimate of the labor force is independent of the agricultural census and is for 1959.

[1]Coffee output was higher than in 1960 but price was low in 1959 so, at least as compared to the immediately surrounding years, this would not bias income upwards in the coffee departments.

to the fact that labor is not evenly distributed over the other factors of production.[1] A wage below the average marginal productivity would imply that the landless wage earners (to whom these wage rate figures for the most part refer) were either (a) working in regions or on farms where the marginal productivity was below the national average, or, more likely (b) receiving a salary which was below their marginal productivity. The latter case (b) seems more plausible, i.e., they would be working on farms where their marginal productivity was fairly high but being paid a salary below this, the differential being due, most likely, to a general preference of land owners not to hire labor up to the point where it leaves profits unchanged. The laborers themselves would be willing to work at this low wage if they were completely landless or had such small plots that the marginal productivity of more labor applied to them was very low.[2]

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[1] The explanation we present here takes into account the fact that the alternative estimates of the marginal productivity of labor in subsequent equations were usually higher than in this one: while it is perhaps the best estimate we can achieve with the crude data at hand, there is thus a possibility that it is biased downward.

[2] Note that the positive (and fairly high) marginal productivity estimated here is not necessarily inconsistent with the direct evidence from some regions of the country to the effect that surplus labor exists. (If they were inconsistent the latter would be the stronger piece of evidence.) The regression coefficient would be a meaningful estimate of the average difference in output per person between a heavily populated and a sparsely populated region where the tenure structures were comparable, i.e., there were more commercial farmers, more small farmers, more landless workers, and more family helpers in the first region than the second. Surplus labor could exist in both regions, in each case focusing in the form of unnecessary family helpers or partially or wholly unemployed landless workers. The marginal productivity as measured by the regression equation, would be the amount by which the output of the heavily populated region exceeded that of the other because it had more of all types of farmers. It would be below average productivity but above zero as long as there were some agricultural units in the sparsely populated region which had a positive marginal productivity.

The marginal productivity on family farms where there is surplus labor could, as mentioned above, be as low as zero. Its co-existence with a positive or higher

The marginal productivity of one additional peso of capital is estimated as 0.34 peso by the equation. But the equations still to be presented suggest that one can place little confidence in this estimate.

Equation (1) has several weaknesses. The failure to include pasture land is the most obvious, since about one-third of all value added in Colombian agriculture is in the form of livestock. When it is included, however, it has a low coefficient and adds little explanatory value.

Disaggregation of the capital stock into the three components from which it was derived, and the inclusion of fallow land offer possibilities of learning more about the production function. But the use of a Cobb-Douglas function is less meaningful when factors which are likely to be competitive are included;[1] the alternative, a linear function is not likely to be very satisfactory either. Nevertheless, with careful interpretation, they may add to our information.

Fallow land had a negative coefficient in all of the equations in which it appeared, whether the production function was specified as linear or as Cobb-Douglas. Since, by definition, the fallow land is not in production, one might expect the coefficient to be zero. A possible explanation of its negative sign is that a high fallow/cropped land ratio implies a low quality of the cropped

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marginal productivity on larger farms could result from any of:
a) factor immobility (e.g., between different regions),
b) high real or perceived costs of administering labor which imply that the real or perceived marginal productivity on the large farms after these costs is low,
c) a variety of other institutional factors.

[1] One would not expect the marginal productivity of a given value of coffee plantation to be increased by an addition to capital in the form of livestock.

land (and perhaps the pasture land as well). A more likely explanation is that a lot of fallow implies absentee ownership and poor use of resources. The ratio of fallow land to cropped land tends to be highest in the lowland, sparsely populated departments (Cordoba, Magdalena, Bolivar and Atlantico) and lowest in areas characterized by denser populations and either a) high quality land (as in Valle, Caldas, Tolima, parts of Cauca) or b) very poor populations (Narino, parts of Cauca). In Table IV-2 the departments are ranked by the ratio of cropped land to fallow or cropped land. The per cent of all agricultural land in the form of pasture is also presented. These two rankings are rather closely related. On the departmental level, the extent of fallow land is not related to the per cent of farms managed by an administrator (Col. 5) or the per cent of land so managed (Col. 6).

As noted above, the fallow/cropped land ratio is especially low in the densely settled departments (Valle, Caldas, Nariño). But the negative coefficients for fallow land could not be a result of the fact that population is more dense in some areas than in others. If the population were evenly distributed over the land in each region, a high ratio of population to effective units of land in a given region would imply the use of lower average quality land for crops than in other areas and the presence of relatively little fallow land. Thus the greater the share of fallow land in land either fallow or cropped and the greater the share of pasture to all land, the higher would be the average quality of the cropped land (and of the pasture land), so that the coefficients of these variables would pick up quality differences and come out positive. Apparently whatever factor leads to the negative coefficients is strong enough to offset this tendency to positive ones. Other possible explanations are,

TABLE IV-2

Indicators of Intensity of Cultivation: by Departments

Department	Cropped Land / Fallow Land and Cropped Land (1)	Rank (2)	Pasture / Total Land (3)	Rank (from low pasture to high) (4)	Per Cent of Farms Managed by an Administrator (5)	Per Cent of Land Managed by an Administrator (6)
Antioquia	68.5	(8)	69.71	(9)	4.6	32.3
Atlantico	54.4	(13)	80.43	(12)	6.6	41.9
Bolivar	56.1	(12)	84.58	(14)	3.2	35.1
Boyaca	63.7	(10)	86.55	(15)	1.1	31.3
Caldas	85.20	(2)	57.26	(4)	7.0	38.0
Cauca	76.80	(4)	63.17	(7)	1.9	28.8
Cordoba	45.91	(15)	84.10	(13)	2.3	28.4
Cundinamarca	65.84	(9)	57.51	(5)	3.3	29.5
Huila	73.64	(5)	78.59	(10)	3.1	24.7
Magdalena	54.27	(13)	78.83	(11)	5.1	38.7
Nariño	77.62	(3)	36.89	(1)	1.3	10.7
Norte Santander	73.54	(5)	51.62	(3)	2.3	19.0
Santander	58.75	(11)	50.59	(2)	2.1	22.6
Tolima	73.22	(5)	64.15	(8)	4.0	31.3
Valle	93.85	(1)	62.00	(6)	11.7	47.3
TOTAL	69.20		74.97		3.5	34.5

Source: Agricultural Census of 1960

a) different quality of labor, with that of the intensively farmed areas being higher:

b) lower efficiency of farming in the extensively farmed areas, either because of

i) poor farm management, or

ii) poor distribution of factors, e.g., uneven distribution of land, an aspect of a poor tenure system.

Quality of labor might be related to the wage rate, on the grounds that adequate nutrition is necessary to do a good day's work. Some relation between the height of the wage and the cropped/cropped plus fallow ratio was found, but not enough to provide a strong hypothesis that labor quality differentials accounted for the negative sign with fallow land. Despite the lack of clear statistical support, the hypothesis that fallow land is associated with poor use of land seems plausible.

Disaggregation of the stock of capital led to more somewhat confusing results. The three forms usually were significant, or highly significant, especially in the linear production function,[1] but their disaggregation left the coefficient of cropped land small or even negative. The equations including all the variables were as follows:

Cobb-Douglas form:

$$\log \text{Output} = -\log 0.013 - \underset{(0.376)}{0.225} \log C - \underset{(0.104)}{0.526} \log F + \underset{(0.107)}{0.062} \log P$$

[1] It was noted earlier that the Cobb-Douglas form is not a suitable specification when forms of capital such as we have here are introduced separately. The multiple correlation coefficient was consistently higher in the linear case when the three forms of capital were all present (though not when only machinery and livestock were introduced).

$$+ 0.751 \log L + 0.194 \log M + 0.281 \log LS + 0.281 \log PL$$
$$(0.233) \qquad (0.085) \qquad (0.125) \qquad (0.147)$$

$R^2 = .987$ 7 degrees of freedom (Equation 2)

where O = output, in millions of pesos
C = cropped land, in thousands of hectares
F = fallow land, in thousands of hectares
P = pasture land, in thousands of hectares
L = labor, in thousands of people
M = machinery, in millions of pesos
LS = livestock, in millions of pesos
PL = plantations, in millions of pesos

Linear Form·

$$O = -72.22 - 0.014\,C - 0.191\,F + 0.035\,P + 1.586\,L + 3.483\,M + 0.255\,LS$$
$$(0.445) \quad (0.402) \quad (0.032) \quad (0.575) \quad (0.771) \quad (0.081)$$

$$+ 1.113\,PL \qquad \text{(Equation 3)}$$
$$(0.310)$$

$R^2 = .990$ 7 degrees of freedom

The high significance of the three forms of capital and their high output elasticities suggests that they are correlated with other variables affecting output positively. And the low or negative coefficient going with cropped land, while in part a result of poor statistics, might also reflect the fact that in Colombia the way the land is used is indeed much more important than the amount of it. (Yields of some crops (e.g., corn) on modern farms may be four or five times as high as on backward farms.) Much of the cropped land is not very high in quality.

The "marginal productivity of machinery" indicated in Table IV-3 is very high, showing probably that it has picked up the effects of an omitted variable, probably degree of advancement of technology or something akin. The plantation "marginal productivity" is also very high; the coffee departments differ in a number of ways from other departments so a variety of factors could be responsible. The "marginal productivity" figure for livestock is reasonable in the linear equation.

TABLE IV-3

Factor Productivities Based on Equations (2) and (3)

	Marginal Productivity		Average
	Cobb-Douglas Form	Linear Form	Productivity
1 hectare of cropped land	negative	negative	2.258 pesos
1 man	2.640 pesos	1.586 pesos	3.512 pesos
1 peso of machinery	3.705 pesos	3.483 pesos	19.096 pesos
1 peso of capital in livestock	0.395 pesos	0.255 pesos	1.405 pesos
1 peso of plantation	0.995 pesos	1.113 pesos	3.542 pesos

(The Cobb-Douglas is presented only for comparison; it is presumably an inferior specification given the variables included.) Since the livestock regions are not distinguished by their modernity, one would not expect this variable to pick up the effect of other variables, as we did in the case of machinery.

In Summary: The most striking result of this analysis is the suggestion of either a very high productivity of capital in machinery or plantations, or of their relation (not necessarily causal) with other important determinants of output.

There is no hint of a very low marginal productivity for labor but there is for land. The data would, however, have to be refined before a fairly precise estimate of all these things could be made.

B. The Land Tenure System, Its Origins and Characteristics

Many of the alleged inefficiencies of Colombian agriculture are laid at the door of the land tenure system, with its extremes of minifundismo, latifundismo, poor tenancy arrangements, etc. We will attempt to hypothesize on the effects of the system on total agricultural production and on the distribution of income in the rural areas.

The distribution of land among operators (whether owners or tenants) is important because it helps to determine the efficiency of the distribution of labor, management, and capital over the available land. With a latifundio-minifundio system labor tends to be very unevenly distributed over the land, leading to a smaller total output than could otherwise be achieved. The same is often true of management skill, though here the case is more complicated, as is that of capital.

The uneven distribution of land ownership is associated with uneven distribution of wealth and income. Theoretically this could affect total output in any or all of a variety of ways. Concentration of income could lead to higher or lower savings, investment, and growth. High investment in education by large-scale farmers could lead to better use of technology on a substantial portion of the land and higher total output if a more even distribution of income would not have placed as many people in a position to afford such education. Or the presence of some very high income farmers could imply a low valuation of another dollar of income on their part and hence less effort to be efficient. Unstable rental arrangements may decrease the incentives of renters to improve the land they operate. All of these possibilities and others will be borne in mind in the rest of this chapter.

The Land Tenure Situation in 1960: Size Distribution and Tenancy Arrangements

1. The minifundio problem

As of about 1959, relatively few farm families were completely landless in Colombia, but the majority had operating control of too little land to provide anything approaching a satisfactory income. Of the 1.2 million farms reported in the Agricultural Census of 1960, 500,000 (489,418) or 40 per cent had less than 2 hectares, and about 600,000 had less than 3 hectares (see Table A-50). About 800,000 of the farms were either owned or occupied without title, with something less than 300,000 rented and about 100,000 under a combination of tenancy forms.

How many of these 1,200,000 units give the family its sole or main source of income? A farm of less than 1/2 hectares cannot do so except under exceptional circumstances. Many of the small plots, especially those of less than 1/2 hectare, are residential (around urban areas) as attested by their high catastral valuations (see Table A-52). And many farm laborers either own, or use in partial exchange for their services, the small plot on which they live; there they produce some food for their own use, and possibly a small amount of salable produce. This pattern shades into one in which the family earns its whole income on its own plot. Some light may be thrown on the extent of self-support from own plots by using the population census breakdown into persons classified as farm operators and those classified as workers.[1] A tentative measure of the number of

[1]These calculations are of value only if the population census takers drew a meaningful line between these two categories, and I have been unable to find a clearly defined one. The census states that "only the principal occupation of the interviewee was considered, that is, the one to which the most time was dedicated or from which the most income was derived." The two considerations used might put the individual in different categories, and the general vagueness of the conceptual breakdown does not give strong grounds for confidence that a con-

farm operators (pending new evidence from the 1964 population census) would be about 850,000.[1] This suggests that the operators of perhaps 350,000 of the smallest (or least productive) of the 1,200,000 units recorded in the agricultural census were earning the bulk of their income from other sources than their own plots.[2]

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sistent rule was used in practice. I have in any case assumed that the categories "empleadores" and "trabajadores independientes" encompass the number of farm families who do get most of their income from farming the plots they operate.

[1]The categories "empleadores" and "trabajadores independientes" totalled 778,317 in the 1951 population census. There was probably some underenumeration due to the violence of the time and to typical census difficulties. Allowing for this, and a growth of perhaps 1/2 per cent per year or at most 1 per cent per year to 1959, a reasonable guess for that date might be 850,000. As agricultural population was estimated to be rising at not more than 1 per cent, and as the farm operator category grew less rapidly than the worker category between 1938 and 1951, the 1/2 per cent assumption might be more accurate.

[2]Some discrepancy exists between the two data sources underlying this calculation. The agricultural census included only the departments, the population census included the whole country. But the discrepancy so created would not be large.

The calculation is, however, dubious for a number of other reasons. The census based estimate of farm operators getting most of their income from their own plot is weak. So is the estimate of plots. A downward bias with respect to the latter is undoubtedly present due to incomplete enumeration, and upward biases due to the inclusion of many plots which are really residential only, and to the fact that some farmers operate more than one plot. The agricultural census defines the unit of production as that land operated by one producer within a given municipio. Thus the difference between the number of farms reported and the number of farm operators would presumably result only from farmers with land in more than one municipio (probably fairly rare) and errors in enumeration. The above reasoning would suggest almost as many farmers as farms but the fact that 142,000 farms did not have houses puts this in some doubt. If some of these small plot owners live in the city and have decently paying jobs, the agrarian situation is less serious than it would otherwise appear. As long as the plots held by persons not living on them do tend to be the smallest ones, then our conclusion (see next page) that the last family which earns most of its income in agriculture earns it on something less than two hectares remains correct.

If 850,000 operators earned most of their income on land they operated then the total 1960 active agricultural population estimate of 2,375 thousand would

The landless families might be estimated by comparing the number of houses (1,310 thousand) and farms (1,200 thousand) in the 1960 Agricultural Census. Something over 100 thousand families (i.e., relatively few) seem to fall in this category.[1] The total of families earning most or all of their income from other sources than their own farm (the landless farmers of course do not have farms) would be thus over 450,000, with an active population close to one million.[2] The number of families with less than two hectares would be over 600,000.

In the problems created by poor distribution of land the smallness (or lack) of plots is relevant as is the availability of other income-earning pursuits. We have very little data as to the per cent of income earned from these other occupations by small-scale operators. If the population census of 1951 adhered to its distinction between those people who earned the bulk of their income from their own land and those who did not, then a sizeable number of farm operators were earning the bulk of their income off less than 2 hectares. If those operators who

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imply perhaps 1,250,000 people who were primarily neither own-farm operators nor family helpers.

According to the agricultural census there were 1,310 thousand dwellings. This suggests an average of about 2374/1310 = 1.8 active persons per dwelling unit. This figure has been calculated in other connections as the average number of active persons per family, suggesting that this would be consistent with a house per family situation. Observation suggests that this is not far from the facts. The assumption of one family is as used by CIDA, op. cit., p. 395.

[1] CIDA estimates about 175,000 families, of which 56,000 are those of administrators. (For their methodology, see pp. 395 and 27.) Their estimate of total rural population was higher than mine by 300,000 (2,675 thousand as opposed to 2,375 thousand.) It is difficult to guess at the extent of underestimation in the population census.

[2] Overestimation due to the inclusion of some urban plots must be weighed against census underenumeration.

earned most of their income elsewhere were precisely those with the smallest plots, then the figure would be about 100-150 thousand. To the extent that this assumption was not met (and for a variety of reasons it would not be), then there must have been more families in this category.[1]

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[1] Lauchlin Currie, in his study of the coffee industry in Colombia, La Industria Cafetera en la Agricultura Colombia, Banco Cafetero, 1962, suggested that in most departments of the country, a coffee farm of less than 3 hectares did not provide an "adequate" income, i.e., such a family would be in poverty. Since coffee is one of the most productive crops (per acre) grown in Colombia, an even larger farm size would be required to give a decent income for other crops. It is true that many of the small plots are for coffee (e.g., about 135,000 plots of less than 2 hectares grow coffee, and almost 180,000 of less than 3 hectares) but by no means a majority.

CIDA drew a distinction among four farm sizes which it called sub-family, family, medium-sized multi-family and large sized multi-family. It tried to define a sub-family farm as one with a family cash income of less than 5,000 pesos in 1962 prices. (This was over and above consumption on the farm.) The line was drawn bearing in mind the existing technological level of the typical Colombian small farm. The size was allegedly chosen both with a view to minimum level of income and the possibility of supplying remunerative employment for the farm family. This latter criterion was used more as a check on the first. It was arbitrarily assumed that a level of 0.35 man-years per hectare was the maximum labor input which could be economically employed given current technology. This suggests about 1 person for every 3 hectares or almost 6 hectares per family. Further proof that this calculation is not meaningless is alleged from the fact that with the 600 man days of work available in this family, and with an income of 5,000 pesos, the implied wage rate would be about 8 pesos a day, which was just a little less than the official minimum established for agricultural workers in most of the zones of the country. (In this calculation the home consumption of goods produced on the farm does seem to have been forgotten; with that added in, the implied wage rate would be higher, and this would corroborate the author's view that in most areas of the country 6 hectares would, in some sense, be well above a culturally defined subsistence level.)

The other lines drawn were between family and middle multi-family farms, 50 hectares: and between middle multi-family and large multi-family, 200 hectares. These figures all refer to the Andean region, and were arbitrarily doubled with reference to the Caribbean region, which was defined as including the departments of Atlantico, Bolivar, Cordoba, and Magdalena.

The definition of minifundio or sub-family farms as having less than 5 hectares is clearly arbitrary and normative. It would be of no operational value in enabling us to guess on what size of farms the proportion of income derived from the farm was greater or less than 50 per cent, for example. In some of the regions investigated by CIDA, it was found that farmers with say 2 hectares felt that 3 or 4 hectares would be all that they could handle and all that they wanted.

The per cent of farms and of area falling in each size category according to the Agricultural Census are presented in Table A-51. No matter how one views the situation, the distribution looks very unequal. Even if no farmer with less than 2 hectares got most of his income from those 2 hectares, the farms of 2-4 hectares (i.e., quite small), would still constitute about one-third of all farms above two hectares. An alternative classification by CIDA (Table IV-4), tells the same story. About seven per cent of the active population is estimated to have had neither land nor any supervisory function· a total of about 10 per cent had no land. A further 58 per cent had insufficient land, defined as less than 10 hectares in the Caribbean departments and less than 5 hectares in the Andean departments. While the figures are doubtless imprecise, they indicate unmistakeably the overall pattern.

A small-sized farm implies a low income for an owner-operator (assuming other income sources are not highly lucrative--a safe assumption in most cases)· income is even lower if the farmer is a sharecropper or renter.[1] In Colombia (as in many other countries), non-ownership is positively correlated with small size, as illustrated by the figures of Table A-50.

Unfortunately, the existence of the category entitled "more than one form of tenancy" makes the interpretation of the results somewhat difficult, since this category includes a rather different per cent of all productive units according to the size of the unit. It increases from less than 2 per cent in farms of less

[1] The monetary sum by which a renter is worse off than an owner with the same land is equal to the rent on the land. Some CIDA studies showed that this was 20 to 30 per cent of gross income, and hence a higher per cent of net income. (CIDA, p. 124.) It is suggested that with sharecropping the individual receives only somewhere between 50 and 80 per cent of the gross income he produces. (CIDA, p. 132.)

Table IV-4

Colombia: Distribution of the Agricultural Population According to Size of Farms and Form of Tenancy

Size and Tenancy Arrangement of Farm	Nuclear Families		Agricultural Population			
			Active		Total	
	Thousands	Per cent	Thousands	Per cent	Thousands	Per cent
Large Multi-family Size						
Owners	11.1	0.8	22.2	0.8	65.9	0.8
Renters	0.9	0.1	1.7	0.1	5.0	0.1
Squatters	1.7	0.1	3.4	0.1	10.2	0.1
Others	1.0	0.1	2.1	0.1	6.3	0.1
Sub-Total	14.7	1.1	29.4	1.1	87.4	1.1
Medium Multi-family Size						
Owners	39.1	2.9	78.2	3.0	231.5	3.0
Renters	4.1	0.3	8.2	0.3	24.5	0.3
Squatters	6.5	0.5	13.0	0.5	38.6	0.5
Others	3.9	0.3	7.8	0.3	23.3	0.3
Sub-Total	53.6	4.0	107.2	4.1	317.9	4.1
Family Size						
Owners	244.7	17.9	489.4	18.5	1,456.2	18.7
Renters	56.6	4.1	113.2	4.3	338.3	4.3
Squatters	17.5	1.3	35.0	1.3	103.3	1.3
Others	41.7	3.0	83.4	3.1	248.8	3.2
Sub-Total	360.5	26.3	721.0	27.2	2,146.6	27.5
Less Than Family Size						
Owners	454.1	33.2	908.2	34.3	2,703.4	34.7
Renters	214.0	15.6	428.0	16.1	1,271.0	16.3
Squatters	17.9	1.3	35.8	1.3	104.3	1.3
Others	79.0	5.8	158.0	6.0	469.8	6.0
Sub-Total	765.0	55.9	1,530.0	57.7	4,548.5	58.3
Administrators of Multi-family Sized Farms	20.8	1.5	31.2	1.2	83.2	1.1
Administrators of Family and Sub-family Sized Farms	35.8	2.6	53.7	2.0	143.2	1.8
Landless Workers	118.4	8.6	177.5	6.7	473.6	6.1
TOTAL	1,368.8	100.0	2,650.0	100.0	7,800.4	100.0

a) Includes renters in the strict sense (payment fixed in money or in kind), sharecroppers, and other forms of rental arrangements.

Source: CIDA, op. cit., p. 135. Based on the results of the Agricultural Census of 1960.

than 1/2 hectare to over 12 per cent in the 4 to 5 hectare range, dropping back later to a little over 4 per cent. Some form of rental arrangement is often one of the forms referred to.

In general, the larger the size of farm the greater the percentage of farms owned up to the category of 2,500 hectares and over, when the category "farms without titles" jumps suddenly from about 10 per cent to about 20 per cent. If farms held without title are lumped with "owned farms" there is an even clearer monotonic relationship with farm size.[1] Such a grouping makes sense since in neither category does the farmer pay rent. (It is true, though, that some farmers without title operate under considerable uncertainty.) The high ownership ratio for very small plots may be due to the residential nature of these plots.

The per cent of all farms rented shows a relatively smooth decline from a little over 30 per cent in the farms of between one-half and one hectare to only a little over 2 per cent for the largest size category of 2,500 hectares and up.[2]

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[1] The relationship could be less monotonic than this suggests if, at small farm sizes the form were like ownership and at large farm sizes like renting. But since the institution of renting is in considerable measure an adjustment to a lack of capital associated with the operator of a small farm, this is most unlikely. Even if it were true for farms of 1/2 to about 3 hectares, the per cent owned would be smaller than for the larger sized farms.

[2] Not all of the individual types of rental arrangements follow the same pattern, although most do. The most important is sharecropping, which usually (i.e., for most farm sizes) accounts for something like half of all farms rented. It is especially frequent for farms of 1/2 hectare to 20 or 30 hectares. Rental payments in kind are considerably less popular and except for the category of farms under 1/2 hectare, these never account for more than 4 1/2 per cent of all units. Farms held without title are relatively much more numerous at larger farm sizes than at small ones. They constitute 10 per cent or more of all farms for all farm sizes of 40 hectares and up. This is dramatic support for the idea that title problems are one of the serious aspects of the overall tenure situation. The per cent of the surface included in the whole agricultural census held without title is 12.1.

Small-scale operators thus own their farms less often than large operators. Since the large-scale operator often owns other farms, he is even better off than would be suggested by the amount of land he actually farms (directly or through a manager).

2. Land Tenure Arrangements Apart from Ownership: Associated Problems

The most important group of individuals paying money rent are the commercial farmers operating flat mechanizable lands. They include members of the urban middle class and small farmers who one way or another have been able to save and obtain credit sufficient to build up the capital needed for such an operation.[1] The contracts are generally signed on a one year or even a one-half year basis, but in this case the short-term is not necessarily contrary to the wishes of the renter, who is often interested in rather short-term profit maximization.

There appears to be considerable imprecision in the law on renting, and this presumably results from the minor importance which outright rental arrangements have had in the past. Neither the owners of land nor the renters place much confidence in the law and its application this constitutes a problem, though of a different order from the difficulties of the small scale renter, for whom renting implies lower income and higher uncertainty than owning, and who is close to subsistence in any case.

Sharecropping is most popular with small plots. In the majority of the contracts, one-quarter of the product is turned over to the land-owner, but this may rise as high as 50 per cent in some other areas. Another traditional form of tenancy found in several regions, especially in the cold zones of Cundinamarca,

[1] See CIDA, op. cit., p. 124.

is an arrangement between equals called 'compania.' Two small producers, usually relatives or friends, join their resources to make use of small parcels. There are a number of variations according to who supplies what. The profits are usually shared in halves. This form, along with the more traditional sharecropping, serves the function of supplying needed capital to very small operators, although often at high cost. The smaller the operator the more risky is the supplying of capital to him and hence the higher the price he pays.

Colonato, or holding of land without title does not cover a large amount of land, if we forget the de facto occupation of large-scale public lands by powerful individuals. But many small farmers are colonos. Some occupy permanently the land which they have developed, and others clear and cultivate subsistence crops during one or two years, and then turn the plot over to livestock farmers who pay for the improvements that have been made. This latter type, commonly called roza, usually does not leave the colono in better economic condition than a farm worker, but he has the advantage that he is free and mobile, which accords with the preferences of some of the Costeño groups.[1]

The other group of colonos are rather distinct: they are serious small farmers, often very enterprising. They usually have little capital; this, along with a desire to avoid complications with powerful persons who often claim the lands near populated areas leads them to choose a piece of land on the margins of the mountain forest or the plains, often some distance from civilization, and from all public services such as schools, medicine, markets, churches, etc.[2]

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[1] See CIDA, op. cit., p. 128.

[2] CIDA, op. cit., p. 129.

The extent of inequality of distribution of the land by owner is very difficult to measure. Colombia's assessment figures do not permit such an estimation. But piecing together the various sources of information gives at least some idea as to the distribution of land.[1,2]

As a measure of the really large size farms, or of the amount of land belonging to large landowners, the declarations made to INCORA (required by the agrarian reform law) are almost certainly more accurate than the catastral figures or the agricultural census figures. Table IV-7 presents the data from all three

[1]It is true that 723 of the 937 municipios found in the 16 departments of the country have had catastral surveys, and a tabulation of the distribution of rural properties by size is present. Other souces of information are the tabulation made by INCORA for the department of Antioquia (which is not handled by the Geographical Institute) and the tabulation of the declarations required by the agrarian reform law of individual properties of 2,000 hectares and up. (See CIDA, p. 74). CIDA notes that the catastral tabulations are probably faulty in a number of ways. A lack of topographical surveys and the tendency of the large land owners not to declare their areas correctly are among these. Many small plots do not even get registered. All of the emphasis is on the parcel (a piece of land belonging to one man and surrounded by pieces belonging to others or by the municipal boundary) as the taxable unit, and there is no aggregation at the level of owners either at the municipal, regional or national level. Often large-scale plots belonging to one man are found in more than one municipio. The lands occupied without title are not included in the catastral survey, and many of these are held by large landowners. The agricultural census contains some of the same difficulties as the catastral survey but probably not so many.

[2]Note that the total number of predios (parcels) calculated by CIDA on the basis of statistics from the geographical institute, and presented in Table A-57, suggests a number of farms (using the agricultural census definition) of about 1,100,000. (This calculation is based on an assumed 1.8 parcels per farm.) The difference between this figure of 1,100,000 and the 1,200,000 indicated in the agricultural census could be due to the failure of the catastral survey to cover the whole of the country. Another source of difference would be the probably greater inclusiveness of the agricultural census which caught, for example, the floating colonos listed under the title "other rental arrangements." The catastral survey would certainly not catch these 30 or 40 thousand farm families. In any case, the two figures are close enough together to lend each other some additional credibility.

Transportation of goods for sale and goods purchased is, of course, very difficult. But their lack of legal right to the land can often create problems: they are at a disadvantage with respect to the acquisition of credit and in any conflict with powerful people.

The rendering of services (known in Colombia as concertaje) is now relatively unimportant. There are a few regions where it prevails, such as the municipio of Subachoque, on the margin of the savannah of Bogota.[1] The other region where rendering of services is important according to the agricultural census of 1960 is in the coastal zones. but this refers mainly to the type of floating workers mentioned above, who contract for specific maintainence and improvements with the owners of pastures. Often mayordomos, overseers and agricultural workers are given a piece of land free by the owner and in a sense this is in return for services in that they must work on the main farm and the owner would not tolerate their presence unless they did so.

The problem (if it is a problem) of fragmentation tends to be concentrated in certain regions of the country such as Boyaca. It is in general somewhat more prevalent as the size of the farm increases. (see Table IV-6).

3. The problem of concentration of land

The existence of very small farms implies low incomes for their operators. It does not necessarily imply any inefficiency within agriculture as a whole-i.e., it does not necessarily imply a total output falling below the potential maximum. Nor, conceptually, do large farms. But it is argued that the latifundio of Latin America does imply marked inefficiency, due to the owner's lack of interest in making it productive. The uninterested latifunista is not absent in Colombia.

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[1] CIDA, op. cit., p. 130.

sources and reveals some of the differences among them.[1]

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[1] While the declarations of INCORA and the figures of the Agricultural Census are not quite comparable, since the lower limit for the former is farms of 2,000 hectares and for the latter 2,500, the declarations to INCORA are much higher when the figures for Meta are excluded from the totals of the agricultural census. The area included in the declarations to INCORA for farms 2,000 and up was something over 7 million hectares while the area included in farms 2,500 and up in the agricultural census was only somewhat under 3.5 million hectares. The catastral survey figures were even lower in these large size farms; technically the figures included Meta; even so something less than 2.5 million hectares were listed in farms of 2,500 hectares and up. The agricultural census included 27.3 million hectares and the cadastral survey 21.9 million, covering at least theoretically comparable areas. Therer is no self-evident inconsistency between these two figures since we know that the cadastral survey failed to consider something over 100 municipios.

The source of these discrepancies could be either a) more complete statements in the declaration to INCORA than in the other two cases, or b) the fact that in the INCORA declarations the unit in questions was the area belonging to one man, while in the other two cases the defining characteristic of the unit was not whether it belonged to one man or not. Thus, farms which in the cadastral survey and the agricultural census figures appear in smaller size categories would appear as part of larger size ones in the declarations to INCORA since they all belong to one man. There is unfortunately no easy way to test how much of the discrepancy is due to this phenomenon, since the declarations to INCORA were only for large size farms and no comparable tabulations are present for smaller sized ones.

A tabulation by the Geographic Institute for four municipios on the Sabana de Bogota does enable us to make comparisons between the distribution of land by owner and by taxable parcel. The cadastral survey in this region (the basis for the tabulations) has special interest as it was based on modern precise measurements, classification of soils, etc. The soils are in general very fertile and productive (CIDA, op. cit. p. 81). The tabulation, summarized in Table A-44, indicates that the cadastral figures of farms by size tend to underestimate the degree of concentration by owner quite seriously. We d not, informatively, have figures of the agricultural census by size classification for these municipios: it would provide the really interesting comparison with the 'by owner" figures. The latter indicate almost three quarters of the land belonging to owners with 100 hectares or more, while the cadastral figures indicate less than half of the land in taxed plots of greater than 100 hectares.

Some evidence from other individual municipios may be added. Pupiales in Nariño illustrates how the number of separate plots per owner rises with the size of the farm. Presumably some of these separate plots are rented out. A comparison of the figures with those of the agricultural census contrasts the 2,943 owners farmers, 3,588 separately owned units, and... separately operated units.

In terms of knowing the absolute number of large-scale land owners and

The extreme results presented in the INCORA figures (636 owners with more than 7 million hectares) may not give a valid picture of the concentration of land. On the one hand underreporting of farm size may still be present and the registering of family land in the name of various members of the family may suggest less concentration than actually exists. And not all of the farms of more than 2,000 hectares were declared by their owners.[1] On the other hand, on about 115 of the farms included were 1.7 million hectares of baldios, that is, land without title (which could therefore not be registered in the catastral survey) which will be the next to revert to the public domain. (Some of these were apparently in Choco, and so were never included in the figures.) A further 800,000 hectares constitutes land formerly the property of mining, petroleum and forestry companies, which is not completely under exploitation. INCORA investigators say that some large properties, although declared as one farm, belong "pro indiviso" to many persons or families. In short, the estimate of 7 million hectares owned by people or entities with at least 2,000 hectares could be too high or too low as a measure of decent agricultural land so held. More detailed studies are

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the land they own, the relative importance of these two sources of difference between the INCORA, census and catastral figures is not particularly important: we can assume the INCORA figures are closest to the truth. But for knowing the per cent of all land and of agricultural land operated by large-scale owners, and knowing the possibilities of increasing agricultural output based on bringing the land into effective use, it would pay to know. For example, large farms rented out in small parcels may be producing near their potential whereas large farms used for cattle raising presumably do not.

[1] See CIDA, op. cit., p. 80.

needed to give precision to the figures on distribution of land ownership.

The extent of underutilized land remains perhaps more unclear still. According to the inspections of the very large properties carried out by INCORA, a good proportion are occupied by many small farmers, some of whom even claim to have valid titles themselves. Part of these lands are probably subject to double title.

INCORA personnel also argue that the majority of the area in the large-scale farms of the interior of the country (the Llanos region) is not suitable for agricultural use. Few tabulated figures can be put to work directly to give us an accurate impression of the distribution of effective land (amount of land, adjusted for its quality) either by owner or by user. Yet direct observation still affirms the existence of rather substantial underutilization of lands in many regions.

4. The distribution of "effective" land in the private sector

Table IV-5 presented the distribution of land by producing unit as found in the 1960 Agricultural Census. But considering only area figures can lead to an over-estimate of the inequality of distribution, since large farms may have much mountainous, forested, or otherwise useless land. In Colombia, though, the argument has been made in the past that much of the best land is in large farms while the small operators tend to work the difficult poor quality sort on the hillsides. So the direction of bias is not clear. A tentative judgment, based on relative assessed values per hectare of parcels of different sizes, is that the average quality is considerably lower on the largest farms, but does not vary enough within the size category containing almost all of the farms to affect the general picture of the skewness of distribution.

Assessment values would be most useful if they were available either a) by

size of unit operated by each producer, or b) by amount owned by each individual. Unfortunately, the catastral surveys give land valuations by taxable parcel, a land distribution corresponding to neither of these classifications· it is closer to the latter, but for a variety of reasons not quite the same. In one calculation (Columns (7) and (8) of Table IV-8) we abstract both from this difficulty[1] and from the biases[2] in the land assessments, obtaining distributions which probably give a minimum estimate of the degree of inequality.[3] Column (9) gives a best estimate of the inequality of distribution of land parcels, and column (11) a best estimate of the more meaningful distribution of land by operator. Ownership of land would be even more concentrated than the distribution of column (11).

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[1]That is, we treat the assessment values by farm size as if the "farms" referred to were producing units (as in the census) when in fact they were contiguous units owned by one man. The error introduced in this way is probably not large.

[2]Biases probably present are· (a) small farms have had more improvements (including housing), so this may give a biased picture of relative productive potentials· (b) large farms are probably undervalued because undercultivation makes them look to be worth less than they really are or because of favoritism. CIDA, op cit., p. 76, corroborates both these points.

A study of four Sabana de Bogota municipios illustrated the second. The assessment for one land quality was found to be 50 per cent higher for farms in the 10-40 hectare range than for farms of over 200 hectares· for another land quality the smaller farms were assessed as much as 100 or 150 per cent more. (See CIDA, p. 387.)

It is not inconceivable that a 50 per cent to 100 per cent assessment difference exists between the smaller and the largest farms.

It is true that many (perhaps most) of the large farms listed for Boyaca, Cauca, and Nariño are in the llanos, or the tropical Pacific coast lands, so that their true value may currently be low. But the extensive farming usually carried out on them, and the fact that they are owned in large plots, probably lead to some underassessment.

[3]The effective land per farmer in each size category is based on a multiplication of the number of hectares by the average assessed value per hectare.

The land included is from fifteen departments (figures for Antioquia were not available at the Instituto Geografico "Agustin Codazzi," where these data

TABLE IV-8

Distribution of Land and "Effective Land" by Farm Size

Farm in Hectares	Assessed Value Per Hectare (thousands of pesos)			Per Cent Distribution of Assessed Land Surface			Per Cent Distribution of Effective Land (assessed)			
	Berry	CIDA	CIDA Adjusted	Berry	CIDA	Agricultural Census	Berry	CIDA	CIDA Adjusted	Agricultura Census
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
less than 1/2	4.97	8.40	8.40	0.19	0.24	0.14	2.44	3.35	2.50	2.26
1/2-1	1.95	2.60	2.60	0.49	0.55	0.34	2.46	2.44	1.83	1.68
1-2	1.70	1.90	1.90	1.50	1.48	0.99	6.56	4.70	3.52	3.60
2-3	1.11	1.50	1.50	1.49	1.34	1.01	4.20	3.55	2.66	2.91
3-4	1.01	1.40	1.40	1.43	1.36	1.13	3.69	3.30	2.47	3.02
4-5	0.90	1.20	1.20	1.22	1.10	0.92	2.81	2.27	1.70	2.12
5-10	0.82	1.20	1.20	4.51	4.46	4.26	9.39	8.78	6.57	9.78
10-20	0.64	0.95	1.05	6.24	6.16	5.75	10.23	9.83	8.12	10.45
20-30	0.50	0.80	0.95	4.71	4.57	3.82	5.99	5.92	5.26	5.86
30-40	0.43	0.70	0.88	4.00	3.96	3.26	4.36	4.46	4.18	4.36
40-50	0.45	0.65	0.85	3.46	3.35	2.58	3.98	3.62	3.52	3.22
50-100	0.32	0.55	0.79	11.69	12.00	9.80	9.51	10.98	11.80	10.32
100-200	0.29	0.50	0.75	13.16	13.05	10.96	9.80	10.64	11.94	10.49
200-500	0.26	0.42	0.70	17.51	17.46	14.61	11.63	12.77	15.92	11.75
500-1000	0.24	0.40	0.65	9.75	9.84	9.99	6.07	6.92	8.42	7.66
1000-2500	0.19	0.30	0.60	9.26	8.50	10.27	4.45	4.25	6.36	5.90
2500 and over	0.10	0.12	0.24	9.40	10.67	20.17	2.39	2.22	3.32	4.63

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Farm Size in Hectares	Land Per Farm (Agricultural Census) (12)	Berry (13)	Estimated Effective Land Per Farm (Agricultural Census) CIDA (14)	CIDA Adjusted (15)	Number of Farms (16)
less than 1/2	0.23	1.28	1.61	1.61	165,652
1/2-1	0.71	1.54	1.54	1.54	132,419
1-2	1.41	2.66	2.23	2.23	191,347
2-3	2.36	2.92	2.95	2.95	117,005
3-4	3.37	3.81	3.93	3.93	92,001
4-5	4.33	4.33	4.33	4.33	58,181
5-10	9.99	9.19	9.99	9.99	169,145
10-20	13.76	9.77	10.90	12.06	114,231
20-30	23.69	13.27	15.79	18.79	44,049
30-40	33.56	16.11	19.58	24.66	26,500
40-50	43.43	21.72	23.53	30.82	16,240
50-100	67.01	24.12	30.71	44.20	39,990
100-200	134.2	42.94	55.92	84.04	22,317
200-500	291.6	84.56	102.05	170.44	13,693
500-1000	658.1	177.7	219.4	357.18	4,141
1000-2500	1,421.0	298.4	355.3	711.9	1,975
2500 and over	7,002.0	770.2	700.2	1,403.2	786

(continued on following page)

Col. (1) is my calculation based on tables supplied by the Geographical Institute. The catastral values were, for the most part, but perhaps not fully, for the year 1960.

Col. (2) is from CIDA, op. cit., p. 404, based on data also from the Geographical Institute, but for February, 1963. Col. (3) is my adjustment of Col. (2) to allow for relative underassessment at large farm sizes. For both Col. (1) and Col. (2) the size breakdown from the Geographical Institute was by predios or parcels, not by farmed units. Since Col. (3) is based on Col. (2), the same is true for it.

Cols. (4) and (5) give the per cent distribution of assessed land surface based respectively on my 1960 compilation from the Geographical Institute and CIDA's 1963 compilation. Col. (6) gives the per cent distribution of land surveyed in the Agricultural Census of 1960, by size of producing unit.

Col. (7) gives the per cent distribution of effective land which was assessed as of 1960 using the assessment values of the same year (i.e., Col. (1)) as the measure of land quality. Col. (8) gives the same distribution for assessed land as of 1963 and using the assessment values of that year (Col. (2)) as the measure of land quality. Col. (9) uses the adjusted assessment values of Col. (3) along with the land distribution figures of Col. (5). It thus represents an attempt to allow for bias towards lower assessed values for larger farm sizes. But since the land distribution is that of the catastral surveys, it still underestimates the amount of effective land in the larger categories.

Col. (10) uses the Agricultural Census land distribution breakdown-Col. (6)-with the unadjusted 1963 assessment values-Col. (2). Col. (11) repeats the procedure using instead the adjusted assessment values of Col. (3). Thus these two columns apply land prices by size of unit owned based on the catastral survey to agricultural census categories of farms by size of producing unit. This is an inappropriate procedure but for want of an alternative we use it anyway.

Col. (12) presents the average hectares per farm in each category, according to the Agricultural Census.

Cols. (13), (14) and (15) show the effective hectares per farm for farms of different sizes (defined by number of hectares) when an "effective hectare" has the value of the average hectare on a farm of the 4-5 hectares category. Col. (13) uses the assessment values of Col. (1) Col. (14) uses those of Col. (2) and Col. (15) uses those of Col (3).

Col. (16), for reference purposes, presents the number of farms in each size category according to the Agricultural Census.

While columns (11) and (9) indicate degrees of inequality of effective hectares which are considerably less than those of columns (6) and (5) respectively (hectares, unadjusted) the "effective" land is still very unevenly distributed. About 75 per cent of all land is in producing units of 50 hectares and up (see column (6)) the estimate of effective land in this category would range from a minimum of 50 per cent from column 7,[1] to perhaps 65 or 70 per cent with a best estimate of 60 per cent (from column (11)).[2]

Even the adjusted assessment values of column (7) indicate that land quality does decrease substantially with farm size. But this does not contradict allegations that much of the country's best land has been found in the large farms, since it is clear that such poor land is too, and the latter may simply outweigh the former in the averages we have here. In the departments of Tolima, Valle and Cauca, assessed value per hectare does tend to rise over certain ranges of farm size. This is very clear in Valle, with the average hectare in farms of 100 1,000 hectares having a higher assessed value than the hectare in farms of

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were obtained) a good deal of land, especially on large farms, which was reported in the agricultural census has not been assessed, so the total area figures are much smaller than those of the census.

[1] Based on the assumption that the assessment values of column (1) bear the same relation to true values for each farm size, and that there is no problem in applying assessment values from the catastral survey farm size categories to the agricultural census farm size categories.

[2] On the assumption that the adjustments made in column (3) to allow for relative underassessing of large farms were correct and, once again that assessment values from the catastro can be applied to the agricultural census size categories.

20-100 hectares, even without allowance for possible downward bias in the relative assessment of large farms. Roughly the same is true for Cauca. The phenomenon is not clearly marked in Tolima, and might more easily be due to statistical noise. It would take more detailed study to see whether these trends are related to the presence of the sugar industry (in Valle, at least) or whether they do in fact imply a general tendency for many large farms to have noticeably better land.

C. The Economic Effects of Uneven Land Distribution

It is difficult to sort out the causal relationships among the complex of variables associated with size of farm, tenure conditions, education, wealth, technological level, etc., and output. To a certain extent, a test for the effect of one of these variables on output may inevitably be a test for the whole group. In any case, it is of interest to find the implications of the differences in the collective bundle of conditions which characterize different farm sizes, if nothing else.

The most direct implication of the very uneven distribution of land is an uneven distribution of income. But another important question is its effect on (net) output[1] (value added) and on gross or total output.[2] The less the substitutability between land an labor, the more is net output reduced by the uneven

[1] By "output" we shall mean net output or value added, in accord with the usual national accounting use of the term. When value of goods produced is the aggregate under consideration, the term "gross output" will be used.

[2] Inefficient distribution of factors implies a net output below potential; it does not have any direct implications for value of product, but it would be reasonable to expect this also to be below the level corresponding to efficient use of factors.

distribution of labor over the existing land,[1] and the more unequal is the distribution of income likely to be. Furthermore, an uneven distribution of income may lower incentives for people who have a lot of land and lower investment capabilities of those who have little, again contributing to low output, and a continuance or increase in the skewness of the income distribution.

Uneven farm size does lead to very different labor-land ratios on different sized farms as we see in Table IV- 9. Columns (1) and (3) which give alternative guesses at the labor-land ratio overestimate the real differences by not allowing for differing land quality. A more meaningful measure (labor per unit of effective land) is presented in Column (9).

Even for cultivated land the labor inputs are at least five and possibly more than ten times higher on the smallest category farms than on the biggest ones. The labor/effective land ratio is about 15 times as high on the smallest as on the biggest category. Given the plausible assumption of diminishing marginal productivity of labor, output must be below potential. If technology and amount of capital did not vary with farm size, the different labor-land ratios would imply a lower marginal productivity of labor on the smaller farms (which have the higher labor-land ratios) and one could guess at the output lost through this maldistribution of labor. In Colombia these ceteris paribus conditions are not met, so the crude estimates of gross output per hectare by farm size (shown in Table IV-10) are hard to interpret. With land quality held constant, and under the assumption that yield per hectare for each individual crop is unrelated to farm size, then gross output per hectare would probably fall by about 50 to 60 per cent between the smallest size category and the

[1] By itself, the very uneven distribution of labor on land might suggest a high substitutability between labor and land or between labor and capital. But there are ample institutional factors to explain the unevenness in other ways, so such a deduction would be quite invalid.

Table IV-7

Labor Input per Unit of Land

Size of Farm	Persons Occupied per Hectare				Persons Occupied per Hectare of Cultivated Land			Persons Occupied per Effective Hectare	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Estimate A	Index	Estimate B	Index	Estimate A	Index	Estimate B	Index	Index
Sub-Family	1.154	100.0	0.936	100.0	1.711	100.0	1.388	100.0	100.0
Family	0.132	12.0	0.155	16.6	0.368	21.5	0.413	29.8	25.6
Medium Multi-Family	0.036	3.1	0.044	4.7	0.100	11.1	0.232	16.7	19.7
Large Multi-Family	0.010	0.0	0.017	1.8	0.138	8.04	0.235	16.9	6.6
Averages	0.109	0.4	0.100	9.4	0.545	31.85	0.545	39.26	

SOURCES AND METHODOLOGY: Columns 5 and 7 are based on Columns 5 and 8 respectively of Table IV-10, and estimates of cultivated land in each size category; these come originally from the Agricultural Census. The farm size categories are those of CIDA.

Table IV-10

Some Characteristics of Different Farm Sizes

	Index of Gross Output per Hectare of Agricultural Land	Index of Gross Output per Hectare of Cultivated Land	Index of Gross Output per unit of "Effective" Land		Persons Occupied	Persons Occupied per Hectare
			Best Estimate[1]	Alternative Estimate[2]		
	(1)	(2)	(3)	(4)	(5)	(6)
Sub-Family	100	100	100.0	100.0	1,537	1.154
Family	47	90	73.5	82.0	821	.138
Medium Multi-Family	19	84	54.0	73.0	186	.036
Large Multi-Family	7	80	40.0 - 45.0	72.0	106	.010
TOTAL	23	90			2,650	.109

[1]Col. (3) gives a best estimate, based on the effective land distribution of Table IV-8, Col. (11).

[2]Col. (4) is based on downward biased estimates of inequality of distribution given in Col. (7) of Table IV-8.

Sources and Methodology:

Cols. (1) and (2) are based on figures from CIDA; see also Table IV-16, where similar but not quite identical figures are presented. Cols. (3) and (4) are based on CIDA estimates of output by farm size and on effective land estimates shown in Table IV-8. CIDA's estimates assume yields unrelated to farm size.

Col. (5) is based on the CIDA estimates of active population and their distribution as shown in Table IV-10. Col. (6) is based on Cuadro 11-3 (p. 72) of CIDA and Col. (5). Col. (7) is from CIDA. It does not correspond precisely with the series implied by Cols. (1) and (6). I am unaware of the source of the discrepancy.

Index of Gross Output per Agricultural Worker	Persons Occupied Alternative Estimate	Persons Occupied per Hectare Alternative Guess	Index of Gross Output per Agricultural Worker Alternative Estimate	Estimate 1	Persons Occupied per Effective Hectare Estimate 2	Best Estimate
(7)	(8)	(9)	(10)	(11)	(12)	(13)
100	1245.6	.936	100.0	1.161	.936	.936
430	903.5-953.5	.152-.160	285-300	.203	.285-.300	.240
1,015	289.1	.040-.047	400-605	.065	.115-.135	.100
1,960	161.8-211.8	.015-.019	690-870	.029-.033	.079-.100	.062
281						

Sources and Methodology Continued·

CIDA's distribution of the landless workers among farm sizes must have been fairly arbitrary but coincidentally, almost exactly corresponded with my independent calculation. It seems unlikely that the labor hours are distributed this way, but rather that small operators rent their land to big ones somewhat more than is suggested by these figures, and those of Cuadro 11-21 of CIDA (p. 135). Col. (8) gives an alternative guess as to man-equivalents employed on the different farm sizes, trying to allow for more work of small farmers on large farms. The agricultural census provides few clues as to the extent of this rendering of services· only in the case of rent payment by service rendering can we be sure the phenomenon occurs and this form of rental is quantitatively insignificant. And few case studies are available. So we arbitrarily subtract 300,000 workers from the smallest category and assume two different patterns in which they might be distributed to the other three farm sizes. Col. (9) gives the implied persons per hectare and Col. (10) the output per person implied by Cols. (1) and (9). It presents a picture radically different from that of Col. (7), indicating how sensitive this series is to the assumption about the amount of work done on large farms by the small farmers.

Cols. (11) and (12) give two estimates of labor to effective land ratios, based respectively on the combination of assumptions about distribution of effective land and distribution of labor which imply the highest and lowest differences in the ratios for different farm sizes. Col. (13) gives our best estimate.

largest, according to our "best estimate" in Col. 3. The fall is so great as to make it implausible that the efficiency loss is not very great.

Tautologically, one can say that different gross output per hectare figures for different farm sizes must be due to either

i) higher net output/gross output ratios on the larger farms (so that net output per hectare might be constant); this probably does not explain any of the variation (the relation going instead in the other direction) and so can be largely discarded;

ii) different cropping patterns

or

iii) different yields for the crops grown.

Differences in both yields and cropping patterns are in turn due to

a) different labor/land ratios

b) different capital/land ratios

c) different labor quality

d) different technology

e) different land quality

If we measure output per unit of effective land, the problem of varying land quality is taken care of.

The more precisely the contributing role of each of these factors can be defined, the more information one has about the production function and the more accurately can the "static" loss due to maldistribution of labor (and other factors) be calculated. And the more that is understood about the basic causes of loss, which might include non-profit maximizing behavior on the part of farmers, poor diffusion of technical knowledge, lack of labor mobility, low levels of rural education (which could be a result of the unequal income distribution) and

so on, the more successfully can these problems be attacked. The rest of the present chapter will try to deduce the relative importance of these basic sources of inefficiency, partly by direct use of information on factor ratios where possible, and partly by studying the implications of different cropping patterns, different yields, etc.

Variation of Land Use with Farm Size

In Colombia the major source of different gross and net outputs per hectare among different farm sizes is different cropping patterns, and the nature of these differences is such as to suggest very strongly a lack of profit-maximizing behaviour on the part of many farmers (often absentee). Table IV-11 gives the land on farms of each different size which is used in crops, pasture, etc.[1] (Table A-112 gives the per cent used in the various ways by the farm size groupings of CIDA.) It illustrates that the smaller the size of farm the greater is the per cent of land cultivated in temporary crops, the greater is the per cent in permanent crops, the smaller the per cent in pasture, and the smaller the per cent in mountains and forests.[2] (Farms of less than 1/2 hectare do not follow this general pattern, presumably due to the fact that they are often not basically agricultural enterprises.) Further, the per cent of arable land actually in temporary crops in a given year decreases very substantially as farm size goes

[1] This table is based on the Agricultural Census of 1960. Table A-51 shows crop patterns by the four CIDA size categories.

[2] The per cent of farms in mountains and forests does not increase monotonically as size of farm goes up; it does this only to a farm size range of 100 to 200 hectares and then drops off later. This results presumably from the existence of very large farms on the eastern llanos.

TABLE IV-11

Major Product of Farms, By Size

Size of Farm (Hectares)	MAJOR PRODUCT					
	Total		Crops		Livestock	
	Number	Area	Number	Area	Number	Area
Less than 1/2	165,652	38,344	93,849	26,028	18,687	3,319
1/2 to less than 1	132,419	93,649	116,702	83,636	6,337	4,196
1 to less than 2	191,347	270,308	173,388	245,341	9,196	13,035
2 to less than 3	117,005	275,656	104,576	246,071	6,910	16,466
3 to less than 4	92,001	309,165	80,225	269,383	6,917	23,303
4 to less than 5	58,181	251,854	49,639	214,849	4,968	21,467
5 to less than 10	169,145	1,164,749	135,382	926,735	20,660	145,817
10 to less than 20	114,231	1,572,076	79,998	1,090.340	22,470	316,467
20 to less than 30	44,049	1,043,554	26,734	630,925	12,078	287,438
30 to less than 40	26,500	899,100	14,474	484,254	8,726	294,003
40 to less than 50	16,240	705,047	8,323	360,440	5,866	255,119
50 to less than 100	39,990	2,680,471	17,870	1,171,322	17,189	1,174,337
100 to less than 200	22,317	2,996,152	7,603	992,928	12,072	1,644,744
200 to less than 500	13,693	3,994,319	3,165	868,840	9,037	2,685,749
500 to less than 1,000	4,141	2,730,764	555	357,046	3,192	2,115,298
1,000 to less than 2,500	1,975	2,808,210	145	198,258	1,659	2,372,198
2,500 and up	786	5,513,409	34	225,643	712	5,097,958
TOTAL	1,209,672	27,337,827	912,662	8,392,039	166,676	16,470,914

	Poultry		Bees		Mixed	
	Number	Area	Number	Area	Number	Area
Less than 1/2	43,134	6,952	71	13	9,911	2,032
1/2 to less than 1	5,067	2,932	17	10	4,296	2,875
1 to less than 2	2,234	2,650	21	25	6,508	9,257
2 to less than 3	539	1,185	7	16	4,973	11,918
3 to less than 4	263	855	10	34	4,586	15,590
4 to less than 5	115	483	3	13	3,456	15,042
5 to less than 10	265	1,750	10	72	12,828	90,375
10 to less than 20	94	1,242	1	11	11,668	164,016
20 to less than 30	21	491	--	--	5,216	124,700
30 to less than 40	12	406	1	32	3,287	111,405
40 to less than 50	5	222	--	--	2,046	89,266
50 to less than 100	10	723	2	136	4,919	333,953
100 to less than 200	2	301	--	--	2,640	358,177
200 to less than 500	2	515	--	--	1,489	439,215
500 to less than 1,000	--	--	--	--	394	258,420
1,000 to less than 2,500	--	--	--	--	171	237,754
2,500 and up	--	--	--	--	40	189,808
	51,763	20,707	143	362	78,428	2,453,805

up. For farms of 1/2 hectare to 1 hectare about 80 per cent of all arable land is in crops, while for the farm size, 1,000 to 2,500 hectares, the ratio is only about 33 per cent. This is by far the most important of the differences among farms of different sizes. In general smaller farms do grow crops with higher net incomes per unit of land. A more detailed picture of the differences in cropping patterns is given in Table A-III, which shows estimates by specific crops for the year 1959.

The differences in crop patterns seen here are explainable in terms of the following phenomena:

a) failure of some large-scale farmers, especially those engaged in extensive livestock rearing, to maximize profits. This is probably the chief factor underlying the greater share of land in large farms which is used for livestock.

b) lower average quality of land on larger farms. The importance of this factor is less clear due to the imprecision of the evidence, but the fact seems beyond doubt. (As we saw in Table IV-10, differences in land quality are far from being enough to reduce substantially the variation in the output per unit of land ratio.)

c) failure of some small farms to maximize expected profits due to unwillingness either to change or to take risks or both. This helps to explain why staple crops are grown so widely on small farms.[1,2]

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[1] In other cases the phenomenon is probably better explained by the isolation of the farms, making production for own use almost inevitable.

[2] The rapid increase in the number of small scale coffee producers (for whom coffee was not the major crop) in the last years of high domestic coffee prices (1956-59) is suggestive of a caution or reluctance to jump into a venture

d) differences in availability of or desire to use various factors. The inability of the small farmer to get credit for capital formation affects his decisions on what to produce; the large-scale farmer's fear of labor trouble affects his decision, as would the unwillingness of small-scale farmers to leave their own plots and hire out their services.

Lack of Profit Maximization on Large Farms

A number of observers have concluded that most large-scale farmers do not make a serious effort to maximize profits. This is suggested, but not proven, by the rather large differences in gross output per effective hectare on large farms as compared to small ones (see Table IV-10), even in the face of the very plausible assumption that modern technology is more accessible to the large scale operator than the small scale one. Net output (value added) per effective hectare undoubtedly shows the same (or possibly even a more extreme) variation from small to large sized farms.[1] But it would require more and better statistics than we

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which because it involved a cash crop was necessarily somewhat risky. This may have prevented their planting until prices had been high for five or six years. (Unfortunately they planted just before (or even during) the start of the decline in world coffee prices.)

[1] Net output/gross output would very likely be higher on the small scale farms to the extent that these farms tended not to use as many material inputs (fertilizer, etc.) as the large ones. The main expenditures in the crop sector were on fertilizers, seeds, insecticides, and fuels and lybricants, in that order. These are probably most heavily used on the larger commercial type farms. The Central Bank estimates a lower value added/value of output ratio in the livestock sector than in the crop sector (82.2 to 92.3). (This was partly due to inputs of fodder coming from the crop sector but perhaps from the same farm; even without these, however, the value added/value of output ratio was lower than on crop farms.) This, along with the presumption that the ratio is higher for small crop farms than for large ones implies that it must be higher for all small farms

have at hand to determine the extent of internal inefficiency,[1] on the large farms; if they used more of all factors per unit of output than the small farms, their inefficiency would be proven, but this is not the case. Our estimates in Table IV-12 suggest that the amount of capital in the form of machinery, livestock and plantations per unit of output increases with farm size. (This is due to the high capital/output ratio in livestock production.) Output per unit of effective land decreases (Table IV-10) and output per worker increases.

In any case all of the impressionistic evidence suggests that the major form of inefficinecy is the choice of the wrong output, which implies the choice of incorrect factor proportions. If technology were the same on all farm sizes, and if labor and capital markets were perfect so that their price measured their marginal productivities, it would be possible to get a rough idea of the extent of inefficiency through the use of wrong factor proportions on the larger farms, assuming the proportions on the small farms were such as to maximize output there. The additional output which could be obtained on a large farm by

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(crop and livestock) than for large ones, unless it is much lower for small livestock farms than large ones. The biggest input in livestock raising is for animal feeds (over half) and drugs. It seems unlikely that the small farmers use these in higher proportion than the large farms--to make the ratio equal for all farm sizes a very great difference would have to exist on the livestock farms. Thus it is safe to conclude that value added figures would show output falling faster by farm size than do value of product figures, though not a great deal faster since the ratio in question is probably high for all farm sizes.

[1] We define "internal inefficiency" here as the failure to get the potential output from the set of factor inputs actually chosen.

TABLE IV-12

Capital Stock by Farm Size and Its Relation to Output

Farm Size in Hectares	Capital Stock[1] (Millions of Pesos) Estimate B	Estimate A	Value of Output	Capital/Value of Output Using Estimate A of Capital
Less than 1/2	24.76	48.9	46.23	1.058
1/2-1	77.62	60.1	97.85	.614
1-2	215.04	155.7	265.80	.586
2-3	199.71	140.9	248.85	.566
3-4	226.93	153.5	268.11	.573
4-5	401.84	117.5	218.03	.539
5-10	781.99	523.7	913.74	.573
10-20	913.01	618.6	975.38	.634
20-30	531.22	366.5	505.41	.725
30-40	523.57	296.1	377.51	.784
40-50	283.57	224.5	265.80	.845
50-100	925.90	783.2	739.62	1.058
100-200	931.11	854.3	675.68	1.264
200-500	1169.41	1171.4	792.01	1.479
500-1000	771.91	813.1	518.51	1.568
1000-2000	666.71	724.5	412.19	1.758
2000 and up	645.28	744.4	364.42	2.043
Total	9062.0	7796.9	7685	1.015

[1] Includes only livestock, machinery, plantations, and irrigation works.

SOURCES AND METHODOLOGY: The capital stock series are based on estimates of the various types of capital, owned by family size, coming mostly from the agricultural census, as in the case of machinery and hectares of plantations. Length of life assumptions for machinery (needed to determine depreciated values) were based on a variety of sources. Two alternate sets of prices were used to value the plantations and the irrigation works. Two alternative assumptions were made as to the distribution of livestock; one used the distribution by farm size of the agricultural census (with the total stock inflated to allow for census underenumeration); the other was the author's revision of the census distribution, using the assumption that underenumeration of cattle was more severe on larger farms. As of 1953 ECLA estimated the value of the irrigation works for one hectare at 1000 pesos. If this estimate was accurate, and if the value of this form of investment has risen in line with general inflation, the current value would be about 1,750 pesos.

Estimate B uses that set of assumptions implying the largest per cent of capital to be on large farms; estimate A does the opposite. Since I believe provision of the distribution of the stock of cattle is a reasonable estimate, and since this is the most important form of capital, estimate A is more or less a best estimate, estimate B is almost certainly biased. We do not estimate the capital/output ratio using estimate B of capital since the distribution of the stocks of cattle by size of farm would be different from the distribution used to estimate output of livestock by farm size in the output series.

applying more (or less) of the various factors would be greater than the cost of said factors.[1]

In fact, such a calculation has no meaning in the Colombian case since the assumptions just outlined are not met. When it is performed, it suggests that the large-scale farmer would lose money by the application of labor and capital (measured at prices in line with actual wage rates and a reasonable return to capital) to his land in the same proportions per effective hectare as does the small farmer. This result can be explained by the substantial technological gap between the small and large farms, and also the fact that the small-scale farm probably has more labor per unit of effective land than would pay if the excess could easily find jobs on other farms at the going wage rate.

Further light is cast by the micro-economic evidence at hand, which also indicates that the low output on large farms results primarily from the unduly large amount of land in pasture, and the inefficiency of livestock raising on these farms. Gross value of output per hectare is probably 10 or 12 times as high on the average cropped hectare as on the average hectare in pasture,[2] and observation on specific large farms indicates

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[1] Such a calculation could not be inflated into a measure of total waste in the system due to misallocation of factors, since not all farms would be able to use the factor proportions currently existing on the smaller ones.

[2] As noted earlier, the relevant comparison is net income or value added to all factor inputs. So if much more labor and capital are used per unit of land in crop production, the inefficiency referred to could not be taken as proven. A summary of guesses as to the values of these ratios is presented below.

	Gross Output / Hectare	Capital / Hectare	Labor / Hectare
Crops/Livestock	9.1	2.2	14.4

ECLA estimated that gross output per hectare in 1953 was about 16 times higher in crop growing than livestock. The figure depends very much on where the line is drawn as to pasture land. ECLA used the figure 26.9 million hectares; the agricultural census of 1960 caught only 14.6 million hectares of pasture out of a total of 27.3 million hectares of land classified. Another 6.4 million was listed as forests and mountains--cattle may roam on some of this. For the comparison undertaken here, it is more relevant to consider only that land which could

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that the gross and net income per hectare can be as much as 10 times greater on cropped land. We have, unfortunately, no good evidence on the relative quality of land used for livestock and land used for crops so it is impossible to estimate with any accuracy how far output falls below its potential due to these reasons.[1]

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potentially be used to produce crops, and with this in the denominator the output/hectare ratio for cattle might be about 1/9 that of crops. This fraction would fall to the extent that the agricultural census did seriously underestimate the area in pasture; on the other hand it would rise substantially to 1/6.25 if the fallow land were removed from the calculation of output per hectare for crops.

The second column is based on the use of an output/hectare advantage of 9:1 in favor of crops, and on ECLA's estimates of capital/output ratios in the two sectors. ECLA estimated a much higher capital output ratio for the livestock sector than for crop growing as of about 1953 (livestock, 5.093, crops, 1.237).

In column three, total hectares used to produce crops were 5.05 million according to the agricultural census (including 1.59 which were fallow), while there were 14.63 million in pasture. Labor inputs are hard to divide between the sectors. ECLA made what seemed to be a very inaccurate guess that the active populations involved in livestock and in crops respectively were 1,056.4 thousand and 1,158.2 thousand people. The only way in which a guess might be based on the agricultural census of 1960 would be to use the number of houses per farm as an indicator of the people occupied on a farm. A probably upward biased estimate of the active population living on livestock farms could be obtained by assuming the same number of houses per farm, given farm size, for both livestock and crop farms. The figure arrived at is 395 thousand, or 17 per cent of the active population. This figure is used to arrive at the ratio presented.

[1] The adjusted assessment values by size of plot (see Table IV-8) give some idea since most of the small farms are used for crop growing and most of the large ones for cattle raising. But any estimate based on these figures would have a considerable margin of imprecision. If, within each size category, quality were the same on the two types of farms, then output would be about 66 per cent below potential; if land on livestock farms were half as productive as on crop farms (a not implausible assumption) it would imply that current output fell short of potential by about 45 per cent. (Both figures are biased upwards by the assumption that relative prices of crops and livestock are fixed; unless major crop exports could be achieved this would not happen and the falling price and social utility for crops as compared to livestock would imply a potential gain somewhat smaller than just estimated.)

Why this failure to maximize profits in agriculture on the part of large landowners? A variety of explanations have been put forward, among them the following.

1) The fact that the owners are very wealthy implies a low marginal utility of additional income--so they pay little attention to profits.

2) Land is often thought of not as a business venture, but as having value for its own sake--the same man might be a profit maximizer in an urban pursuit but not in agriculture. He would presumably have a minimum profit (or maximum loss) constraint. But with the inflation of recent years and the appearance of commercial renters the real market value of the land has increased such that the land owner typically makes a good profit simply by holding the land. Indirect economic benefits from land holding (whose relative importance is unknown) also enter the balance: among these are the advantages obtained from large land holdings in terms of the ease of acquiring bank credit, which is then often directed to other uses. Until recently large-scale land holders had the privilege of offsetting their supposed losses in agriculture against gains in other activities, and this possibility would constitute a definite excuse for not showing large profits from agriculture.

3) The opportunity cost of living in the country and dedicating most or all of their time to agriculture is so high for many of the landowners that they prefer the lower income attendent on living and working in the city. This is quite consistent with the social ideas prevalent in a country like Colombia. It is possible, though, for the individuals to be overall profit maximizers whose potential income is simply higher in the city than in the country. Complementary to either of these explanations is the apparent fact that,

4) there is a serious shortage of qualified farm managers who can be hired, with the result that many mayordomos cannot run any complicated farming operation.

5) Owners feel that maximization of their long-run income requires constraining their hiring of labor and renting out of land as these can lead to possible legal problems later. Maximization of short run income might imply labor intensive techniques or crops, but a long-run risk would be attached.

6) The alternative of renting land which the owner does not want to use intensively himself may be in part precluded by a scarcity of entrepreneurs willing to become "agricultural capitalists", i.e.. a lack of demand for rented land.[1] And more recently the agrarian reform law, which comes out strongly against the institution of renting, has made the supply of land for renting much less, since rented land is classified so as to make it more subject to expropriation than otherwise.

It seems probable that all of these explanations play some role--the evidence to be presented in the next pages will attempt to throw some light on their relative importance.

The delegation of farm management by the owner may be safely interpreted as an indicator of the individual's failure to maximize profit from agriculture (and probably from all pursuits together), and of a gap between actual and potential output. The extent of delegation is shown in Table IV-13; 35 per cent of all land area is managed by an employee: if the catastral estimates of value per hectare were accurate, and managed farms were of the same average quality as others,

[1] On the other hand CIDA notes that the rents paid by commerical farmers are usually high; this would not suggest a very small demand and would be more consistent with the inelastic supply possibly resulting from the agrarian reform law.

TABLE IV-13

Relation of the Operator or Manager to the Land

Tenancy by which Producer[1] Holds the Land	Of All Plots		Of Plots Greater Than 2 Hectares	
	Number	Area	Number	Area
Owns Outright	62.43	72.35	64.04	72.45
Rents	23.34	7.34	18.70	7.01
Holds Without Title, or Under Combination Form	14.23	20.31	17.26	20.54
Day to Day Operator				
Producer	96.5	65.5	94.51	65.0
Hired Manager	3.5	34.5	5.49	35.0

[1]The "producer" is defined as the individual who has the right to the goods produced, pays the factors, etc.

Source: Agricultural Census of 1960.

given the size,[1] then about 20 per cent of effective agricultural land would be operated by these managers. With reasonable adjustments to the assessed values , the per cent would be about 25.[2] Absentee ownership becomes more prevalent with increasing farm size (see Table IV-14); 39 per cent of all farms over 200 hectares are managed by an "administrator."

Although the Agricultural Census of 1960 did not indicate the relative importance of hired administrators on livestock as opposed to crop farms, their very close relation to large cattle farms can be guessed from the figures of Table IV-14, as well as from direct observation. Almost all farms of 2,500 hectares and up are livestock farms and almost two-thirds are run by administrators. Over one-half of those in the 1,000-2,500 category are also run by administrators, and, again, almost all are cattle farms. So it appears that not less than two-thirds of the cattle farms of more than 2,500 hectares are run by administrators, as are one-half to two-thirds of those between 500 and 2,500 hectares.

CIDA claims that a better term for these managers would be 'mayordomos"

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[1] I know of no data which would help to decide in which direction this assumption errs. If the data of the agricultural census had been fully cross-classified, very good hints could have been obtained, but this was not the case.

[2] While not as directly relevant as the proportion of land managed by the producer (owner or renter), the proportion owned and operated by the same man is of interest, especially in light of the frequent allegation that although a renter may maximize short-run returns he may run down the quality of the land and thus not maximize long-run returns. The calculation would require a more detailed cross-classification than that presented in the Agricultural Census, since some renters may use managers. If it were true that no renters used managers, one could say that only about 35 or 40 per cent of all agricultural land was managed by the owner (see Table IV-13). And even if farmers who held land without title and under other forms were included, the figure would not rise above 60 per cent. After allowance for differing quality of land, it would be somewhat higher.

TABLE IV-14

Relationship Between Tendency to Hire an Administrator and Size and Type of Farm

Size of Farm (hectares)	Number of Farms		Farms Administered by			Per Cent Operated by an Administrator
	Agricultural	Livestock	Owner	Hired Administrator	Total	
100- 200	7,603	12,072	17,387	4,930	22,317	22.1
200- 500	3,165	9,037	9,310	4,483	13,693	32.7
500-1000	555	3,192	2,193	1,948	4,141	47.0
1000-2500	145	1,659	851	1,124	1,975	56.9
2500 and up	34	712	290	496	786	63.1
All sizes	912,662	166,676	1167,202	42,478	1209,672	3.5

Source: Agricultural Census of 1960.

and that in fact they are usually almost completely unqualified for real management, having little or no education and little technical knowledge. They usually receive very low salaries, only a little above those of the ordinary workmen, although usually supplemented by some food products and a small subsistence plot, so it is natural that their personal interest in good administration and improved output is not too great.[1] The situation may improve as a result of SENA's increased activities in the agricultural field, but this remains to be seen.

The delegation of management is thus doubly serious in that it indicates the owner's lack of interest in high production, and usually implies that an unprepared individual will run the farm. Observers in various regions of the country have suggested that different administrative skills (whatever the source of the differences) are the major source of different yields and profits as between different farms.[2,3]

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[1] CIDA, op. cit., p. 169. CIDA cites the municipio of Subachoque, where more than 70 per cent of all the land exploited was in the hands of administrators, including about 50 per cent of the best lands in the valley, as a case in point of the problem under discussion.

[2] E.g., Eugene Havens, "Tamesis, Estructura y Cambio." Ediciones Tercer Mundo y Facultad de Sociologia, Universidad Nacional de Colombia, Bogota, 1966.

A sample of 100 farms in the municipio of Tamesis, Antioquia, was the basis for Havens' conclusion that administration was the key to high output. The farmers were, in this area, quite willing to run risks in trying out new methods (the region may not be representative of Colombia as a whole in this respect) but generally low levels of education tended to prevent the effective application of the new knowledge.

[3] Deficient administration reflects itself in part in the form of non-optimal factor ratios, e.g., the use of two little labor or capital on a large farm. This part of the inefficiency will be caught in our measure (later in this chapter) of the loss due to uneven factor distribution. The further decrease in output which results from using the factors on the specific farm wastefully will not be caught.

Examples of poor management of good land on very large farms, with output much lower than would be possible using more labor, are plentiful.[1] Even on farms where crop growing is handled efficiently, livestock raising seems to be carried on much more extensively than can be explained on economic grounds.[2] And the same farm which grows crops efficiently seems usually to raise cattle inefficiently, i.e., not to maximize profits per unit of land dedicated to livestock. In some cases there may not be enough management skills to handle both operations effectively. But the prevalence of the phenomenon seems to support the interpretations of many direct observers to the effect that these farmers simply do not feel a great need to maximize profits; the subjective opportunity cost of more time spent on the job for them is quite high. They may have a sort of target income level, on the basis of what they decide what proportion of the farm to plant in crops.

Many large crop farms are, of course, inefficient even in crop production. The low degree of utilization characteristic of some is illustrated by a number of examples in the CIDA study.[3] In the Saldaña-Campoalegre region of Tolima,

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[1] E.g., CIDA, op. cit., p. 102.

[2] CIDA (p. 104) gives the following example. A farm in Tolima which handled crop production well and where the owner and his three sons, all of whom had studied abroad, devoted themselves full time to the running of the farm, still seemed inefficient on the livestock side. The net income per hectare on the cropped land was above 1,300 pesos; income gross of payments to labor seems to have been around 3,000 pesos per hectare, which is above that of most of the sub-family plots researched in detail. The gross income per hectare on pasture land, which was admittedly lower quality than average, was only 150 pesos. There appear to have been about 1 1/2 workers per hectare for the cropped land. Cotton, rice, and sesame are grown. The CIDA group felt the output could be doubled or tripled if the same land were in well-managed family farms.

[3] CIDA, op. cit., circa p. 104.

large farms make a practice of growing only one rice crop whereas with irrigation, two would be quite easy, and three would be possible. Evidence abounds that commercial renters use the land more intensively than owner-operators. But on occasion land has been ruined by one-cropping, e.g., cotton;[1] this constitutes a different type of inefficiency, whose quantitative significance remains unknown.

Many middle to large size farms (including probably most of the commercial farms and some which are owner-operated) use modern inputs and methods, although often in a somewhat indiscriminate fashion due to lack of knowledge. This is a different form of inefficiency than the others just referred to; it could be overcome by increasing education, extension, etc. The labor/land ratio is higher than on the traditional cattle farms, but is still low due to the heavy use of machinery. The labor used is often seasonal only.[2]

Variations in Output/Hectare by Farm Size: Cattle Raising

The major source of loss of potential output on large farms is undoubtedly the dedication of too much land to livestock: a related but less important factor is the inefficiency with which the livestock are raised.

One measure of social (and probably also of private) efficiency in cattle raising is the 'head of cattle per hectare of pasture." The overall average in Colombia as of 1959 was about one head per hectare.[3] A simple comparison of the

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[1] A case was cited by CIDA where the land was finally not even fit to be returned to pasture.

[2] CIDA, op. cit., p. 111.

[3] On the assumption of about 14 million head of cattle and 14.6 million acres of pasture (the latter figure coming from the Agricultural Census). Such a figure is not too meaningful unless one can allow for land quality and rate of growth of the cattle. More relevant than a comparison with other countries on the basis of such a figure are the comments of knowledgeable observers who say that the land is used very poorly and extensively in Colombia by any standards.

number of cattle and the amount of pasture reported in the census by farm size suggests a rapid decrease in intensity of use of the land as farm size rises (see Table IV-15, Col. 1). But the census seriously underestimated the number of cattle: a plausible assumption is that this underestimation was most serious on the larger sized farms (where enumerators would not be able to verify the owner's statements visually and where the owner would more likely be afraid to report accurately).[1] Using arbitrarily assumed coefficients of underestimation, ranging from between 5 and 10 per cent for the smallest farms to almost 50 per cent on the largest ones, one gets the head/hectare ratios of Col. 2, with small farms still having much higher ratios than large ones. If, finally, an attempt is made to allow for land quality (Col. 3) according to the assessment values , the head/effective hectare ratio appears to bear no relation to farm size for farms above about 3 hectares. This is inconsistent with impressionistic evidence and is probably biased in favor of the larger farms, for two reasons. First, the assessment values used probably underestimated the relative worth of the larger farms, and especially of the pasture lands on them,[2] and second, the

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[1] Consistent empirical evidence comes from the fact that the underenumeration was most severe in Bolivar, a department where most of the cattle are raised on large ranches.

[2] Even after our adjustments to the assessed values by farm sizes, Column 3 of Table IV-8 indicates that we are assuming the land quality is three times as high in a plot of 1-2 hectares as in one of 1000-2500 hectares. In the calculation here, we assumed that relative quality of pasture land by farm size is the same as that of all land. This is unrealistic since it seems almost certain that land has to be relatively higher quality on larger farms before it is cropped; hence the relative quality of pasture lands on large farms is probably higher than the relative quality of all land. Further, the proportion of forest and mountain land rises on large farms, and some cattle may be pastured here, so that the head per hectare of pasture calculation for the large farm overestimates the number of cattle actually on the pasture. This factor alone could introduce a considerable differential in the cattle/effective hectare ratio. But the author is unaware of relevant statistics to aid in such a calculation.

TABLE IV-15

Cattle Carried Per Hectare, by Farm Size

	Cattle (Census Estimate) Hectares in Pasture (Temporary or Permanent) (1)	Cattle (My Adjusted Estimate) Hectares in Pasture (2)	Cattle (My Estimate) Effective Hectares in Pasture (3)
1/2	17.70	19.38	2.77
1/2 - 1	5.73	5.67	2.63
1 - 2	3.58	4.10	2.59
2 - 3	2.59	2.97	2.38
3 - 4	2.09	2.36	2.02
4 - 5	1.83	2.06	2.06
5 - 10	1.50	1.80	1.80
10 - 20	1.19	1.46	1.67
20 - 30	1.044	1.358	1.72
30 - 40	0.975	1.316	1.80
40 - 50	0.952	1.331	1.88
50 - 100	0.878	1.274	1.94
100 - 200	0.815	1.221	1.95
200 - 500	0.752	1.202	2.06
500 - 1000	0.691	1.140	2.11
1000 - 2500	0.549	0.932	1.86
2500	0.223	0.391	1.95
Total	0.660	0.988	

Sources: The pasture figures come from the Agricultural Census, p. 45; the cattle estimates used in Col. (1) also come from the census, p. 53· those used in Col. (2) are my revisions of same. The effective hectares estimates used in Col. (3) are based on Table IV-8, Col. (3).

years to maturation are probably considerably more on the larger farms so that even if the head/hectare ratio were the same the production of meat per hectare ratio would be lower. The true production/effective hectare ratio might be somewhere between 1.5 and 3 times as high on small farms as on very large ones.[1] One may conclude, then, that large cattle farms are wasteful, both in that they should not exist in the first place, and in that they are inefficient in the production of livestock given that they do exist.[2]

There are a number of observable concomitants of this inefficiency; it is true that many are also present in the small farms. The use of food concentrates is almost non-existent; the pastures are in large part natural and in any case poorly cared for. Poor animal care leads to low natality, high mortality, and late maturity. Vaccination is taken so little seriously that outbreaks of hoof and mouth disease are common.[3] CIDA suggests that the cattle industry in Colombia compares very unfavorably with the same industry in other Latin American countries.

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[1] This is, at best, a semi-educated guess. Note that one of the few high quality micro studies of a specific region--that carried out by Montoya in Roldanillo-La Union-Toro-showed a much higher productivity of cattle on the smaller farms than on the larger ones, despite the fact that the opposite was true in the case of crops.

[2] CIDA suggests (p. 161), and this is inconsistent with some other points of view, that the indiscriminate introduction of the zebu race during the present century has led to a marked lowering of the quality of the cattle. They suggest that the criolla breeds which were also adapted to the environment had both higher quality and higher commercial yields. The implication is that these required more care, and so their having higher commercial yields apparently depends upon the amount of input the farmer is willing to exert. The herds of imported cattle are in the hands of a small group of gentlemen farmers, who according to CIDA "constitute a society for mutual admiration and are not exerting an appreciable influence on the commercial herds."

[3] The indifference is so extreme, according to CIDA, that large land owners reacted negatively when asked to participate in the cost of an intensive campaign for the irradication of the disease (op. cit., p. 161).

Against this background of underutilized land are perhaps one million families with very low income levels and according to CIDA, at least a half million hectares of currently underutilized flat lands which would be quite productive with virtually no investment. At least two more millions could be made productive but would require substantial investment.

Variations in Gross Output per Hectare by Farm Size: Crop Growing

Output per effective hectare used for livestock is probably somewhat higher on small farms than large. But in the case of crops this may not be true. Whether it is or not depends on the way in which the quality of cropped land varies with farm size and the extent to which yields increase--as they probably do--with farm size. Technological differences are probably the most important factor in higher yields on larger farms; certainly this explains high yields on the commercial farms.

The effect of different crop patterns by size of farm can be seen by assuming the same yield for a given crop on all farm sizes and calculating value of output per hectare or effective hectare for the different farm sizes. On this basis value of output per hectare would be considerably lower for the larger size categories of farms if fallow land were included in the definition of cropped land (see Table IV-16).[1] When fallow is excluded the index is virtually constant over the four size categories;[2] the slight increase indicated is not statistically significant given the quality of the data. The fact that large-

[1] The relevant columns are (5) and (6); one indicates a somewhat erratic negative relation between output per hectare and farm size; in the other the relation is smooth. Their respective denotations are explained in the footnote to Table IV-16.

[2] It must be remembered that this calculation is a very artificial one in a sense; it says nothing about whether large farms make better use of the land,

TABLE IV-16

Relation of Output per Hectare of Cropped Land to Farm Sizes,

Assuming Yields Unrelated to Farm Size, 1959

Size of Farm	Value of Crops (Millions of Pesos) (1)	Area in Crops. Including Fallow (Thousands of Hectares) (2)	Area in Crops. Excluding Fallow (Thousands of Hectares) (3)	Value of Output Hectare (Fallow Included) (4)	Index (5)	Value of Output Hectare (Fallow Excluded) (6)	Index (7)
Sub-Family (0-5 hectares)	10,465	972	839	1,077	100.0	1,247	100.00
Family (5-50 hectares)	23,406	2,298	1,789	1,019	94.7	1,308	104.9
Medium Multi-Family (50-200 hectares)	8,550	1,084	656	789	73.3	1,303	104.5
Large Multi-Family (> 200 hectares)	6,802	1,004	497	677	62.9	1,369	109.8
Total	49,223	5,358	3,781	919	85.3	1,302	104.4

SOURCES AND METHODOLOGY: Column (1) is based on a distribution of the estimated total value of crops (Banco de la Republica) by farm size categories according to proportions calculated on the basis of by crop estamates of CIDA (p. 426) based primarily on the Agricultural Census, and on CIDA value of crop per hectare estimates for 1962. (Failure to use price and area figures for the same year may have introduced a bias).

Column (3) is also based on CIDA's estimates (p. 426), which were slightly amplified versions of the Agricultural Census figures. Column (2) is Column (3) plus the fallow land estimates of the Agricultural Census (with Meta excluded as it was in the CIDA study).

Columns (4) and (6) are based on Columns (1), (2) and (3); Columns (5) and (7) are indices based on Columns (4) and (6).

We have used here the farm size categories set up by CIDA. In most of their discussions and some of their analysis they defined each size category as relating to farms twice as large in the Caribbean departments as in the Andean departments. In a calculation similar to that of this table which they carried out they used uniform definitions of each type of farm in all the departments.

scale farms produce relatively high value crops like bananas, cotton, and sugar, is apparently just about offset by the concentration of production on small farms of other high value crops like tobacco and potatoes.

Yield Variation by Farm Size

Output per hectare is probably higher on large farms than on small ones when allowance is made for the fact that yields do vary with farm size. For those crops in which the modern mechanized large scale farm competes with the small farm, the former tends to have higher yields.[1] This relationship does not hold for the more traditional crops, especially the tree crops, where technological change has brought less improvement than for many of the grains and other annual crops. Coffee yields very little with the size of the plantation which presumably varies fairly closely with the size of the farm (see Table IV-17), according to the detailed study carried out jointly by the Economic Commission for Latin America and the Food and Agricultural Organization of the U. N. in 1955.[2] Very large size plantings had lower yields, but other differences were

(continued from preceding page)

they crop until allowance is made for differing yields by farm size (which probably favors the larger farms) and for different quality of cropped land by farm size (it may well be higher on large farms).

[1] E.g., CIDA, op. cit., p. 170, cites the cases of cotton in Arroyo, and of rice in Saldaña. Corn could unquestionably be added to the list.

[2] United Nations Food and Agricultural Organization Coffee in Latin America: Colombia and El Salvador United Nations. New York 1958.

TABLE IV-17

Farm Size and Yield for Coffee: 1955-56

Size of Adult Coffee-Planting (Hectares)	Yield: Kilograms/Hectare
less than 1	483
1-10	534
10-50	546
50-100	506
100-200	459
more than 200	227
TOTAL	523

Source: United Nations Food and Agriculture Organization, "Coffee in Latin America: Colombia and El Salvador," United Nations, New York, 1958, p. 27.

not so great as to be unexplainable by statistical error.[1]

Firm data on this important question of the relationship between yield and farm size for specific crops is so scarce as to suggest the use of indirect evidence. Given that different sized farms specialize in different crops, one can compare yields in Colombia with Latin America and the rest of the world, to see if there is some relationship between these relative yields and the size of farm on which the crop is typically grown in Colombia.[2] One can also test to see if changes in yields made possible by technical change have primarily occurred in the crops grown on larger scale (or small scale) farms.

A comparison of yields shows that Colombia was, as of about 1960, above the Latin American average by a substantial amount in barley, cotton, tobacco and potatoes, by a small amount in rice and was a little below for wheat, corn and beans (see Table IV-18). U. S. yields were surpassed in the cases of barley and tobacco and European averages in tobacco and cotton.

No generalization as to whether large or small farms are conducive to high yields can be made on the basis of this data. Of cotton, tobacco and barley, all of which have high yields, cotton is definitely a "large-farm" crop.

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[1] CIDA, (op. cit.,) argues that the larger size or capitalistic coffee farms have a higher yield than the small ones, but suggests that this may be due to the fact that most of the largest and best coffee farms are run by owner-operators of Antioqueño origin. This conclusion is not consistent with the more empirically based result of FAO ECLA, so the latter will be tentatively accepted.

[2] If a crop is primarily grown on large (small) farms, then the average yield (a figure which is available) is necessarily largely determined by yields on the large (small) farms. But this fact would not provide an effective test of the tendency to high yields on larger or smaller farms if other countries had the same patterns of different crops and yields by farm size as did Colombia.

TABLE IV-18

Colombian Yields Compared to Those of Other Countries and Regions: 1959-61

Country or Area	Crop							
	Wheat	Barley	Corn	Rice	Potatoes	Tobacco	Cotton	Dry Beans
Europe	19.3	23.0	22.2	45.1	14.4	10.9	3.1	
Denmark	41.4	31.1						
United Kingdom	36.2	33.0						
Netherlands			23.4					
Italy				55.6				
Belgium					17.2	24.6	4.3	
United States	14.6	15.2	33.3	37.9	20.6	17.5	5.2	
South America	11.3	11.9	11.8	17.1	6.6	0.6	2.8	5.9
Argentina	12.4	11.6	18.5	35.6	8.7	10.5	2.1	9.9
Brasil	5.6	7.9[1]	12.9	16.2	5.6	7.6	1.8	6.7
Chile	13.0	16.6	19.9	26.1	7.9	21.4	-	8.7
Colombia	9.2	16.5	11.4	19.2	12.3	19.0	4.4	4.7
Ecuador	8.5	7.9	7.4	15.3	-	-	1.6	-
Mexico	14.8	7.5	9.0	21.3	5.7	13.5	5.2[2]	4.3
Paraguay	7.2	-	12.7	22.3	3.5	10.8	2.0[2]	8.0
Peru	10.0	10.4	13.2	39.3	5.2	9.7	5.3	10.0
Uruguay	6.5	5.7[1]	5.1	33.0	4.3	-	-	-
Venezuela	5.9	-	11.3	14.8	7.2	13.3	1.5	6.1[1]
Asia	8.8	10.5	9.9	16.6	9.6	8.2		

[1] These figures varied substantially from those of surrounding years and so cannot be taken as typical.

[2] Figure for 1962.

Source: Figures for South American countries are from Statistical Bulletin for Latin America, Volume II, No. 1, pp. 163-167. Figures for other countries are taken from the Production Yearbook of the Food and Agriculture Organization of the United Nations.

barley to a lesser degree, and tobacco is (in the extreme) a small farm crop, (see Table A-III). More noteworthy, apparently, is the fact that there is a serious producers' organization in the cases of cotton and tobacco, and in the case of barley the beer company Bavaria encourages the use of better varieties, practices, etc.. A hypothesis that high yields cannot be attained on small farms is given the lie in the case of tobacco.

Potato yields are high by Latin American standards despite its being to some extent a small farm crop. Wheat yields are rather low; little extension work has been carried on and it tends to be a small farm crop. Beans and corn have more or less average distributions of output by farm size; bean yields are low--consistent with the little or no extension work carried on and corn yields are about the Latin American average. Some extension has been carried on but the crop requires sophisticated handling to get the much higher American yields.

It would be risky to conclude that because the high yielding crops were those grown primarily on large farms that, for a given crop, yields are higher on the larger sized farms. So it is similarly risky to conclude that because there is not a close relation between "tendency to be grown on large farms" and either high or low yields, that no general relationship between farm size and yields exists. Impressionistic evidence might suggest a positive relationship; the above, very indirect, evidence might simply lead us to doubt the existence of a strongly positive relation.

Our conclusion that output per cropped hectare is higher on larger farms leaves unresolved the question of whether these farms are more efficient from a social point of view than the small ones until allowance is made for differences in labor/output and capital output ratios and for land quality. Some impressionistic

evidence suggests that, for cropped land, the quality is higher on the larger farms, but this remains open to doubt.[1] Even if the relationship has held historically, it is not clear that it may not have changed over time.

Regardless of the overall relation between farm size and output per unit of land, it is important to distinguish among the larger farms. Colombian agriculture is in transition in a number of ways, chief of which is the trend toward commercial modern farming on both owned and rented land. Thus the category of large farms (e.g., over 50 hectares) is made up of these modern farms as well as very backward cattle farms--a most heterogeneous combination overall.

Studies in several particular areas help to draw the distinction between these types of farms, as well as presenting useful micro-economic evidence on relative yields by farm sizes, and on other issues. In 1963 Montoya studied the area of Roldanilla-la Union-Toro in which the traditional livestock raising economy is in transition toward a more intensive agriculture. The highest gross income per hectare figures were achieved in the larger sized farms, as we see

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[1] It is not possible to support this hypothesis using the catastral figures, without knowledge as to how a hectare of cropped land is valued compared to a hectare of non-cropped land. Observation suggests that much of the cropped land on large farms is in flat, fertile areas, whereas smaller farms on hillsides have poorer land. And the generally smaller incentive to produce on may large farms makes the supposition that land must be higher quality on such farms before it will be used intensively a reasonable one.

in Table IV-19, but interestingly the receipts on the owner-operated farms are much lower than those on the rented farms and somewhat lower even than those on the smaller sized farms. The gross income from crops in general increases with the size of the farm, with the monotonicity of the relationship disturbed by the fact that the owner-operators concentrated in the size range 50 to 100 hectares have an income only about one-half that of the large-scale modern renting farmers. Unfortunately the net income generated per plaza figures shown in Table IV-19 have probably not been able to take into account the capital depreciation costs.[1,2] Nevertheless it is noted that the four largest farms are relatively unmechanized, which makes the high income generated per unit area figures all the more significant; the differential between these farms and the smaller ones must be due largely either to economies of scale or to better technology.

The region in question has a variety of different outputs, and it appears that the effect of farm size and of owner operation as opposed to renter operation have made themselves felt in part through different cropping patterns. The most important crops were cotton (56 per cent of the total value of annual crops), corn (20 per cent) and soybeans (about 18 per cent). There was a large difference in the value of output per plaza for different crops with tomatoes

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[1] Footnote 25 on page 203 of the CIDA study throws some doubt on our presumption that capital costs were not included in the money expenditures per farm figures in Table 4-8 of the CIDA study. The expenses connected with tractor use are referred to in this footnote; while it is possible that these are only operating expenses, it seems also possible that they have included depreciation costs.

[2] The net income figures referred to for the various farms are cash income. In other words they do not include production for consumption on the farm of such crops as yuca, platanos, potatoes, and corn. This means that they are not indicative in some cases of total real income. How serious a problem this constitutes is unknown to me. It is true that the workers are often given a tiny plot on which they, too, raise some food products.

TABLE IV-19

Income and Output by Size of Farm: Roldanillo-La Union-Toro, 1963

Size of Farm in Plazas	(1) Number of Farms	(2) Average Size	(3) Average Area Cultivated	(4) Net Family Income Per Plaza	(5) Total Net Income Generated Per Plaza	(6) Gross Product Plaza
<1.5	22	0.0	0.7	710	747	985
1.6 - 7.5	50	3.9	3.3	530	598	892
7.6 - 15.0	13	10.4	7.5	325	438	845
15.1 - 30.0	9	21.9	9.7	469	593	928
30.1 - 75.0	5	46.9	23.0	694	870	1291
75.1 - 150.0	6	109.0	32.2	351	410	666
>1500	4	343.3	246.8	784	1145	1995
Total or Average	109	25.9				

Source: The figures are desired from CIDA, op. cit., pp. 204-5, and come originally from Montoya, op. cit.

running at 6,480 pesos, cotton at 2,500, platanos at 1,000 and corn and soybeans at only 600 pesos. Corn, whose production was concentrated in the small farms, and which gave low yields, was the traditional crop of the region and the prime item in the diet. Although the risk in growing this crop is high,[1] the investment required in its production with traditional systems is less than that required with other products.

Perhaps the most striking result of the Montoya study lay in the difference between net income per farm or per hectare on large-scale rented farms and on large-scale owner operated farms. There were two rented farms of over 100 hectares and two owned ones, with the family income per hectare on the rented farms being about double that on the owned farms. On the other hand, for small-sized farms (less than about 10 hectares) the income per farm was considerably higher for the owner operated farms. The small renters in this case were sharecroppers. For farms in the 10 to 20 hectare range, the renters had a much higher income per family than the owners; the source of this result is not

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[1] Risk is high in the sense that yields vary from year to year; but since corn is a staple crop it at least guarantees something to eat unless it is a complete failure.

clear.[1]

A final conclusion of this particular study was that between the agricultural census of 1959 and Montoya's survey of 1962, a period during which flood control and irrigation works were effected, there was a very substantial change and improvement in the utilization of land. In 1959 the three municipios had 60 per cent of the land in pastures, and in 1962 the sample farms had only 40 per cent in pastures; since it was alleged that the sample was representative this seemed to indicate a very substantial change, boding well for the flexibility of the agricultural sector in at least one region.

The positive relation between farm size and output per hectare of cropped land which we have concluded probably holds for the country as a whole, undoubtedly does in this region (with the exception of a group of farms in the size range of 50-100 hectares whose income was very low because of extensive

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[1] Linking the relatively good position of renters vis-a-vis owners in this 10-20 hectare range and their relatively poor position in the less than 10 hectare range CIDA deduces, somewhat dubiously, that an important downward pull on the income of the very small sharecroppers results from payment of rent to the owners. It is not intuitively clear why the percent decrease in family income would be greater for the small-scale renters or sharecroppers than the medium scale ones.

The upshot of all the disequalities in the area was that 78 per cent of the farmers received only 9 per cent of the income, while 4 per cent of the farmers, i.e., four farmers, received 63 per cent of total income. The net family income per man day of work was lowest in the smallest group (0-5 hectares) where it averaged 20 pesos. Nevertheless, this was about double the average salary per day of labor. This seems to suggest that the payment to land was quite high in this area (or to other factors than labor).

A general conclusion coming from the case studies undertaken by CIDA was that the net incomes of the very small farms, whether or not they were supplemented by outside work, did not differ much from those of landless workers. In a number of cases the small, independent farmer was in considerably worse condition than the permanent worker on some large-scale farms. Thus the Roldanillo area was not typical in this respect.

cattle farming). In fact there is even a positive relation between farm size and output per hectare (again with the exception just cited). Since the large farms must have a high percent of their land in pasture, this is a stronger result. Further, still, the utilization of labor was not lower on the large size farms than on the small ones. If the transition which has occurred in this area became general, the nature of many problems in the agricultural sector would be altered. It seems very likely, therefore, that among crop farms a redistribution of land would not lead to greeter labor input and possibly not to greater output, but primarily to a much improved distribution of income.[1] The ownership of land by the small-scale farmer would also improve his position, especially in areas where landless farers must rent on an occasional basis (the redistribution of land used for livestock would lead to increased output).

The wide differential between the big and the small farms in this study is attributed by CIDA to the deficient technical knowledge and difficulty of capital accumulation on the part of the small operators, and to the predominance of the cultivation by them of traditional food crops, characterized by low prices. (The food crops presumably must be grown in order to cut down the uncertainty involved with cash crops.)

In other regions also small farms have relatively low outputs traceable at least in part to poor land. Technological backwardness may explain a further

[1] This is , of course, a static conclusion, and the fact the labor inputs and quantity of outputs per hectare are not higher on the small farms than on the large ones is in part due to the technological lag on the small ones. If a high labor supply could be combined with better technology and the incentive of the smaller-scale producer, it is certainly not impossible that higher yields would result from redistribution of land.

part.[1] But there seem to be few clear-cut relationships. In the municipios of Palmira, Dagua and La Cumbre, in the southern part of the department of Valle, yields in the flat and partly irrigated lands were as high as 12,000 pesos per hectare in one farm and 9,000 in another (these were small farms). At the same time a large farmer with 800 hectares growing sugar and pasture for dairy cattle had a very low productivity for this zone of only 815 pesos per hectare. Some large farms did better; for example, a 330 hectare farm produced 3,470 pesos per hectare.

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[1] A coffee zone in Antioquia illustrates again the low productivity of the small farms. In two small ones, gross income per hectare was 620 pesos; in two medium farms the figure was 1,000 pesos, and in the larger ones it reached 1,200 and 2,400 per hectare of total land and as high as 4,000 pesos per hectare of coffee land in the most productive farm. A nearby cattle farm, outside the coffee zone but in an area where other crops could have been grown, produced scarcely 630 pesos per hectare. Note, however, that this latter figure is no lower than that on the small coffee farms. Armero was another region in which the medium and large size renters achieved a high gross income of between 3,400 and 4,000 pesos; a small sharecropper achieved 2,800 pesos and large-scale owners operating their own farms achieved only 340 and 850 pesos per hectare. The municipio of Campoalegre had a major difference between the farmers on the mountain, almost all small and medium, and those in the plain, usually medium size or large. Income per hectare cultivated on the mountain was between 300 and 700 pesos for four farmers, with one reaching as high as 1,400 pesos. Income per total hectare was between 62 and 424 pesos. In the flat lands the income ranged between 500 and 5,300 pesos per hectare. Not enough farms were studied to give a clear indication of a general relationship between income per hectare and farm size; the highest income was achieved by a middle-sized farmer. The major determinant of income per hectare was the distribution of land between crops and cattle. A large-scale farmer who used cut forage intensively still only had a yield of 185 pesos per hectare.

A reasonable guess would be that value of output per cropped hectare rises slightly with the size of farms; although smaller farms tend to specialize a little more in crops with high output/hectare averages for the country as a whole, yields for individual crops may rise enough with farm size to more than offset this. The difference is not likely to be very great, however.[1] The lower output per hectare or effective hectare of agricultural land as a whole on the large farms is due solely to their undue preoccupation with raising livestock. A more detailed understanding of the way in which labor, capital and technology substitute for each other as between different farm sizes would be helpful. What is the nature and extent of the technological (or capital accumulation) gap between large and small farms? Are there labor intensive technologies which could be effective on small farms for some crops?

Different crops have different shaped isoquants, implying that for some a large input of labor can be used before its marginal productivity becomes too low, while for others this is less true. Technology also is relatively more important for some crops, in that the difference in yield between a good variety and a poor one is great, or between good cropping practice and poor. No detailed studies of production functions by crop have been done for Colombia to my knowledge, although scattered estimates of labor inputs by crops exist.

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[1] We have already seen that, as of the mid-fifties, coffee yields were by and large unrelated to farm size; this is the most important single crop for farms in most size categories. Further, the tendency for production of some crops to be concentrated either on large farms (cotton, rice, etc.) and others on small (tobacco, potatoes, wheat, etc.) means that the national average output per hectare which is applied to these crops cannot be far in error for that category of farm sizes which dominates production.

All crops can be grown in ways which are labor- intensive compared to those employed in the United States. (See the man-hour estimates of Table IV-20, comparing Colombia and the United States.) The difficult question, for a country like Colombia, is whether modern technology (in terms of good practices and varieties, etc.) is so linked to large-scale operations, or to mechanization, that the very labor intensive factor combination are simply dominated. Economics of scale in the diffusion of new information to larger farms, and the rapid changes of the technology could explain such a phenomenon. One can only say, for Colombia, that production functions have never been traced out, since no serious attempts have been made to spread technology to the small farmer.

For the most part, our knowledge of alternative technologies by which a given crop can be grown is insufficient to enable an *a priori* prediction as to the substitutability between labor and capital and labor and land. At the same time we do not at present have, for given crops, good measures of capital, effective land and technology on different farm sizes or in different regions; detailed field studies would be necessary to explore this approach. Overall, however, one can make some guess as to the size of the residual of output differences by farm size which must be explained by technology, since data are more readily available for the crop sector as a whole.

As we have seen, output per cropped hectare varies little with farm size (see Table IV-16). It is probable that output per effective hectare falls somewhat with farm size. Capital used in crop production per cropped hectare probably also decreases with farm size. In the case of plantations (see Table IV-21) the investment per hectare of cropped land is highest for middle sized farms (say 5-50 hectares) and lower for both larger and smaller farms. Many

TABLE IV-20

Man-hours per Hectare Used in the Production of Various Crops: Colombia and the United States

	Colombia			United States
	ECLA (circa 1953)	Currie (circa 1965) "Mechanized"	Currie (circa 1965) "Non-Mechanized"	ECLA (circa 1953)
	(1)	(2)	(3)	(4)
Rice	649	225	513	36.3
Sesame	389	270	900	
Cotton	548	604	684	
Coffee	653		900	
Cacao	431		486	
Barley	324	90	297	14.3
Beans	701	450	702	47.2
Corn	520	135	423	32.0
Potatoes	860	594	1,197	166.9
Tobacco	3,177		4,410	1,154.0
Wheat	342	90	297	10.9
Yucca	837		693	
Panela	945[a]		1,062	
Sugar	540	360		
Bananas	387	288[b]		
Plantanos	315		450[c]	
Fique			432	

a- includes manufacturing the brown sugar

b- export bananas only

c- includes bananas not for export

SOURCES AND METHODOLOGY:

Columns (1) and (4) come from ECLA, op. cit., p. 200, while Columns (2) and (3) are from Currie, op. cit., p. 174. The figures from Currie were converted from their per day basis by assuming a nine-hour working day.

coffee farms are of medium size. Machinery used per cropped hectare is difficult to define, due to incomplete classification by the Agricultural Census.[1] It appears certain, however that it rises with farm size (see Table IV-21). In any case this form of capital is considerably less important in terms of investment than other forms such as plantations. Agriculture in Colombia remains not very mechanized.[2]

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[1] Value of machinery owned can be estimated for different farm sizes, but the data does not allow a distinction between that on crop farms and that on livestock farms. The calculation presented in Table IV-21 would be strictly meaningful only if no machinery were used on livestock farms.

Capital owned is the appropriate concept in the analysis of some economic problems, but in the present case the relevant one is use. The agricultural census presented figures on the number of farms using various forms of capital (again, see table A-[illegible]); these suggest that there is a substantial amount of renting out of implements, especially to small farms. It seems probable that the share of machines owned on small farms is less than the share of machine used on them. But even with this caveat and allowing for some use of machines on livestock farms it seems safe to conclude that machine use per cropped hectare rises quite substantially with size of farm. Table A-[illegible] shows the relation between tractors owned per 100 hectares of arable (cropped plus fallow) land; the ratio decrease up to the farm size 5-10 hectares and rises rapidly thereafter. Much renting of tractors by large scale farmers to small scale operators, or much more extensive use of those tractors owned on small farms than those owned on large ones would be necessary to suggest that tractor hours per hectare of cropped land were a decreasing function of farm size.

[2] On over half of the farms power is supplied by humans only (see table A-[illegible]) with the percent using only this form decreasing from about 70% on the smallest to 30 per cent or less on the largest farms. A lack of machinery can indicate either low technical knowledge or a shortage of investible funds. Only 18% of farms between 200 and 500 hectares were reported as using some form of mechanical power and of these less than half used tractors. Since about 34 per cent of the farms in this size range are either crop farms or mixed farms (i.e. substantial crop growing), this means that if no livestock farms had any mechanism power, we would conclude that about half of the farms (in this size range) growing substantial amounts of crops had nay form of mechanism power and only about one quarter had tractors. In fact the ratios would be lower than this since some livestock farms do have tractors or other mechanical sources of power. It is true that even on the crop farms perhaps only about one third of the area is actually in temporary or permanent crops, but the low usage of machinery remains striking.

Where animal force is used (on about 1/3 of all farms) the Roman-type plow called "achuzo" prevails. From the point of view of soil conservation this is fortunate, since only the absence of the moldboard plow and the presence of permanent tree crops and shade tress explains the lack of erosion in a majority of the minfundio area: exception to this rule are the Santanders and Boyaca with their more erosion-prone soils

TABLE IV-21

Estimates of Some Forms of Capital Used in Crop Production per Cropped Hectare[1]

By Farm Size, 1959

(Values in Thousands of Pesos)

Farm Size in Hectares	Value of Machinery Owned Cropped Hectare (1)	Value of Irrigation Work/Cropped Hectare (2)	Value of Plantations/ Cropped Hectare (3) Estimate A	(4) Estimate B
< 1/2	21	141	239	256
1/2 - 1	15	116	714	250
1-2	14	94	708	247
2-3	10	79	687	238
3-4	10	86	767	267
4-5	11	80	761	265
5-10	14	83	847	296
10-20	17	86	892	313
20-30	22	99	944	306
30-40	24	116	870	308
40-50	27	123	809	284
50-100	33	167	735	257
100-200	44	271	594	206
200-500	53	439	466	162
500-1000	73	656	373	131
1000-2500	86	777	279	97
2500 and up	96	1980	118	1365

Sources and Methodology: See the explanation given in Table IV-12.

[1]Defined here to exclude fallow land.

Investment in irrigation when related to area in temporary crops, or in all crops tends to increase with farm size for farms above about five acres.[1,2] It is possible that the capital/cropped hectare ratio for the other forms of capital used in crop growing (for whose distribution by farm size we have no available data) decreases with farm size.[3] If this is the case, it is possible

[1] Again, there is a difficulty in that the Agricultural Census did not distinguish between irrigated crop land and irrigated pasture. But it appears unlikely that enough pasture land is irrigated on large farms to negusion that the percent of cropped land which is irrigated increases with farm size. Results of a CIDA questionnaire in the municipios of Saldaña and Campo Alegre indicated that the percent of all land in the farm irrigated rose with farm size in these two heavily irrigated regions ; this suggests our conclusion.

[2] The percent of all farms (crop or livestock) where some forms of irrigation is practiced is between 2 and 4 for almost all farm sizes. Seventy percent of the 226,000 hectares under irrigation in the country are in farms of 50 hectares or more and 50 percent in farms of more than 200 hectares. The generally low level of irrigation in the country as a whole results from lack of a tradition of such and the absence of public projects. CIDA suggests (p. 182) that there has been a tendency fore the public projects to favor the large-scale farmers or owners. The irrigation works in Saldaña, for example, have tended to benefit the renters of thsoe lands and to increase enormously the commercial value of the land. But the payments required of the workers have not been dusted upward with the decreasing value of money.

[3] The major forms of capital of which we are not able to take account are soil improvements, fences, buildings, and working capital. (For an idea of their relative importance, as estimated by ECLA in 1953, see Table A-12. . In the case of some buildings and fences, it seems unlikely that capital per hectare would rise with farm size; the presence of economies of scale in these forms of capital would suggest the opposite. But for other types of buildings and for some types of installations, this is not true (e.g., some coffee processing installations tend to be present only on farms above a certain size).

Working capital per hectare might rise with farm size due to easier availability; on the other hand economies of scale are present here too so no a priori judgment can be made. ECLA estimated as of 1953 that working capital accounted for between 20 and 25 per cent of all capital on crop farms. (See Table A-12).

that total capital per cropped hectare is a decreasing function of farm size, at least for the small and medium sized farms. But this is by no means clear and if such a decrease does occur, it is not a dramatic one. An increasing capital/cropped hectare ratio is equally possible. For farms above 20-30 hectares the value of plantations per hectare falls but that of irrigation works rises; uncertainty as to whether we are valuing these different assets correctly (and as to what proportion of all irrigation on large farms is for crops) makes any conclusions difficult here too. But it seems probable that capital intensity per cropped hectare increases at the largest farm sizes.[1]

The overall picture of factor use for crops by farm size is, then, the following. Labor inputs per cropped hectare are much higher on the smaller farms. Capital per cropped hectare is higher for some traditional types of capital (e.g., plantations) and lower for other modern types (machinery, irrigation).[2] For all capital, it is not clear how the ratio moves; a best guess is that it is not too far from being constant. Yet, due to the superior technology available on the

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[1] Irrigation works are sometimes constructed by the public sector; although the investment does not then represent an outlay for the farmer, it affects his output potential in the same way as if he had done the construction. If we generalize a little farther, it is clear that roads likewise are a form of social infrastructure which make a farm potentially more productive. It is difficult to know where the line should be drawn, and depends on the type of analysis being carried out.

[2] The situation thus bears out the argument of Theodore Schultz, (Transforming Traditional Agriculture, Yale University Press, New Haven, 1964), that in "traditional" agriculture the farmer may well insist quite heavily on traditional inputs; what distinguishes modern from traditional agriculture is not the amount of investment per unit of land or output but the type of investment.

Note also that the forms of investment which the small farmer concentrates on usually involve few purchases of goods or services -- they can be produced by the farmer with his own labor. Concentration on these forms of investment suggests the existence of surplus labor.

large farm, output per cropped hectare is roughly constant, while output per effective cropped hectare may fall but probably not dramatically. The contribution of this superior technology cannot be quantified with the data at hand, though an order of magnitude might be 20 to 50 per cent of the output on the larger farm.

The small-scale farmer has, for a variety of reasons, much less access to the recent technological advances than does the larger scale farmer. Among these are his lack of education, the general scarcity of extension personnel, and the monopolization of the industrial crops by the middle and large-scale farms. The institutions or companies which support these crops control a large amount of the total technical assistance available and the larger scale farmers are in general most ready to receive it.[1] The CIDA study notes that almost none of the family or sub-family sized farms which were interviewed had received a visit from an extension worker. To none of the sub-family farms had come bulletins or periodicals of technical information. In the family sized farms some did receive reviews or other technical information as well as selected seeds. The large-scale farmers who want to use extension workers have little trouble in getting them as a result of their greater knowledge of such services and their social and personal relationship with these people and the tendency of the latter to visit the large farms out of preference.[2] Greater difficulty in obtaining credit also hinders the smaller farmer.

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[1] It is an interesting question, the extent to which the industrial crops, even if they were produced on small or relatively small farms, would be accepted by the large buying firms.

[2] The most active organizations in terms of extension appear to be those specializing in individual crops, such as the Coffee Growers' Federation and the Institute of Cotton Development. In 1962, there were four independent central institutions operating in agricultural extension with more than 200 professional and specialized individuals. CIDA feels that this dispersion of effort is bad; this could be questioned. There has been also a lack of connection between education, research and extension. The formation of the Instituto Colombiano Agro-Pecuario (ICA), in 1962, may help to solve this problem. Income distribution questions aside, it is true that agricultural output can be increased fastest by spreading

Technical change occurs on the small farm too, of course, but is more likely to result from such indirect sources as friends' hearsay, the demonstration effect of seeing something new on a neighbor's farm, etc. The size of the technological gaps between larger and smaller farms would depend in part on the speed of technological change, which is now reasonably rapid in Colombia.

The use of modern inputs such as selected seeds, fertilizers, and other such items is the exception in the majority of small farms although it appears to have been increasing in recent years. (Fertilizer use is, as seen in Table III-29, about as common on small as on large farms; whether this is because of different cropping patterns on the different sized farms is unclear.[1]

Other Disadvantages of the Small Farm

The gap in awareness of new technology is probably the main disadvantage faced by the small farmer. But inaccessibility of new technology may be very important as well.[2] In Colombia, the difference in degree of mechanization between the small farmer and the large-scale commercial farmer is probably due to the different availability of investable funds or different possiblities for the use of machinery on different sized farms rather than to different awareness of techniques.

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[1] The commercial farms present a somewhat confusing picture in terms of their internal efficiency and in terms of their welfare implications. They use modern machinery, fertilizers and other chemical products, selected seeds and even aerial fumigation of the cotton and rice fields. The use of machinery may be inefficient from the social point of view as it is very labor saving. The application of chemicals is often done without detailed technical knowledge and such practices as the use of green fertilizer and crop rotation are almost unknown. The lack of these two practices is probably explained by the desire to maximize profits in the short run on the part of these often renting commercial farmers. The lack of detailed knowledge on which chemical inputs to use is a different matter, and seems to be inconsistent with the general attempt to maximize profits. The application of the modern inputs seems in most cases to be more or less mechanical, and not yet based on calculations of marginal returns.

[2] In practice the two are often hard to distinguish. Even conceptually they fade into each other; it may not pay a farmer to try to keep abreast of new developments if for some reason he would be unable to put them into practice anyway.

And even with respect to the use of improved varieties and chemical fertilizers, items often considered to be the hallmarks of modern technology, the problem may be one of inaccessibility rather than lack of knowledge on the part of the farmer. The bias of the credit system against the small farmer, especially against the one who does not own his land, is well known. Perhaps less frequently realized is the inability of the distribution system to provide the small farmer with such inputs as fertilizer and new seeds in small quantities at a reasonable price. On the selling side, the same inefficiencies of small scale trading prevent the little man from receiving as good a price as does the big man.[1]

There is still no market information service in the reach of the farmer, despite the fact that many farmers do have transistor or other radios. In general price stabilization has proceeded much farther on the commercial type crops then on the typical crop grown by the smaller farm. Among the typical peasant or small farmer crops, only corn, potatoes, and beans have price support programs, and these have virtually no effect due to technical problems and lack of storage. The services furnished to growers on the savannah of Bogota are quite impressive, including the good technical service system, the distribution of seeds and fertilizers, and even renting of machinery. But this is received primarily by the large land holders.

In his analysis of Colombia munifundistas, Grunig distinguishes six types of munifundistas.[1] These are subsistence level campesinos, apathetic campesinos, non-innovative coffee growers, frustrated entrepreneurs, frontier settlers, and entrepreneurs. He regards the first type as most common in Colombia. For this type entrepreneurship is impossible, there is no chance for advancing within the society and few if any opportunities are available. The members of this typology are old, uneducated, and very poor, with age the most important variable in describing the type. (Grunig used Q analyses to organize the typologies.) Risk and uncertainty reduction is the most important decision criteria. "Both percent returned to variable costs and to fixed costs are very high, and return over variable and fixed cost per hectare are both average."

In the four departments from which the sample was taken (Meta, Valle, Caldas, and Boyaca) ownership was high in this group, and landholding small (an average of 2.8 hectares).

At the other extreme the group which Grunig labels "entrepreneurs" generally have fertile soil on flat land, produce an intensive crop which brings high returns per unit of land; nearly all the beneficiaries of agrarian reform programs fall into this category. (Grunig feel that agrarian reform efforts have not led yet to the success of this type but rather that a success of the type has made it eligible for agrarian reform benefits.) This is the most entrepreneurial group. They do not have a great deal of land (4.2 hectares on average). They are

[1] James E. Grunig, "Economic Decisionmaking and Entrepreneurship Among Colombian Munifundistas" InterAmerican Economic Affairs, ...

usually young, fairly well educated, and literate. They are favored with a stable market, modern transportation facilities, ample credit, technical assistance with credit, information from authoritative sources, etc. A group entitled "Frustrated entrepreneurs" were quite literate and second only to the entrepreneurs in level of education, had the highest level of aspirations and achievement motivation but had too many limitations, in particular a small amount of land (average 2.3 hectares) few alternative credit sources, tendency to use private credit and general difficulty in obtaining it, low market stability and low exposure to authorative information and technical assistance received with credit though they tend to be high adopters and to feel information is relevant.

The group called "non-innovative coffee growers" are quite interesting in that they are well below average on literacy, average on level of education, and highest on "ignoraat habit decision behavior", low on adoption yet have the highest total income over variable costs and only slightly investible income over the total cost than the entrepreneurs. But the group selected had a lot of land (10.4 hectares) so the total figures for them are not so relevant. Still their income minus total cost per hectare figure was second last and income as variable costs third highest. But these figures also are not too significant because of the total size difference. In a sense they substitute land for capital. They do not have modern transportation or good access to roads and use little credit. Essentially they are in a stable situation of a Schultzian type.

The frontier settlements with an average landholding 37.5 hectares and with ample supervised credit from incora tended to farm rather extensively and reach the moderately high level of total income. NEither land nor capital were being used efficiently until the income could be increased considerably. But markets development is well below average although the availability of technical assistance

The problem with one set of munifundistas is that since their own initiative in the past has not had much reward, they have become apathetic and fatalistic. Among the younger and better educated ones there is no general feeling among the investigators that they are unduly risk averse or that their attitudes are not conducive to rational planning. It is generally believed that small farmers are better planners in the ex post sense than are large farmers. Among the latifundistas certainly one part of the problem is lack of incentive to be good farmers--not necessarily a lack of incentive to make more money, other things being equal, but lack of incentive to give up the things that would be necessary--i.e., give up substantial part of the urban residence, etc. On balance one would probably have to conclude that attitudes of farmers would not be much a problem if appropriate structural changes were brought about.

Estimates of Static Loss Through the Use of Different Factor Proportions on Different Sized Farms

The use of different factor proportions on different farms implies inefficiency in the Colombian context. But it is not possible, without much more information than is available, to do more than perform the hypothetical experiment of asking

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[1] This problem affects the farmer's income but not the value of output produced as we have defined it so far, assuming the same price for each product regardless of where produced and to whom sold.

how much greater output would currently be if historically the distribution of land had been even, but none of the other results of such equality (such as higher or lower investment in the past) had occurred. This would give an overestimate of the increase in output (if it would be an increase at all) which would occur in the short run if large-scale land redistribution took place, since considerable costs of transition would be sustained. (On the other hand, redistribution could lead to greater investment so that the discounted value of all increases in output, present and future, might be very large--but this is a separate question.) While this experiment is clearly artificial it still has conceptual interest.[1]

The higher labor to land ratio on the smaller sized farms presumably implies a lower marginal product of labor on these farms, and certainly a lower average productivity of labor. Average output per man is probably ten to twenty times as high on the largest farm category defined by CIDA as on the sub-family farm category (see Table IV-10). This is the widest range prevailing in any of the five countries for which CIDA calculated this particular statistic.[2] The increase in output which could be achieved by shifting laborers around, assuming that there were no changes in incentives going along with the process, would depend on the relative marginal productivities of labor on the various sized farms. With the just mentioned differences in average productivity, it is hard to believe that there is not a significant difference in the marginal productivity also.

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[1] A further confusion in such an experiment involves the fact that different sized farms have different technological levels, i.e., different production functions. A redistribution of land as a result of which each man could produce according to the current (pre-redistribution) technological level of the land to which he moved would lead to an increased output both because of the equalization of factor proportions on different farms and because of an improvement in the average level of technology used.

[2] See Barraclough, Solon L. Agricultural Policy and Land Reform, Conference of key problems of Economic Policy in Latin America, The University of Chicago, November, 1966, pp. 64-65. The CIDA estimate suggested relative average productivities of ten to one. But some of the figures underlying the calculations are seriously off, so an alternative calculation was made by the author.

Evidence on the Marginal Productivity of Labor for Farms of Different Sizes

The marginal productivity on the smallest farms in some regions of the country is very likely zero. A quote from Barraclough is instructive in this connection:

> The one resource most small peasant producers have in abundance is labor. Underemployment is prevalent The ICAD studies estimated that on the average from one-fifth to one-third of the available labor supply is underemployed in the sense that the same output could be obtained with existing techniques and capital but less labor if work organization were improved. Contrary conclusions of some economists who have looked at the employment problem are not at all persuasive. Busy-work expands to occupy available time. Peasants are seldom found sitting idle, but this does not mean that through reorganization of farm activities, the same work could not be accomplished with fewer people--even after taking account of seasonal peak demands for labor. Examples are cited of production falling when peasants leave their parcels to work on a road or construction project, but these prove nothing about the degree of underemployment. Outside jobs increase family incomes far above anything experienced in the past, making it unnecessary to continue cultivation with the same intensity as before. Also, the area sown to subsistence crops tends to be geared to family consumption needs: if the number of consumers decreases, the immediate response is likely to be less production irrespective of the available supply of inexpensive labor.[1]

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[1] The notion that there is widespread peasant underemployment is criticized by T.W. Schultz in Transforming Traditional Agriculture, op. cit. Schultz defines the "labor of zero value" to exclude any possibility of changing work organization. This makes disguised unemployment practically a definitional impossibility. In practice, many producers organize their production as though labor had little real cost. For them, there are no alternative employment alternatives. In addition, wide distribution of the available work is an accepted means of dividing the produce among those who must consume it to live. The author has watched many harvesting operations of this kind where the work could have been accomplished easily with only a fraction of the people employed but where dividing the work among many workers was the social mechanism for assuring a distribution of the harvest. This can be visualized theoretically either as operating with a less "efficient" production function than the best one at the command of the enterprise with existing techniques, or as simply operating at a point well below the surface of the production function with existing techniques and knowledge.

If we accept the fact that the marginal productivity is in some meaningful sense equal to zero in some regions of the country,[1] it remains to determine what it is on the large size farms,[2] and how rapidly it diminishes with increases in the labor-land ratio.[3] If it were true that the large-scale farmer were a true profit maximizer, then the marginal productivity of labor on these farms would be equal to the wage rate paid on them, i.e., rather low. But there are many reasons for believing that this is not the case. Among these is the fact the large-scale landowner is typically sufficiently wealthy that maximizing income is not very important to him; thus maximization would usually involve staying on the farm, and devoting his time to running it efficiently; this is inconsistent with the preference patterns of many large land holders, who prefer to live in the city and delegate

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[1] An example of such a region would be the municipio of Fredonia in Antioquia where, according to CIDA, there is a very high degree of underemployment of family labor in the farms of less than 1 hectare.

[2] To the extent that we interest ourselves in the actual results of a reallocation of labor we would also be interested in the extent people could actually be moved from one region to another, either to work on large size farms if this were possible or to take over the management of plots which are now in the form of large size farms.

[3] If the optimal technology on a large scale farm for some reason implied rapidly diminished marginal productivity of labor, then gains from shifting of labor would be lower. MP_L probably does diminish rapidly for some types of agriculture but not for all. In the coffee region of Fredonia, CIDA notes that the utilization of labor does not decrease very much between family size and multi-family size farmers, even though the latter do not dedicate their whole land to coffee. They suggest that this might be due to the fact that the technological level is higher in the larger farms than in the smaller ones.

the farm management. The manager is often technically backward, and the land is usually farmed in a very extensive unproductive way. And even were it not for these important problems of incentives, one could conclude that too few laborers would be used on the large-scale farms, since the use of large-scale machinery has been subsidized (by importation at an exchange rate below an equilibrium rate) and is often encouraged by the prestige factor attached to it. To add to this distortion is the fact that landlords are probably averse to hiring a great deal of labor due to the fear of labor problems, the fear that the laborers would attain squatters' rights and create difficulties, etc. All these factors joined together suggest very strongly that the marginal productivity of labor on the larger farms would be well above the going wage rate, given a certain amount of reorganization of production, (primarily a decrease in pasture and an increase in cropped land) etc. Such a reorganization would probably imply the use of less machinery than is now used, although this is not clear.

While it cannot be conclusive by itself, estimates of the labor input per hectare for different farm sizes can be very instructive. Figures for the country as a whole are highly suggestive (see Table A-114; even more convincing are comparisons of labor inputs by farm size in specific regions of the country.[1] CIDA has made a number of such estimates for various regions in the country[2] with results sufficiently uniform to suggest that they are general. The first conclusion is that labor used decreases very rapidly with increasing farm size. This is illustrated for municipios in a variety of different regions of the country.

The most dramatic variation as farm

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[1] Such comparisons diminish the likelihood that country-wide differences are based on the coincidence that different cropping patterns and different farm sizes go together by region.

[2] See CIDA, op. cit., page 146 and on.

size increases occurs in the cattle regions of the coast where farms less than three hectares average 1.3 fixed workers per farm or about the same amount per hectare, while the farms in the range 500 to 2,500 hectares average only 5.5 fixed workers per farm, and 0.006 per hectare.

The tables in question, as well as interpretations of them point out the relative importance of occasional salaried labor on farms of all sizes, and in particular the high ratio of seasonal workers on the large farms to permanent workers. The implications of this seasonality for lost output potential are not clear. It can indicate unemployment during much of the year, but not necessarily; it has been noted that due to the different seasons of various operations in different regions not too far separated geographically, it is possible for a worker to move from one region to another and be occupied a large part of the time. Exactly how much of the time is not known.[1] Presumably, there is some output loss, since the opportunity on the part of the owner to hire and dismiss easily may relieve him of the bother of finding something at least somewhat productive for the otherwise unemployed labor to do.[2] Nevertheless, the marginal productivity of

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[1] CIDA notes that migration of labor was very marked in Valledupar, where there were regular flows going as far as Venezuela. The appendix tables cited above include figures on seasonal labor, although they are not definitive since they indicate only the maximum number of laborers used at a given time, and not the percentage of total man hours hired from seasonal workers as opposed to fixed labor.

[2] The insecurity involved for the seasonal worker is quite high. An extreme case, noted by CIDA (p. 155), was in the municipio of Armero, where only 2 of 10 large farms studied used less than 50 per cent of total labor input in the form of seasonal labor. Another extreme case was that of a renter with 120 hectares who employed 95 per cent of all the labor he used during the months of April and August. CIDA suggests that such a seasonality of demand is in part a result of the mechanization of some of the operations; in the case of cotton almost all of the operations except the harvest have been mechanized. Thus, there is no demand for labor during the other periods. Another apparent effect of the introduction of industrial crops under current systems of management has been a proletization of the campesinos in these zones: many of the current occasional workers were originally small operators, owners, or sharecroppers with diversified farms. In the three municipios of Armero, Campoalegre, and Saldaña, of the 28 large farms studied, two-thirds of the labor

(footnote continued on following page)

a worker probably does vary a great deal according to the season, even if an attempt is made to allocate labor effectively over the year. The study by Montoya in the region of Roldanillo-la Union-Toro indicated that a relatively high amount of salaried work was necessary even on small farms where members of the family had a total number of man-days available much greater than would be needed.

One can only guess at the total "static waste" implied by this maldistribution of land.[1] Assume a redistribution of labor to the point where the labor/effective hectare ratio is constant. If we could assume that the capital/effective hectare ratio were originally constant over farm sizes, we could then assume that the output per effective hectare for the country after the redistribution would be that of the farm size which currently has a labor/effective hectare ratio equal to the national average. The same result would pertain if capital were mobile so that it also could be evenly distributed over the effective land, and if the farm size with the average labor/effective hectare ratio also had the average capital/effective hectare ratio. Since a redistribution of capital over the land could not occur, the conceptual estimation of loss is a little more problematic in this case. Still it appears that the assumption of an

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(footnote continued from preceding page)

employed was seasonal. Another aspect of the uncertainty connected with these particular regions, was that on occasion the land reverts back from crop growing to something else, and even the seasonal demand suddenly disappears. As a result of the agrarian reform law which treats renting as proof of inadequate use of the land, a commercial renter was no longer able to cultivate a plot and therefore had to fire all the workers, as the owner decided to convert the land back into pasture.

[1] We use the term "static waste" here to distinguish two parts of the increase in output which could result from better land distribution. One would be essentially a short-term gain resulting from the fact that if the labor were better distributed over the land, output would go up, because of more even factor proportions, and because the small-scale farmer would tend to be more of a profit maximizer than the large-scale farmer. But a distinct form of increasing output, which would occur in subsequent periods, would result from the fact that the average investment coefficient would probably rise with redistribution of land, since the currently impoverished farmer would at that time be in a position to reinvest more of his

average output per hectare equal to that currently obtained on that farm size which has the average labor/effective hectare for the economy is, if anything, biased down, since the capital/effective hectare ratio on the farm size with the average labor/effective hectare ratio is probably below the country average. Depending on the specific assumptions as to the distribution of effective land among different farm sizes and the distribution of employed people by farm size our estimates of this waste range between 30 and 40 per cent of current output. This calculation is independent of whether in fact labor surplus now exists on the smaller farms; after the redistribution of labor it would presumably no longer exist.

Land Tenure in Other Latin American Countries Compared to that in Colombia

Lack of the appropriate statistics make tenuous any comparison between the Colombian land tenure situation and that of other underdeveloped countries, even those in Latin America. An uneven distribution of land and other usually related defects in the tenure system have two major effects--an unequal distribution of agricultural income (always), and a smaller total output than could be obtained (usually). Implications for income distribution do, however, depend very much on the wage rate at which the small scale farmer can find work off his own plot. Thus, one might have one country with many small scale operators who were better off (because they could supplement the incomes from their own farms) than those in another country who, although having more land had no recourse to alternative opportunities.[1]

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[1] In general one would expect these outside opportunities to be the greater,

1. the greater the land/man ratio in the agricultural sector. More land implies a higher marginal productivity of land on the larger farms.
2. the greater the difficulty in mechanizing the production of the crops grown on the large-scale farms.

To provide a fairly adequate picture of income distribution within agriculture, information on wage rates is, therefore, a necessary supplement to data on distribution of land. One would expect a relationship between the agricultural wage on larger farms and the net income of the owner-operator, though it might not be a simple one.[1] Since wage rate data by country is not available to me, a comparison between Colombia and other Latin American countries must rely on the land distribution figures alone. Table IV-22 from CIDA suggests that Colombia is at neither extreme in relation to a group of Latin American countries studied. Though, by its own admission, CIDA's methodology was dubious, its ranking of the percent of agrarian families falling in the "inferior" status is probably valid to the extent of placing Ecuador and Guatemala below Colombia and Argentina

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[1] The latter would be greater in a very simple economy where land had no value apart from its direct productive capacity; the owner operator's income would exceed that of the landless worker by the rent of his own land (and management). But this relationship could be disturbed by a bias of large owners against hiring labor. If their demand was very low compared to the supply of landless farmers, income of the latter group could be much the smaller of the two. In a sense this would imply that the marginal productivity of owning enough land to employ oneself was extremely high so one could say that the income of the small owner-operator was high due to a very high imputed rent. Regardless of the theoretical interpretation, the two incomes could differ widely.

It could occur, on the other hand, that the landless worker might earn more than the owner-operator due to the latter's preference to work his own soil and have the added security of ownership. For whatever psychological reasons, some believe that this phenomenon occurs on occasion.

A final source of difference between the two incomes under consideration could be the existence of differing incomes in different regions. A decent agricultural wage and ease of employment in one region may not imply a decent situation for the small owner-operator in another region.

Table IV - 22

Distribution of the Farming Families According to Their Socio-economic Status in the Selected Countries for the CIDA Study[a]

	Argentina (1960)	Brazil (1950)	Chile (1950)	Colombia (1960)	Ecuador (1960)	Guatemala (1950)
Thousands of farming families	786.6	5404.2	344.9	1368.8	440.0	417.4
Farming families status			(percent)			
Total superior status	5.2	14.6	9.5	5.0	2.4	1.6
Operators of large size farms	0.4	1.8	3.0	1.1	0.3	0.1
Operators of middle size farms	4.8	12.8	6.5	3.9	2.1	1.5
Total medium status	33.9	17.0	19.8	24.8	9.5	10.0
Administrators of large and middle size farms	1.3	2.1	2.1	1.5	-	2.2
Proprietors of family farms	16.4	12.0	14.8	17.9	8.0	6.6
Operators, not proprietors, of family farms	16.2	2.9	2.9	5.4	1.5	1.2
Total inferior status	60.9	68.4	70.7	70.2	88.1	88.4
Proprietors in co-ops	-	-	16.6	-	1.3	-
Operators of sub-family farms	25.9	8.6	6.5	47.0	52.3	63.6
Farmers without land	35.0	59.8	47.6	23.2	34.5	24.8

[a] According to CIDA, this data overestimates the numerical importance of both superior and medium status, while they underestimate those of the inferior status. A considerable number of the operators of the middle size farms would never be accepted as superior status and half or more of the operators of family farms differ from the sociological viewpoint only, to those of sub-family farms who merely have a little less land."

Source: Barraclough and Domike, op. cit., p. 242.

above.[1] Colombia's high share of "middle status" farmers is due to the presence of coffee. This table lumps the landless workers together with those having very little land, Colombia's relative position, especially vis a vis Chile, improving as a result. Colombia has 64 per cent of all plots listed as sub-family, but has a much smaller proportion of landless workers to the total agricultural labor force than does Chile.[2]

Colombia, according to CIDA figures, has a higher per cent of agricultural output produced on family and subfamily plots than any of the other countries considered.. Only Argentina (slightly) surpasses it in the share of output from family plots and only Guatemala and Ecuador from sub-family plots (see Table IV-23). A similarly high ratio of agricultural labor is employed on these medium and small plots.[3]

In three of the six countries compared in Table IV-23 output per cultivated hectare was substantially smaller on the larger farms than the smaller ones; these were Chile (most dramatically) and Brazil and Argentina. Colombia, Ecuador and Guatemala did not have this characteristic. Output per worker was, of course, always higher on the larger scale farms but did not increase nearly as rapidly in Chile as in Colombia (where the range was widest of all the countries). It

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[1] Unfortunately, CIDA has not used a definition of sub-family plots which makes for a really meaningful comparison. The definition used was "plots too small to satisfy the basic needs of a family according to the local standards, as well as to provide remunerative employment of two man years at the prevailing technological level." It is true that the psychological standard of living may be assumed to depend on one's material standard relative to his neighbors, so it is not clear how serious the above problem is.

[2] This was partly an illusion based on the fact that the Colombia census included as operators some very small renters or share croppers who in Chile were classified as workers.

[3] It must be borne in mind that the figures for the countries compared here are not based on censuses of the same year so fine comparisons at a point of time are not possible.

Table IV - 23

Relationships among the Agricultural Production Value and Agricultural Land; and Cultivated Land and Agricultural Force According to Size in Selected Countries for the CIDA Study [a]

Countries and Farm size Categories	Percent of Totals in each country			Index of production value: Value of subfamily farms equal to 100		
	Agricultural land	Agricultural force	Production value	Per hectare of agricultural land	Per hectare of cultivated land	Per farmer
Argentina (1960)						
Sub-family	3	30	12	100	100	100
Family	46	49	47	30	50	250
Medium multifamily	15	15	26	50	62	470
Large multifamily	36	6	15	12	49	620
Total	100	100	100	30	57	260
Brazil (1950)						
Sub-family	0	11	3	100	100	100
Family	6	26	18	59	80	290
Medium multifamily	34	42	43	24	53	420
Large multifamily	60	21	36	11	42	690
Total	100	100	100	19	52	410
Colombia (1960)						
Sub-family	5	58	21	100	100	100
Family	25	31	45	48	90	418
Medium multifamily	25	7	19	19	84	753
Large multifamily	45	4	15	9	80	995
Total	100	100	100	26	90	281
Chile (1955)						
Sub-family	0	13	4	100	100	100
Family	8	28	16	14	32	170
Medium multifamily	13	21	23	12	25	310
Large multifamily	79	38	57	5	21	440
Total	100	100	100	7	24	290
Ecuador (1954)						
Sub-family	20	c	26	100	100	c
Family	19		33	85	110	
Medium multifamily	19		22	54	110	
Large multifamily	42		19	37	93	
Total	100		100	54	103	
Guatemala (1950)						
Sub-family	15	68	30	100	100	100
Family	13	13	13	56	80	220
Medium multifamily	32	12	36	54	122	670
Large multifamily	40	7	21	25	83	710
Total	100	100	100	48	98	220

[a] Net value of agricultural production with the exception of Argentina, where the figures correspond to the aggregate value.

[c] Data not available.

Source: Barraclough and Domike, op. cit., p.248.

would be of value to know whether these differences in the relative performances of farms of different sizes are due to different crop structures or to relatively larger modern big scale farming in some countries than in others.

Colombia's special situation is nicely summarized in the fact that, while output per hectare of cultivated land is about as great on large farms as on small ones, output per hectare of "agricultural land" falls very rapidly as size increases, the fall being exceeded only by that in Chile.[1] The widespread extensive cattle raising with low output per acre which has been referred to earlier is responsible for this phenomenon.

A comparison of developments implying more or less progress in the solution of agrarian problems is of interest. The rate of population growth in Colombia (about 2.9 per cent) is among the faster ones in Latin America and CIDA's estimates of rate of growth of rural population put it toward the slower end (only Argentina and Chile growing slower). The agricultural sector of Colombia is (along with Ecuador's and Guatemala's) the most important in terms of share in gross domestic product. The growth of agricultural output in the period 1952-1960 was about average. Figures are given below in Table IV-24.

A fast growth of agricultural output and slow growth of agricultural labor force augur well for income per person. The slow growth of the labor force is aided by fast rural to urban migration. Comparative figures for these three variables are shown in Table IV-24. Colombia's situation with respect to growth of output and of rural population tends to be about the average for the seven countries considered.

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[1] Note that my revisions of the CIDA figures to allow for differing land quality suggested that output per hectare fell considerably less rapidly with farm size than indicated by the CIDA figures. Similar quality differences may or may not be present with other countries, so an adequate comparison cannot really be made.

Table IV - 24

Comparative Figures on Output and Labor Force Change in Agriculture;

Selected Latin American Countries

	Rate of Growth of Agricultural Output 1950-1960 (1)	Growth in More Recent Periods (2)	Rate of Growth of Rural Population (3)	Estimated Rate of Growth 1960-1970 (CIDA) (4)	Rate of Growth of Urban Population 1950-1960 (5)	Rural to Urban Migration in 1950-1960 as a percent of Rural Population in 1950 (6)
Argentina	1.8	-1.0	-0.40	1.0	3.0	24.9
Brazil	4.4	4.3	1.11	1.5	5.5	19.0
Chile	1.1	-2.4	-0.07	0.5	4.0	29.0
Colombia	3.1	2.5	1.0	1.0	5.4	16.6
Ecuador	4.1	5.3	2.0	2.0	4.5	17.0
Guatemala	2.7	5.8	2.1	2.1	3.4	3.6
Peru	3.0	6.4	1.5	1.5	4.6	13.6

50-1959.

Sources and Methodology:

Columns (1) and (2) are derived from United Nations, Boletin Estadistica de America Latina, Vol. 11, No. 1,

Cols. (3), (4) and (5) are based on the figures of Table A-82. Col. (6) is from Table A-86.

The negative growth of rural population in Argentina and in Chile in the decade of the 1950's resulted from an emigration of a very large proportion of the agricultural population, but since these countries were already relatively highly urbanized, this did not lead to unduly rapid rates of increase of the urban populations. Brazil and Colombia had modest growth of the rural population (about one per cent) but, as they were less urbanized than the two just mentioned, this implied very rapid rates of urban growth (about 5.5 per cent). The other three countries had slower rates of urban growth and faster rates of rural growth.

The land tenure situation of Colombia is not the worst in Latin America, but it is bad. Most of the land (even after adjusting for quality differences) is held in large farms, and most of the farm families have less than three hectares of land. The implications of this uneven distribution of land for income distribution need little elaboration - the condition of small owners and renters and of landless farmers in such poor departments as Nariño, Boyaca, and Cauca is very dismal indeed.

Land use differs substantially by farm size; by far the most significant difference lies in the fact that the per cent of usable land which is cropped decreases rapidly with farm size - pasture land predominates on large size farms. How great an inefficiency this implies depends primarily on whether the land on the large farms is of sufficient quality to be cropped. A reasonable amount of it is, as judged by the comments of many observers. If quality were adequately reflected in the assessed value per hectare of land in different farm sizes, one would conclude that value of output per "effective hectare" did not fall substantially with farm size. In fact the assessments on large farms are biased

downward more than those on small farms, so after allowance is made for this, one might guess that value of output per effective hectare is between one quarter and one half as high on the largest farms (above 500 hectares) as on the smallest ones (below 5 hectares). A substantial increase in output could be expected to result from redistribution of this land. The presence of this loss of potential output is a result of the failure of large scale farmers to maximize profits. A variety of possible explanations have been proposed for their behaviour, such as low need for added income, strong preference against living in the country, etc.

Output per cropped hectare (fallow excluded) probably rises with farm size due to higher yields on the larger farms. Labor applied is greater on the small farms but it is probably more than offset by greater use of machinery and superior technology on the larger farms.

From an output maximizing point of view there are, thus, two major inefficiencies in Colombian agriculture. When land is held in large plots, too much of it is put in relatively unproductive pasture, and when it is held in small plots the farmer is unable to obtain adequate levels of technology. Some possible policies to deal with these problems will be considered in Chapter 8.

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Chapter V

The Institutional Setting for Agricultural Development

Part I: Introduction

In the previous chapters we have considered the relative importance of some broadly defined determinants of the level and growth of agricultural output. We attempted to sort out the relevant importance of the growth of land in use, the labor force, the capital stock, and other factors (the "residual"); to some extent we tried to decompose this residual, and to some extent too we tried to go behind the process of capital formation, to locate the key determinants of investments. In the preceding chapter we discussed the overall implications of land distribution for output level, growth, and income distribution. In all of these matters both public policy and other elements of the institutional setting has impinged one way or another; in this chapter we discuss the public sector in agriculture, summarizing some of the previous discussions of land policy, etc. bringing in other lines of government policy, and attempting to explain why public policy has taken the direction it has. We also review certain other institutional factors which have probably been important in promoting or retarding development, e.g., the producer organizations for certain crops, accion communal, etc. The final section of the chapter deals with marketing, an important part of the institutional setting for agriculture, and one whose characteristics and contributions (or lack of them) tend to enter popular mythology in a particularly stereotyped fashion. In Colombia, as in many other countries, the marketing systems, in particular various groups of middle men, are frequently

criticized as being monopolists and, in general, obstacles to successful development. And, again as in most other countries, it seems obvious that the role of the middle man in Colombia has not been as negative as frequently suggested; on the other hand, there are obvious weaknesses in the system. Whether these weaknesses are sufficiently important and subject to treatment to make emphasis on improving the market system a priority field in agriculture is the issue for which we try to lay some groundwork in the last part of the Chapter.

The public involvement in agricultural development as a whole over the last 40 years or so has been lethargic and unsatisfactory, reflecting a general lack of interest in the country's rural population, and a relative disinterest in agricultural development. The latter phenomenon has characterized many developing countries, due partly to a misinterpretation of the observable correlation between industrialization and high incomes as a fairly simple causal relationship; they have thus been tempted into an underemphasis on the agricultural sector.[1]

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1. The strong adherence to the prevailing concept linking modernization and progress of the economy with industrialization probably dates from the depression years, and since then through tariff policy, exchange policy and a variety of other policies the industrial sector has been favored. The wisdom of the policy, at least in the extreme way in which it has been carried out in the last 10 years or so, is doubtful.

Historically, the role of the Colombian government has, then, been a weak one. Among its relative successes are the fostering of the Caja Agraria (Agricultural Credit Bank) to furnish credit to the medium and small farmers, and the collaboration in a research program which has had some payoffs during the last ten or fifteen years. But many of its other efforts have been either too

weak to bear fruit, based on a poor understanding of the problems which needed to be solved, or politically unacceptable to the relatively influential large farmers. It is significant that in Colombia there was no Ministry of Agriculture until 1947. And through most of the succeeding years the personnel in this ministry have been of distinctly inferior quality; the minister has often been a political appointee with no knowledge and little interest in agriculture,[1]

1. A characteristic which, however, does not distinguish Colombia from many other countries.

and the personnel farther down the line have been of the same mold. The total ministry of agriculture budget has usually been two or three per cent of the total national budget . Posada in 1952 summarized the nature of government agricultural policy as "temporary, ill-advised, and fragmented."[2] The adjectives

2. Antonio Posada, Economics of Colombian Agriculture, unpublished dissertation, University of Wisconsin, 1952.

would have to be changed little to describe most of the subsequent period although the last few years have seen a definite increase in the concern for the sector; President Lleras even labelled one year of his government as being primarily directed to the resolution of pressing problems in agriculture.

We shall conclude that the bottlenecks to the development of this sector in Colombia do not lie primarily in lack of physical resources, inability to accumulate capital, or backwardness of the peasants, but more in the combined defect of an unfortunate initial distribution of land, and a monumental governmental disinterest in agriculture and the majority of the people in it which has reflected itself in inadequate public services such as roads, education, extension, and so on. Hence further details on the government's role are of interest.

In explaining the past development of the agricultural sector it is, unfortunately, true that one need not consider the government's role in great detail since the creation of new government organizations and agencies appears not to have been a key factor in increasing agricultural output. Some individual organizations have been important in specific spheres, institutional change along certain lines (for example gradual improvements in markets) may have been quantitatively important (but because of the difficulty in observing and measuring it the analysis of it is difficult), and some of the institutional and government policy changes in recent years may have important implications for agricultural productivity and output in the future. But it remains true that the institutional setup within which Colombian agriculture operates is very inadequate--so much so that the changes which might most improve the sector's performance are of an institutional and not a technical nature. Since the institutional structure has undergone very limited change up to fairly recent years, it has not figured importantly in our analysis of changing agricultural output and distribution.

Why has the public sector done so little in the field of agricultural development despite a slow rate of output growth and a secular increase in prices? The reasons (at least some of them) seem deeply embedded in the country's history, and have been important in other countries of South America as well. The growth of agriculture has been slow in most of the Latin American economies during this century; Colombia, with an average output growth of about 3 per cent over the last 40 years, is somewhere around the mean for the continent.

One obvious hypothesis in explaining this retardation is that small, urban-oriented oligarchies have dominated politics and society in most of these countries, and have owned much of the land. "That Spanish cultures have tended to be urban-oriented is evidenced in a variety of ways, including the manner in which new settlements were laid out during colonization. While land owning is highly prestigous, many of the traditional latifundistas have spent most of their time in the city (or abroad). They do not send their children to school in the rural areas or even the small towns. The fact that they have tended to live in the town, and sometimes have had sufficiently large incomes as to be unconcerned with adding further to them, has reduced their interest in pressuring the government to build roads, carry out research, etc."[1]

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1. Albert Berry "Some Implications of Elitist Rule for Economic Development in Colombia," in Gustav Ranis (editor), Government and Economic Development, forthcoming from Yale University Press.

"As time went on some of the large-scale landowners in Colombia came also to have commercial and industrial interests, leading to an ambiguity in the way they pressured the government to distribute its expenditures and favors as between agriculture and other sectors. Meanwhile, the bulk of the agricultural population, being quite poor, has been both physically and culturally unable to make serious claims on the government and the society. Culturally this is so due to the maintenance (gradually in diminishing degree) of the traditional patron-client relationship whereby the small-scale farmer often approached a state of serfdom. Physically it is difficult because of the geographic dispersion of the farm population; political action is much easier for an urban proletariat than for a rural proletariat, especially in a country with Colombia's

terrain. Rural unrest there has been, culminating in the extensive violence of the mid-40's to mid-50's; but although this violence demonstrated that all was not well in the countryside, it was correctly interpreted by the oligarchs as not being a class movement but rather a manifestation in the lower levels of society of the traditional hatred between Colombia's two political parties. As such, it did not generate then, and has still not generated, a political force which might make its voice felt on behalf of the small farmer or agricultural worker. It is not surprising that both the national and the departmental governments (dominated by people who live in the city, and even though they may have a rural base have a sufficiently high total income and wealth as not to be particularly worried about their agricultural incomes) should put little emphasis on agriculture. Although the influence of local people is much greater in the municipal governments, they are in the hands of the better off, more interested in municipal monuments than anything useful, and are in any case very outmoded and inefficient organisms for getting anything done. The degree of inefficiency and built-in lack of interest in doing anything which might help the small farmer is so severe that the juntas de Accion Communal have developed largely as an institution for doing what the municipal governments should have been doing all along. Those levels of government which have had more funds at their command have been particularly uninterested in the agricultural sector, while the municipal governments, which are at least closer to some of the rural problems, have been so inefficient that they have not acquired even the funds available in their own areas, and probably would have misued them if they had obtained them. The relative success of the Accion Comunal juntas indicates that even without really tapping the wealth of the better off local dwellers much could be done just with better organizational conditions.

"The situation, therefore, is one in which land has been very unequally distributed and the government has not had an aggressive policy to promote agricultural output. Each of these aspects has its implications. Comparisons with other countries suggest rather convincingly that if land distribution had been more even from the start, there would have been more widespread rural education, more widespread generation of entrepreneurial talents and acceptance of new modes of farming, etc. The lack of initiative, both individual and cooperative, in the rural sector is certainly due in considerable measure to the patron-client relationship which has always characterized that sector."

Even given the non-optimal structure of land tenure and ownership as fixed, the government's lack of interest has, as we document in other parts of this study, doubtless led to the missing of some of the potentially most productive investment for the economy as a whole.

The above comments should not suggest that agriculture (in particular large scale agriculture) has not been represented by powerful pressure groups on occasion. Although, as of 1961, the Sociedad de Agricultures de Colombia (an organization composed primarily of large scale farmers) was unable to prevent the adoption of the Agrarian Reform Act, it, in conjunction with other groups, put up a strong battle, indicating a blocking power which has been manifest since then as well. The fact that the government has not been more significantly involved in the sector has resulted also from the fact that many of the things the large farmers (with some political power) have wanted, have not required much government intervention. Many large scale farmers have traditionally been cattle ranchers not living on the farm. Hence schools, roads, medical facilities and so on in the

rural areas have not been crucial to them. Nor have good supply systems for inputs. Such contributions as easy credit terms, subsidized machinery imports, and little or no need to pay taxes are favors of little cost or effort to the Ministry of Agriculture, and requiring no well planned or large overall program. In short, to farm the way he has wanted to, the large scale farmer (especially the cattle rancher, and in lesser degree the commercial crop farmer) has not needed the publicly supplied rural infrastructure that a sector composed of family farmers would have required.

Some of the needs of the large farmers, which in other countries might have been met by the government, have been handled by the private or semi-public organizations (usually concerned with the production of a given crop). Since relatively few farmers may be involved, these organizations are not unduly unwieldy.[1]

1. These developments, as well as the tendency for the large farmers to educate children in the cities, produce cattle rather than crops, and so are clearly in part a result of government inactivity as well as a cause; we argue here, basically, that they have been very important as cause.

The latent political power of private groups is more likely to show itself when a threat arises, such as that of Agrarian Reform, a presumptive income tax on land, etc. Meanwhile the small farmer group which needs public services has, as mentioned above, too little power to demand these from the government.

Although unsatisfactory development of public services and other institutions dealing with agriculture has been perhaps the sector's single biggest problem, this has not been for any lack of institutions; the development has been very ad hoc and diverse. The general characteristic of the most successful ones

is that they have been either pressure groups per se, or groups which although not concerned much with pressuring the government, are defined by a narrow interest (e.g. improving the productivity of one or a few products, one region, etc.), or a combination of the two. In other words the institutions promoting the welfare of one group (with the possibility and sometime certainty that they may be damaging other groups) have been more successful than ones (such as the ministry of agriculture), with broader goals. Hence the great proliferation

The substitution of private or semi-public organizations to carry out services which in other countries would be handled by the government itself is to some extent a natural and desirable reaction to the vacuum left by the government. And it is the reflection in the agricultural sector of a general characteristic of the Colombian political-economic system; the development of organizations, either public or private, with aims broader than the improvement of a well specified and narrowly defined group of people, has been slow. This is not to say that some of the usually private or semi-public agricultural institutions have never achieved things of benefit to the country as a whole, but only that the welfare of the society as a whole, or even that of the agricultural sector, has not been the primary interest , even of the semi-public organizations (where one would expect to see it). This is different at least in degree from the situation in such countries as the United States or Canada, where the relative influence of Ministries of Agriculture is greater, and where these ministries have more integrated programs; research and extension programs are organized and coordinated; distinct institutions are not responsible for each of the series of different services needed by the farmer. One may distinguish two ways in which the situation in

Colombia leads to loss. First, an institution (dealing with a given crop, say) may succeed in achieving goals which are inconsistent with the betterment of the society or even of the agricultural sector as a whole; second, the multiplication of institutions leads to undue duplication of effort, and an even more severe scarcity of high quality personnel than would otherwise have existed.

The above interpretations are general and do not apply with the same validity to the various periods. We now turn to a more detailed consideration of government policy toward agriculture over time.

Part II; A Brief Review of The Changing Lines of Government Policies and Interpretations of the Nature of the "Agricultural Problem"

Within the relatively small overall degree of participation of the government in the agricultural sector, there have been some shifts over time in the nature of that participation, largely due to:

a) shifts in the government's perception of the major problems in the agricultural sector, partly due to changes of government, partly due to a learning process, and partly due to,

b) changes in the political pressure put on the government by various groups for the achievement of certain changes in the sector (usually reacting back on (a) and,

c) changes resulting from a gradual learning process with respect to the potential of various types of government activities within the sector;

d) changes in the amount of funds available, or perceived to be available for use in agriculture.

In the following paragraphs we attempt to summarize briefly some of the shifts and explain them in terms of the above mentioned factors. Since many of the institutions dealing with the agricultural sector are semi-public, and in many cases the initiative for their creation comes more from the private than from the public sector, we will again see that a feature determining the government's participation is the extent to which it is put in situations where it need only react rather than initiating new programs on its own account.

No significant governmental attempt to aid agriculture was in evidence before the 1920's. Herron and Adams[1] suggest that during a period extending roughly from 1924 to 1943 the emphasis was on an attempt to solve the problems

1. Antonio Herron O. and Dale W. Adams Los Organismos de Fomento Agropecuario en Colombia, Centro Interamericano de Reforma Agraria, mimeo, No. 2, preliminary version.

of agricultural credit, the commercialization of coffee and some other important products, and work towards a solution to various social problems through parcelization.

The emphasis on streamlining the process of coffee marketing was a natural reaction to the increasing importance of that crop to the economy and the increasing number of people involved in its production. (The 1920's constituted the last of five decades of very rapid growth of coffee output and the importance of coffee to the economy). The Coffee Growers Federation was founded in 1927, designed to organize and regulate the coffee market, with subsidiary functions such as advertising of Colombian coffee in the exterior, campaigns to improve the quality of the coffee increase storage capacity etc. It was financed

by markups and taxes including a ten centavo per sack tax on coffee exported. It fairly quickly established itself as an institutional power within agriculture, and is now a powerful organization both in its own right and via participation and investment in such other agencies as the Banco Cafetero, the Caja Agraria, etc. The Federation has not given credit directly; it relied on the Caja until 1953, when the Banco Cafetero wqs created. (Of course the Caja still lends for coffee also).

Hirshman[1], like Herron and Adams, believes that low agricultural output was

1. Albert O. HIrshman, Journeys Towards Progress - Chapter 2.

not conceived as the major problem during this period;[2] the unequal distribution of land and income and the more technical problem of commercialization

2. Colombia was a much more rural country at that time, of course. As of 1938 only about 30% of the population lived in centers of more than 1,500 people and 10-12% in centers of more than 100,000. And the relative price of agricultural products was stable during these years. It began to rise sharply in 1944 (see Table II-/8) and the Bogota blue collar cost of living series indicates a sharp rise in the relative price of food for several successive years.

and credit were so considered. Social unrest in the rural areas was increasing during the late 20's and early 30's, presumably partly as a result of the worldwide depression which slowed down the economy as a whole, cut employment on a vareity of public works, and pushed people back from the urban to the rural areas. The nature of Alfonso Lopez' reform government also affected the direction of policy at this time; his was the first government in Colombia in this century which could be credited with a broad social concern for the poorer part of the

population; the major tool he undertook to use was land redistribution via Law 200 of 1936 (to be discussed farther on).[1]

1. One might argue that a government really seriously dedicated to changing income distribution in agriculture is more likely to direct its efforts towards land reform than to other instruments which might work in the same direction, such as credit and especially tax policy. This is not, by any means, to say that a land reform policy is likely to be more effective--only that it is likely to be perceived as being more effective because it attacks the problem directly.

While this early period did have some new steps in agricultural policy, they did not involve heavy public expenditures. One major step (land legislation) was a legal one; and while the government may have subsidized the Caja Agraria, the exhaustive expendiutre on this was certainly not large. As a result, expenditure of the national government in the agricultural sector was typically less than 5 per cent of its total expenditures.[2] (See Table V-2). Still, according

2. Needless to say, these figures do not measure precisely that group of public expenditures which influence agriculture, since such expenditures as those on highways, rural education and so on are also important. (We might want to try to separate out this set of expenditures.) While the series indicate that agriculture is coming in for relatively greater attention during the 1960's, they do not alter the obvious fact that expenditures there remains low relative to the importance of the sector in total production and, more relevantly, to the amount of poverty located there.

to ECLA figures, the public share of investment in agriculture did rise substantially beginning in the late 30's.

Government attitude on the land question differed as between the Lopez administrations (1934-38 and 1942-45) and the others of the period, which were generally conservative; Lopez was radical by the standards of the time, at least in intent.

Table V-2

Indication of Government Involvement in Agriculture

Ministry of Agriculture Expenditures as a share of non-debt Expenditures of the National Government	
1938-9	5.42
1940-4	3.94
1945-9	2.81
1950-4	2.60
1955-9	1.79
1960-4	4.26
1965-	7.89

Source: Table A-301 ✓

The key instrument directed at the land question was Law 200 of 1936, which allowed for reversion to the state of land not fully cultivated during 10 years and required owners to compensate renters at the termination of the contract for improvements made to property. The Instituto Geografico "Agustin Codazzi" was founded in 1935 to begin surveying and mapping of Colombia and to collaborate and aid execution of Law 200 of 1936 by assessments and cadastral surveys. Law 100 of 1944 swung the pendulum back in a variety of respects, in particular making tenants who grew tree crops or perennial without explicit permission subject to immediate eviction, and extending the 10 year period allowed to put land under cultivation to 15 if tenants or sharecroppers were employed to increase the production.

The recognition of the small man's need for credit, institutionalized with the formation of the Caja Agraria in 1931, was also consistent with Lopez' idea of social justice; there was a rapid increase in new loans (in real terms) during the first Lopez administrations; between 1934 and 1938 the increase was more than threefold.[1] After this the growth of the loans tapered off quite rapidly. (The Banco Agricola Hipotecario, founded in 1924 and designed to give credit to the Colombian campesino and engage in colonization, had not had noticeable effects; it began as a dependency of the ministry of national economy, and in 1945 was incorporated into the Caja).

The Caja remains the major public or semi-public source of agricultural credit. It has also engaged in limited colonization and parcelization activities, but ineffectively carried out and with few if any positive results.

1. And it should be noted that as of 1940 the Caja was responsible for more than 60 per cent of all official loans to agriculture. The increase during the Lopez years thus constituted a big increase in all official agricultural credit.

Over the years the Caja has picked up a number of other rather important functions; it renders services in the field of rural construction, imports agricultural machinery and multiplies and distributes improved seeds.

After the first Lopez administration there seems to have been a gradual decline in emphasis on land and income distribution problems. Hirschman[1] characterizes the period from the late 30's or early 40's to the early 60's as one during which government policy was directed primarily at increasing output. He interprets the gradual switch from the land reform emphasis as due to a decrease in the extent of social unrest in the countryside in the late 30's and early 40's. This point is widely debated with many observers feeling that the build-up to the violencia, which hit its peak in the late 40's, was a gradual one.[2] Whatever the impact of rural unrest, it does appear that policy shifted to a greater emphasis on raising output; HIrschman interprets Law 100 of 1944 in this light as well as the various tax proposals of the 1950's.[3] Although he does not do so, it would

1. Hirschman, op. cit. Chap. 2.

2. It is probably necessary to distinguish between the whole complex violencia phenomenon and the sort of unrest directly connected with land problems, and which would presumably be more likely to affect government policy on land issues. Possibly the latter was indeed decreasing, as Hirschman argues, in the late 30's as the economy got moving and even as the violencia pushed people out of the rural areas in the late 40's and early 50's. This is a complicated issue calling for more research.

3. Needless to say these issues are complex and the fact that Currie suggested a tax proposal as an optimal technique for handling the agricultural problems did not imply that he thought the major problem was one of low output. He has consistently interpreted Colombia's problem as to a large extent one of income distribution and employment opportunity.

be plausible to interpret this change as a reaction to the fact that real prices of agricultural products in the cities (at least in Bogota) began to rise rapidly about 1944. But it would also be plausible to interpret it as simply a reversion to the more elitist approach of the pre-Lopez days, disguised in the form of the typical impractical gimickry, fairly well understood by all as not being enforceable.[1] A direct attack via land reform might have been less clearly

1. The proposals, mostly by foreigners, were not interpreted by them in this way, presumably. But what was important was the interpretation of the potentially affected parties in Colombia.

interpretable as not meant to be applied than were such ideas as the 1957 tax proposal, by which different types of land would have been taxed at different rates.

The major new institutions set up in the 1940-60 period were INA (1944) and the Ministry of Agriculture (1947) but a proliferation of other organizations designed to fullfil a wide variety of functions was created.[2] INA was designed

2. Herron and Adams, op. cit. characterize this period of institutionalization as one in which, although attempts were made to group and centralize the agricultural and livestock institutions, what happened was more or less the opposite.

to intervene directly in the agricultural market for the benefit of producers and consumers. In its role as protector of the consumer, it was given the right to import necessary amounts of foods in short supply domestically. Only in 1947 was the Ministry of Agriculture and Livestock created. Some of the functions it took up had previously been handled by the Ministry of Industry and later by

the Ministry of National Economy. Its founding was aimed in part at raising output, and was also a reaction to public opinion on the need to create a ministry for colonization.[1] The ministry's original strategy was to organize all agricultural activities under its direct dependency. But since the government did

1. Salazar, Mardonio, Proceso Historico de la Propiedad en Colombia (Bogota, Editorial ABC, 1948), p. 402, referred to by Herron and Adams, op. cit.

not have the funds, without new taxes, to support such an obligation, it had to revert to a decentralization whereby various institution s were allowed to levy specific taxes on the groups which would receive the benefits from them. Among the institutions so created were several designed to encourage production of a specific crop; the number of these has gradually increased, and for the most part they have continued to be financed by indirect taxes. This group includes the Instituto de Fomento Algodonero, the Instituto de Fomento Tabacalero, the Federacion Nacional de Algodoneros, the Federacion de Cacaoteros, and others. A few organizations have been designed to promote the general development of a particular area, financed by some specific taxes and by domestic and foreign loans. The most famous is the Cauca Valley Corporation; others include Magdalena Valley Corporation and CAR,[2] (concerned with the development of the Sabana de Bogota and nearby areas).

A third new group of institutions, ones which functioned on the basis of federal funds, were aimed at agricultural research and extension. Chief of these was the Department of Agricultural Research, part of the Ministry of Agriculture, and charged with the prime responsibility for agricultural research. Another was

2. Corporacion Autonoma para el Desarrollo de la Sabana de Bogota y los Valles de Ubate y Chiquinquira.

the Instituto de Investigaciones Tecnologicas, which has researched matters related to agriculture (e.g. storage, processing, etc.)but not to production per se.

In a sense the violencia dominated the 1950's; perhaps agrarian reform was not considered seriously during these years because the first problem was conceived of as rural pacification. In any case the severe social problems left by the violencia convinced some important people that fairly radical approaches (by Colombia's historical standards) would be necessary to maintain the uneasy peace which followed it. This is one explanation of the support for the agrarian reform law of 1961 which created the important agency INCORA. But the 60's constitute an ambiguous period in terms of the government's relative emphasis on output promotion and improvement of income distribution. Agrarian reform was, at least in the original thinking and in the continued publicity, directed towards income redistribution; but, as we will see, it affects few people. At the same time, some other elements of government policy have been shifting more and more in favor of the larger producer. Part of this latter shift was a result of commercial agriculture's increasing strength and organization which enables it to demand more of the government; as always, the small poor farmer has few institutional channels by which to demand anything. There was, further, the belief on the part of an increasing number of people that commercialization and mechanization represent the best development path for Colombian agriculture; the unsuccessful development of the economy as a whole since the fall of coffee prices increased the emphasis on output growth, and the extended period of balance of payments problems made the fomenting of agricultural exports look more and more important.

It was assumed that these would come from commercial agriculture. The policies, even of such institutions as the Caja Agraria reflected this interpretation; the Caja (originally designed to help the small farmer) has long been importing and selling machinery at subsidized rates. Such policies as the negative income distribution impact of the 1960's has had to speculate that the increased government intervention is not implausible, due to its primarily favoring the large farmer, even if it is not specifically directed against the small one.

With the new initiatives directed at lagging output and at distribution, the 1960's saw also a new attempt to centralize somewhat more the various agricultural activities of the public and semi-public institutions. INCORA has become the main focal point, taking upon itself a variety of functions including supervised, credit, the development of co-operatives; and an attempt to integrate them. The Instituto Colombiano Agropecuario (ICA), designed to integrate research, high level agricultural teaching, and extension, is another such organization.

Perhaps most characteristic of the 1960's has been the clear increase in overall emphasis on agriculture, reflected in a substantial rise in government expenditures (and in the share of all government expenditures going to agriculture). Combined investment expenditures of the national and departmental governments and Incora averaged over three times as high in the years 1964-66 as they had during 1957-59 ; those of the other main decentralized agencies fell between 1961 and 1966, as Incora tended more and more to become the dominant agency. By 1966 she was carrying out almost one half of all public and semi-public investments in the agricultural sector.

The directions of public spending in agriculture have been altered considerably during the 1960's, a change related to the increasing role of Incora. Big increases have occurred in land reclamation and supervised credit.

During 1968-9 what promises to be a significant reorganization of the public and semi-public institutional apparatus dealing with agriculture was effected.

Part III. Organizational Problems in Agricultural Development

Before turning to a discussion of specific elements of government policy in agriculture, it is useful to have some feeling for the context (in terms of social and political institutions) in which initiatives work themselves out; we thus review briefly the way some of the institutions operate, in particular those involved in supplying certain public services to the sector. It is worth noting first that social infrastructure and public services in the rural areas of Colombia are so scarce that many observers place very high priority here. Felstehausen, after a detailed study of Southeastern Antioquia (and there is little question that what he found there would characterize most regions of the country) concluded that a large part of the development problem in Colombia and a major explanation of the lack of social infrastructure[1] is the lack of instruments for making collective decisions.[2] This has produced both lack of social overhead capital and also many serious misallocations of expenditures; Felstehausen suggests, further, that outmigration to cities depends in considerable measure on the extent to which basic public services are provided, so to the extent that migration to the cities is above the socially optimal rate, this is a further cost attributable to the lack of services.[3] The rural development problem is not so much to build any

[1] It is worth noting that this infrastructure affects not only the production side of rural life but the consumption side as well. Public services include health and education, items which may be even more important than those affecting production.

[2] Felstehausen, Herman, Local Government and Rural Service Barriers to Economic Development in Colombia, The Land Tenure Center, Bogota, Colombia, June 1968.

[3] Evidence that outmigration is too fast is far from convincing, though. There are persausive arguments in the opposite direction.

particular road, school house or water main, but to build organizations and governmental instruments which can plan and carry out public functions in those cases where private decisions fail to meet the task.[1] The existing organizational forms lack potential. They have their roots in centuries of institutional struggle and were never designed for the administration of development. Yet

1. Felstehausen notes that development programs, both foreign and domestic, generally ignore infrastructural problems in favor of physical and capital development. Title IX of the U.S. Foreign Assistance Act of 1967 is designed to help correct this bias, but the program (as of 1968) had yet to be funded and applied.

Felstehausen feels that output cannot rise rapidly in areas like eastern Antioquia until public services, in particular roads and schools, improve. He describes the whole political system as a "rigid, outmoded, and negative in its approach." Communications between one level and another are very inefficient. There is no general feeling of responsibility to create socially useful infrastructure, or provide services to the people. This attitude follows naturally from the social structure; the local politicians are part of a system in which the small farmer receives little consideration, remains generally subservient and has not been able to organize to make demands in many places. Meanwhile large scale farmers often circumvent the lack of resources without passing through the stage of pressuring local government.

Thus in the newer regions of Eastern Antioquia along the Magdalena River the large scale farmers, who live in the city, are able to buy their inputs there, and even supply most of their own services -- services which would usually be supplied by the public sector. This decreases both the pressure

on government to take steps to make services available, and the private incentive to market intermediaries who need a minimum market size to operate, and thus helps deprive medium and small size farmers of such services. Since this infrastructure seems important, the indirect results of the presence of the large farmers may be quite negative. On the other hand these bigger farming units sometimes provide external economies when the services they set up for themselves can also be used by others (e.g. roads); while their net effect may not be provably negative, as long as it is assumed that the public sector can do nothing, the obviously best solution is public participation to provide what the large farmer has historically created and what he has retarded. The weakness of municipal governments and of the whole governmental apparatus can be observed both in aggregated municipal budget figures and in more detailed studies like the one performed by Felstehausen in Eastern Antioquia.

In Eastern Antioquia, public expenditure per person stayed about the same over the last ten years, but only due to increased departmental and national grants to municipalities. (This generally unsatisfactory performance must be understood together with the fact that Antioquia appears to have done better than some of the other departments in at least attempting to service rural areas). The unwillingness or inability of municipal governments to collect enough taxes to finance projects of importance is clear; local groups (especially community action boards) collect about as much as the municipalities in taxes, though if contributions of labor and materials are included they exceed the municipalities in financial importance; the two combined account for a little more than a third of departmental taxes collected in the region. (Almost all departmental revenues come from sumptuary taxes). And municipalities

collect less than half of what they spend in Eastern Antioquia;[1] Thus the

1. For 1966 Felstehausen estimated that revenue collected in the region was 70 million pesos and public funds spent were 89 million. He did not measure taxes being paid to the national government, but these were probably small. He was also unable to measure funds spent by higher levels of government for some types of public services.

often heard charge that the departmental government extracts revenues from rural areas which it does not return is not unfounded in Antioquia. There is however, redistribution from rural to urban areas through the municipal budget as few expenditures occur in the rural areas; there may also be net redistribution against these rural areas when the operations of all government levels are taken into account.

Education exemplifies well the disparity between law and practice, and the attempts of interested groups to find ways to circumvent the ineffective formal arrangements. "Public education, especially primary education, is technically a joint responsibility of the municipality and the department. Free and obligatory primary education is guaranteed by the Constitution. (Article 41). In practice this obligation is only partly met and local and private groups bid from dozens of sources for funds to build and operate schools. The law says that the municipality must, 'provide classroom and equipment for the operation of urban and rural schools.' (Law 39, 1903, Art. 9). Later this requirement was modified to, 'grant appropriate grounds for such purposes, and also, fifty per cent of the cost of the buildings.' (Law 69, 1939, Art. 1). The nation is now supposed to pay the rest of the building costs. In the region, both the municipalities and the nation have defaulted regularly on their obligation ..."[2]

[2]Felstehausen, op. cit.

Because of this regular defaulting "many rural communities have begun using informal procedures for raising funds and building schools.[1] This practice

1. In rather ironic confirmation of the fact that only when the interested group has direct channels of action do things get done is Felstehausen's finding that municipal governments did tend to take care of their own locals rather well; half of the municipal buildings were either new or were judged to be in good condition. On the other hand, and rather predictably, slaughter houses and jails were generally in poor condition.

was partly formalized in 1958 when locally organized and already operating community action boards called 'Juntas de Accion Communal' were given legal status. The enabling legislation provides that local groups may assume and share responsibility for certain public services, especially schools, health centers, roads and bridges, recreation and cultural centers, and activities to improve agriculture and cooperatives. (Law 19, 1958)

"Matthew D. Edel indicates that community action boards are currently the main builders of rural schools in Colombia and that their investments in local projects in 1964 were greater than those of departmental and municipal governments combined.[2] This is also true for the rural areas of eastern

2. Edel, Mathew D. The Colombian Community Action Program: An Economic Evaluation, unpublished doctoral dissertation, Yale University, 1967, Chapter 2.

Antioquia in this study and suggests that future local government planning needs to give much more attention to this important sub-sector of community government."[3]

3. Felstehausen, op. cit., p. 19-21.

One of Colombia's most serious and complex infrastructural problems is the planning, construction and maintenance of farm to market roads. The difficulties are due partly to the fact that road construction may demand substantial capital investments but probably more importantly to the fact that Colombian laws and regulations providing for local farm to market roads are so full of blockages and undistributed responsibility that their construction and financing by local government is extremely difficult. The lack of roads prevents a serious problem for getting goods out of many areas; further, agricultural technical services do not go where there are no roads.

Felstehausen notes that "The departmental assemblies determine which will be departmental and which will be municipal roads. (Law 50, 1910, Art. 2). The departments have, for obvious cost reasons, limited their share to as little as possible. They generally provide part of the state trunk system in connection with the national highway network. This leaves most of the departmental territory to the municipalities which have no resources to build roads. The law says: 'Responsibility rests with the respective municipal councils to plan and develop ... the roads which fall under its jurisdiction,' (Law 50, 1910, Art. 4), with the general provision that roads linking municipalities will be departmental responsibilities.

"Local initiative was further confused in 1960 when Decree 1650 created Caminos Vecinales (Community Roads) as an automomous agency and made highway planning a national responsibility. According to follow-up administrative decrees, each department must set up a departmental road fund and planning committee which will provide for roads connecting municipalities. Municipalities are also encouraged to set up local road building committees which will be made up of: 'a) the mayor or his representative; b) the Parish priest; and c) a representative from the respective departmental committee.' (Decree 1084, Art. 11). The use of the local fund and the function of the local committee is to be determined by the National Community Road Board. With the mayor appointed by the governor, and the church and the department on the board, the municipality has essentially lost any ability it may have had to plan local roads. It never did have ability to pay for roads."[1]

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1. Felstehausen, op. cit. p. 25.

Felstehausen estimates that only one of 8 farms in the area is located on a road, that only about 20% of the farms were more or less directly accessible by motor vehicles, and that the desired number of new roads is about five times the number now in existence. Most of these are needed to provide links with the new national highway. Branch roads which could be constructed at low cost would increase accessibility a lot (Jaramillo and Yepes found that additional rural roads could be economically built in Antioquia and that they would make the community more productive. (See Diego Jaramillo F. and Francisco Jairo Yepes E. "Justificacion Economica de la construccion de Tres Carreteras Veredales en Antioquia." Unpublished undergraduate thesis, Facultad de Ciencias Agropecuarias, Medellin, 1968.)

In eastern Antioquia, perhaps the only services, part of whose provisions is handled by modern organizations are the public utilities--water and electricity; Acuantioquia and Electrificadora de Antioquia are semi-autonomous departmental water and power agencies designed to operate public services in small towns. Part of their model for success is provided by the highly successful Empresas Publicas de Medellin, a modern and efficient integrated public utility organization. However, services are usually poor (when municipalities run the light and water systems), partly because the local pressure for low rates tends to be very strong.

The trend in Antioquia is to place increasing responsibilities in the hands of the department (though without giving it new tax powers); also more and more of the public services are being turned over to semi-autonomous departmental agencies. "The multiplicity of agencies, the lack of coordination and the undefined procedures used in approaching 'sponsors' creates confusion at the local level and leaves many groups disappointed when they fail to receive funds. The result is that municipal officials and local leaders all talk of the need for 'pull' (palanca), legal skills, and back-handed dealings to get funds for local services. While resources are obviously limited (as they are in any economic system), the lack of collective forms of decision-making and public procedures block almost every step forward."[1] It is not clear that passing the buck to the departmental level is optimal, even though it may represent an improvement. Community action leaders in the Antioquia study favored local initiative more than the other groups and explained that it was the only way to get the

1. Felstehausen, op. cit., p. 42-3.

job done. All the 31 communities reported numerous "felt needs."

What does seem clear is that municipal governments have little reason for existing. There is evidence that labor cannot be too efficient if education is really bad; also it is impossible to get some people to live near the farm if there are no public services there.

Felstehausen concludes "that the free and representative establishment of public services in rural Colombia is often blocked by monopolized decision, is set by ideals rather than public demands, or in some cases because the instruments to determine the public purpose have never been formed. Recognition of these three problems is important because it leads to the search for new organizational forms rather than focusing concern only on the quantity of services available. At the same time, the new forms must be more appropriate than the old--they will have to stand the tests of use and performance. They cannot be selected just because they reflect a set of 'human ideals' or 'natural rights' as a reading of much of Colombian constitutional history would indicate has happened. Idealized criteria continue to permeate the Colombian legal and political system and give 'bosses' and 'experts' license to carry out many programs that fit their private interests."[1,2.]

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1. Orlando Fals Borda, La Subversion en Colombia, Bogota, Tercer Mundo 1967.

2. Felstehausen, op. cit., p. 49. Felstehausen makes a variety of suggestions (which will be considered in greater detail in our discussion of policy in Chapter VIII) as to possible ways out of this institutional dilemma. Among his major points are the need to give most current functions of the municipality to larger "rural service-administrated zones;" reorganize the make-up of the municipal councils by, for example, gradually giving the Accion Comunal representatives; placing public utilities in the hands of the already established departmental semi-autonomous utility companies; and making a strong effort to get high quality personnel for rural public administration. This is presently a critical lack.

Taxes as Fiscal Weapons

A number of tax proposals have been aimed more at affecting output than at increasing government revenues, improving equity, etc. Hirschman attributes the first move to agricultural taxes as fiscal tools to the fact that, as the tenure difficulties and conflicts of the late 20's and 30's faded, the major agricultural problem as perceived by the government became that of slow output growth. Agrarian reform had been the instrument of social reform but was no longer high on the priority list; fiscal measures now took precedence--it was hoped that these could increase output (no such hope being commonly posited for land reform--some even believed output would fall). Hirschman felt that the changed emphasis was also fostered by the increasing popularity of foreign academic economists as advisors, as they tended more to suggest such "theoretical gimmicks" than attempts to affect the institutions, which they would be unlikely to know in any detail; they would have been unlikely to recommend measures directly affecting the social structure, especially with conservative governments in power.

The first major fiscal proposal was that of a land tax, made by the World Bank Mission of 1949. Currie's proposal, which was mild in comparison to the severity of the Bank's diagnosis of the situation in agriculture, was that the existing land tax of 4 per 1000 of assessed value would apply to lands yielding normal returns or more (e.g., 10-15% perhaps) and if the return were subnormal the land tax would be raised progressively until it reached 4%; it was similar to a presumptive income tax but with a rebate for efficiency. Currie argued that the tax would also lower land prices. The proposal created a good deal of public interest and much angry criticism on the part of the land owners and of domestic fiscal experts and administrators. The Colombian government, in consultation

with the World Bank, set up a committee of its own to consider the recommendations; Currie submitted a revised version of the original proposal and was retained as an advisor to the committee. At this point he suggested that to ensure honest evaluation of land the state should be allowed to purchase any property at 140% of its declared value. But the committee shelved the issue and advised a combination of agricultural credit, investment incentives, and the idea of taxing capital gains on land as a curb to speculative holdings. They felt that the proposal was inapplicable due to the difficulty of achieving the needed level of catastral service, the general feeling that it would be unjust to tax farmers who had no "facility to produce," and like factors.

Up to the present time, no effective use of land taxes has been made; though several laws have been passed, the attempts to enforce them have not been serious ones. In order to administer a good land tax, reasonably good land assessments are necessary. In a country like Colombia with rapid inflation, powerful land owners, mountainous terrain, etc. this is difficult and requires considerable dedication to the task; perhaps more than anything, it requires a decision to focus the efforts on the limited number of relatively large farms, among which are the inefficient ones which the tax is designed to affect. This decision has never been taken.

Various "attempts" at the use of a land tax have been made. Under the rule of General Rojas Pinilla the Minister of Finance, Carlos Villaveces, issued two decrees dealing with the assessment problem. In the first he ordered the automatic upward evaluation of all assessments in accordance with the rise in the cost of living from the date of the last assessment. Then in 1954 he provided that the values of land and properties would be set by declaration of the owners, with the

possibility that this would be the value paid by the state should the property subsequently be expropriated. This threat lacked credibility at the time. Opinion as to the results of this move are divided. It may have raised valuations to more realistic levels in some areas, but this is probably offset by the damage done by disrupting the work of the geographical institute, to which responsibility for land assessment was subsequently returned.[1]

The next step was decree 290 of 1957, issued by the military junta governing the country for over a year after the overthrow of Rojas Pinilla. It was foreshadowed by the 1956 World Bank Mission report on Colombia's agriculture, which had again principally proposed tax measures and recommended that the responsibility for land assessments be returned to an invigorated geographical institute.[4] It also proposed the inclusion in taxable income of a "presumptive return equal to 3-5% of the value of land, capital, and fixed farm capital," a move which would have cut out the possibility of claiming losses in land or capital operations, etc. And it divided land into three quality types accepting the idea that each should be farmed in a different way. The proposal was later considered by the Lleras government of 1960, but the 1957 decree, while accepting some of the World Bank suggestions, turned out a very complex scheme, which required that a certain

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[1] Hirschman points out that these laws tended to hurt the landed oligarchs much less than the exclusion of divided income from the income tax (1953) hurt the country's industrialists, against whom the Rojas clique bore much greater resentment (for example against the Antioqueños) than against the old-fashioned hacendado. Also members of the clique who were originally lower middle class were interested in becoming land owners themselves. This desire of the expanding middle class for land gave the hacendado an important ally. Losses could be claimed in cattle operations quite easily. In the Rojas period coffee prices boomed so that food imports were not difficult to obtain.

[4] IBRD, The Agricultural Development of Colombia, Washington, D.C., IBRD, 1956.

percent of each of the four different types into which all land was classified would have to be cultivated. (The World Bank had, for purposes of analysis, classified the land into three types according to its quality and mechanizability.) People who did not cultivate the appropriate percentage[2] had to pay a supplemental real estate tax which increased from year to year.[3] For the country as a whole the law was clearly quite unworkable, but Hirschman feels it could be thought of as being really directed only at a few well-defined zones, with particularly good land particularly underutilized. This was indeed the interpretation which the Minister of Agriculture in this government took; he started pilot projects for the application of the decree in small areas in each of the four most notoriously underutilized flatland areas of the country. Application of the tax components of the decree never went beyond this pilot stage.[4] Hirschman suggests that the

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[2]Owners of type I land were supposed to have 25% of their land cultivated or in improved pasture for intensive cattle raising, and owners of type II land 15%. (See Jorge Franco Holguin, Consecuencias Economicas de la Tributacion a la Tierra en la Savana de Bogotá, Bogotá, August 1962, mimeo, p. 4.)

[3]The tax was to raise gradually from 2% of the catastral value in 1958 to 10% in 1962 on land not used as prescribed by the law, but needless to say it was beyond Colombia's capacity to administer and collections have been negligible.

[4]The decree also made a wide variety of agricultural investments deductable for income tax purposes and cut in half the income and patrimony tax liabilities for a wide variety of agricultural activities, with the exception of beef cattle operations on level lands. It is perhaps more than anything else noteworthy that many of these deductions would help primarily large scale farmers.

There were tax exemptions for people producing rubber, cacao, olives and other oleaginous plants, an exemption from the patrimony tax for various types of agricultural investments, exemption for 10 years (1958-1968) from 50% of this tax and 50% of the income and excess profit tax to any type of sociedad with an investment of more than 100,000 pesos (not including the value of the land) for agricultural purposes. There was a deduction of 20 pesos from gross income for each rubber, cacao, olive or other oleaginous plant sown, 50% of the patrimony and income taxes of owners who convert land of type three to type one with minimal expenses of 250 pesos per hectare.

decree was not necessarily another spectacular failure, but that some of the progress that was achieved in agriculture in the late 50's should be attributed to it, as increasingly the enterprising middle and upper class operators rented or acquired tracts of good flatland in the Savana de Bogotá, the Cauca Valley and the Tolima Plains; others catalogue the decree with the rest of the wasted effort in this general area. Other factors were of course helping to modernize Colombia's agriculture in the late 50's. The 1957 law which directed commercial banks to reserve 15% of their deposits for loans to agricultural activities probably helped, as did the price supports and technical assistance for barley and cotton (among other crops), the generally high real prices of many products, and the advance of technology.

The next steps in the tax proposal history occurred under the Albert Lleras administration. Lleras gave his support to a simple proposal which would replace the old land tax of 4 per 1000 by a so-called "territorial tax" of 2% on all rural properties, but which unlike the previous tax did entitle the payer to a tax credit against his tax on income from agricultural activities, and was in this sense progressive. It was a comparatively simple proposal, much more so than decree 290 of 1957 which was never really put into operation. Despite Lleras' strong support the proposal was not accepted by Congress. The national planning council criticized it as being insufficiently technical and proposed an alternative of imputing to the land owners a presumed income of 7-10% of the value of their land and to tax them in accordance with the normal progression of income tax. This theoretically attractive proposal, which dated from the World Bank Mission four years earlier, was likewise unable to gain political support.

Hirschman suggested that the history of relative failure of the land tax

schemes is due, at least in part, to the following reasons:

a) There are so many possible solutions that decision makers cannot make up their minds or crystalize in favor of one particular solution;

b) Everything depends on the quality of the catastral survey, which is expensive; such an expense is not too likely to be incurred unless there is some good reason for it. This constitutes a sort of vicious circle;[1]

c) Additional taxation is usually acceptable only when there is a strong need for specific new expenditures. These tax proposals, while possibly benefitting the landless peasant, were too complicated for him to see that. Small farmers, despite provisions exempting them from the taxes, were openly hostile.[2]

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[1]As noted above, the idea that the catastro, selectively applied, would have to be expensive is not obvious and, it seems to me, not demonstrated.

[2]This hostility, to the extent that it was due to a (perhaps deliberately fostered) misunderstanding on their part as to the law, is highly reminiscent of the recent (1964) tax on certain consumer items, which seems to have been fairly vigorously opposed by many of the lower classes in whose benefit it actually was, and of some of the current reform proposals of the Musgrave tax commission. Hirschman cites (pp. 135-37) as evidence for this general principle the Cauca Valley Corporation, which was able to eventually levy a 3 per 1000 land tax, where people approved of the use to which the tax funds would be put. The CVC was established in 1954, and had anticipated financing from the World Bank and the national government, but as a result of the Rojas dictatorship the Bank decided to suspend all new lending to Colombia and Rojas was in any case more favorable to the poor Eastern provinces. So the CVC decided to try to obtain the authority to double the 4 per 1000 tax, earmarking the proceeds for its own operations. The Rojas government accepted this, for a combination of reasons; the traditional land owners and cattlemen were in serious opposition but support came from progressive business circles who were the original promoters, and also the Church, the labor groups and public opinion at large. As a result of the tax the CVC acquired a considerable interest in realistic land assessments and entered a special contract with the geographical institute designed to accelerate survey work.

Hirschman could have added that the political power of the large farmers as a pressure group, the complexity of the theory surrounding the effects of the taxes (which open them up to charges that they will lower output, etc), and the usual prominence of large scale (i.e., tax prone) farmers in the Ministry of Agriculture all worked in the same direction.

As the balance of political power has shifted away from agriculture, and the unattractive alternative of increasing land invasions and disturbances has become more evident, the chance of application of a serious land tax has risen. Current proposals (as of 1971) remain mild but reflect at least a compromise.

As noted earlier, a substitute for an extractive (tax) policy on the part of the government is voluntary flows of funds from agriculture to non-agriculture. Such flows are extremely difficult to measure and usually believed to be small, at least net. Research on this topic is now beginning.

Development of Social Infrastructure

The most important elements of social infrastructure for agricultural development are usually thought to be roads, schools, a satisfactory marketing system--both for the purchase of needed inputs and for the sale of output--and a satisfactory credit system. Another aspect of the situation, often forgotten unless it is a source of difficulty, is the legal framework.

The development of the credit system was considered in Chapter III and the marketing system forms the subject of the last part of this chapter. Here we look only at roads, education, and the legal framework.

Rural and Agricultural Education

Perhaps the most serious failure of government policy in any of the many facets touching the agricultural sector has been in terms of rural education. In Chapter VI changes over time in the level of rural education and the characteristics of that education are considered in some detail, primarily in the role of direct determinant of the welfare level of the rural population (or consumption item). As an investment item, (i.e., something which increases productivity), rural education appears important in several respects. First of all, it is argued that educated farmers make better farmers. Many observers feel that some budget management problems afflicting the small farmers and landless workers--the tendency to spend money foolishly, to consume a lot of alcohol, and so on--might be diminished by improved education. And for those who feel that the rate of out-migration from rural areas is still below the optimal, the fact that education appears in some countries to be positively associated with the tendency to emigrate would suggest another positive effect. But the generality (across different levels and types of education) of the alleged benefits has been by no means demonstrated in traditional agriculture and is often called into question.[1]

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[1]Frederick Harbison, for example, discussing the Nigeria case says: "the case for the spread of primary education as a prerequisite for improvements in traditional rural economies is very weak. There is no clear evidence to indicate that persons need to be literate in order to improve agricultural methods and to participate in community development activities. Certainly, such improvements will not come simply from literacy by itself. And it is useless to make people literate if there is little for them to read.

"It is now generally recognized that for a rural transformation, other productive services must be developed simultaneously with the spread of education. Unless conditions in the rural areas are improving and unless there are attractive job opportunities for local people in the rural areas, investment in formal education

Undoubtedly, when the education-development relation is better understood, the benefits of education will be found to depend importantly on the type of education, the type of agriculture, and possibly the type of society or culture. And doubtless education will be found to be complementary with other developments in the sector. A best guess is that the payoff to rural primary is substantial[2] in Colombia; the increasing need even for the Colombian small farmer to use modern inputs such as insecticides and fertilizers suggests this. The usefulness of education as a direct aid to productivity presumably depends to some degree on the nature of the education; the systems most criticized in this respect are those which give little attention to the study of farming and agriculture, but instead emphasize the traditional classical education as a preparation for secondary school and eventually even university. Colombia's rural education certainly has suffered from such faults, but it might still be argued that the ability to read, write, and calculate may constitute the key assets for the small farmer. This appears to be especially true as the potential gains from the use of modern inputs become larger. Inability to read appears to constitute a substantial

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(1 continued from p. 45) will bring disappointingly low returns. Thus, it is important to decide first to make massive investments of human and financial resources for imporvements in agriculture, in the total public works, and in community development activities of all kinds ..."

[2]The most advanced attempt to test its impact is the work of Thomas Haller. He tested the impact of education on output in four municipios, with, respectively, one major crop and fast technological change, one major crop and little technological change, several crops and rapid change and several crops and little change. He reached the plausible conclusion that the payoff to education was highest where technological change was prevalent and there were several crops. See Thomas Haller . . .

problem for him.[1]

One could, then, argue in terms of the direct productivity-raising impact of rural education that the very low levels of rural education in Colombia have had a negative impact on agricultural productivity. Another effect of the relative lack of rural and agricultural vocational education in Colombia, possibly as important in the long run, is the relatively small supply of agricultural experts (agronomists, veterinarians) and administrators throughout most of the period under consideration in Colombia. Whether the lack of quantity or the lack of quality of these people has been more serious is open to question; jointly, they have constituted a very definite problem. Part of the problem has presumably lain with the small number and in some cases low quality of schools giving higher education in the agricultural sciences. But, comparing Colombia's situation with that of countries which have had relatively efficient agricultural extension and other services the most notable difference is the fact that most people studying agricultural sciences in Colombia do not have rural backgrounds.[2] This means

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[1]It is necessary to distinguish the possible effects of education on people born in rural areas and people who stay there. If it is true, as frequently alleged, that the more education people have the more likely they are to move out, this education may, depending on the relative marginal productivities of labor in agriculture and non-agriculture, improve the person who receives it even though he does not stay in the sector. On the other hand it may be negatively productive if it leads the more productive people to move out of agriculture when in fact their social productivity would have been higher there than in urban areas. Dale Adams notes that one result of poor rural education is precisely that a large part of the potential local leadership of rural areas move into the cities. (Adams, op. cit.)

[2]The current situation in this regard is reported in Dale W. Adams, "Leadership, Education and Agricultural Development Programs in Colombia," Inter-American Economic Affairs, Volume 22, Summer 1968, Page 88. Adams notes that students in the three agricultural colleges studied indicated by their answers to a series of questions that less than half of the parents had any meaningful commitment to agriculture. (See Table No. 1, Page 93.) The agricultural background of the INCORA

that few of them will be able to understand agriculture and rural people as well as if they had been brought up in rural areas, and it frequently implies that they prefer not to live in rural areas, but rather in cities or very close to them. This combination of factors has serious negative implications for the potential impact of extension services.[1] Due to lack of people trained in the agricultural sciences, lawyers, economists, and engineers with little or no background in agriculture have often made up a sizeable proportion of the staff participating in rural development programs.

Illiteracy rates (Table VI-6) reflect the weakness of rural primary education since the 1930's; secondary vocational agricultural education and the training of agricultural experts has also lagged. It indicates that the performance at all periods of time has been poor, although there has been improvement in recent years. Adams notes that in 1964 the number of students in vocational agricultural schools made up less than 1% of the total number of students in secondary training.

Quoting Adams, "Formal university training in agricultural sciences began in Colombia in 1914, and by 1950 there were three Colleges of Agriculture. Between 1950 and 1965 another seven Colleges of Agriculture were established. Over the 1920 to 1963 period, however, less than five percent of the college graduates in Colombia majored in agriculture (2,077 versus a total of 45,483). This was only

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(2 continued from p. 47) employees seems to be better, but only between 20 and 30% grew up in essentially rural areas, and 40% felt they had essentially no practical experience with agriculture except during schooling or their current employment.

[1] In Colombia there is the additional problem that at least up till fairly recent years, students in the agricultural sciences tended to be the rejects from other areas, and therefore low in ability as well as in interest and relevance of preparation.

one-fifth of the total number graduated over the same period in law. There has been some recent increase in the proportion of university students majoring in agriculture, but they still amounted to less than nine percent of the total in 1965. The same situation exists in foreign graduate training in agriculturally related sciences. Of the 5,777 students financed by the Instituto Colombiano de Especializacion Tecnica en el Exterior (ICETEX) to study in foreign countries during 1961 to 1964, only about five percent majored in agriculture."[1]

Highways, Roads and Rural Development

As was suggested in Chapter III, roads opening up new regions of Colombia have been responsible for part of the output increases of the last 30-40 years (as was railroad building for some of the advances of the late 19th and early 20th centuries). A major road building surge occurred in the early 50's , helping to open up some of the country's flatlands such as the eastern llanos; in short, much progress has been made in the last 20 years.[2] Investment in this area has been relatively painless since international lending agencies and advisory groups have been especially interested in stimulating transportation programs which they can supervise and cost account more easily than such

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[1]Adams, op. cit., p. 90.

[2]The number of vehicles, as of the late 60's, was increasing at about 5% per year. Up till 1966 the gas tax was only 15 cents per gallon leaving 22 million pesos in 1961 when the highway budget was almost 400 million pesos; but the new tax (114% of the refinery price of gasoline and 55.5% on Diesel fuel), was producing 700 million pesos per year soon after being decreed. It is channelled through a national highway fund and earmarked for primary and secondary rural construction and maintenance.

Current annual maintenance costs are high due to inadequate drainage, the large proportion of mountain roads, exposed cuts and fields, and so on.

things as education.[1]

Both railway and road investments in Colombia have probably been made after the optimal time; only later in the railway program did some investments of dubious payoff appear. A comparable point has probably been reached now in the road program. Many observers in recent years have felt that, although investments in more major highways, if carefully chosen, might pay off fairly well,[2] the need is relatively much greater for feeder roads or "caminos vecinales." Felstehausen's study of Eastern Antioquia,[3] Edel's study[4] and others concur in this relative lack. Felstehausen, for example, compares the current (1968) network of roads which according to the Ministry of Public Works consisted of 18,000 kilometers of national highways of which 4,000 were paved, 16,000 kilometers of State Roads and only 4,000 km of rural access roads with what he would consider a satisfactory network--it would consist of about 10,000 km of primary roads needed to connect all the main cities, 13,000 km of secondary roads to tie in small towns and a projected 16,000 km of low cost rural access roads. Again, the imbalance is a reflection of the inefficacy of the local governments, which in most countries would be responsible for these roads, and the fact that the departmental and national governments have not, at least up till recently, been interested in stepping in to plug the gap. At present, planning for truck highways is done

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[1] As well as preferring them on some other grounds.

[2] One expert who feels that Colombia may be investing too much in transportation at present is Wilfred Owen.

[3] Felstehausen, op. cit.

[4] Edel, Mathew, op. cit.

jointly by the National Planning Office and the Ministry of Public Works. Secondary roads are planned by an inter-agency unit called "caminos vecinales" which coordinates national and departmental efforts. The local level is largely neglected in these procedures--which partly explains why there is so little construction of rural roads.[1]

In Eastern Antioquia Felstehausen found that most municipalities had contributed practically nothing to new roads in the preceeding five years. Most rural access roads are planned and constructed either by community groups such as Accion Comunal or by private agencies, especially petroleum companies. Accion Comunal procedures are filled with delays and frustrations but estimates are that 5 to 10 thousand km of rural access roads had been built or improved in the 10 years preceeding 1968.[2] Unfortunately, roads built on an ad hoc basis are often abandoned after construction is completed because maintenance allocation has not been set aside. The Accion Comunal groups raise funds among members and seek grants from agencies like Federacion de Cafeteros and INCORA; their building could be stimulated if they knew a permanent source of funds existed with known procedures for getting those funds.[3]

The imbalance between major and minor roads has particularly unfortunate implications in that, like so many other factors in the development pattern of the agricultural sector, it contributes to dualism and to an unequal income distribution. The use of increasingly modern means of transportation (e.g. large

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[1] Felstehausen, op. cit., p. 14.

[2] Mathew Edel, op. cit.

[3] Felstehausen suggests that part of the gasoline tax be used this way.

trucks) makes access to markets of certain types more difficult for the small farmer somewhat removed from a main road.

According to Felstehausen, dualism in transportation is increasing as a result of the uneven development of the transportation system.[1]

Legal Institutions in Agriculture - The Example of Water Rights

The major problem of the legal framework relevant to agriculture is not so much that the laws are bad (although some are) but that they are not enforced. A case can be made that this has been a significant problem, not only in the obvious sense that when a phenomenon like the violencia prevails in a rural area it is sure to create some disruptions to the agricultural system, but in more continuous and possibly even more important ways. The major question surrounds the legal rights to land and how effectively they are applied; this is discussed under the title of "land reform." A less important but still significant issue is rights to water, and the legal history illustrates nicely some problems of assuredly more general application. The laws have been gradually improved, but still require some modification to function optimally. But the basic problem is enforcement.

Historically, the development has been as follows. In the 19th and early

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[1] He cites the examples of the dairy plant in a particular region near Bogotá which will not pick up milk from farmers where its truck cannot enter daily, and the food processers who buy perishable fruits and vegetables only from producers near the city or near paved roads.
Small farmers, of course, try to locate themselves near main roads, and some succeed, but probably less than large ones.

20th centuries riparians had almost exclusive use of water.[1] Gradually (beginning in 1928) this was changed. A license from the government was required to construct canals; the government was to regulate the use of public water, which riparians could no longer sell to non-riparians. But no agency was created to enforce it, so this law had little effect.

As demand rose, violence resulted. The little man came off badly, especially during the droughts in Valle (1935-36).[2] Alfonso Lopez set up a Water Commission in 1935; but it was not the answer.

In 1940 the laws basically ruling today were set up, with functions distributed among the Ministry of Agriculture, Ministry of Government, and various public and semi-public institutions like INCORA and CAR. Under certain conditions the riparian retains the right to 50% of the water as long as the government does not explicitly decide to control it all. A non-riparian can get legal right to a certain amount of water for x years, as can a riparian. Such concessions are not salable. Thus, at first glance, the non-riparian appears to be in an acceptable legal position for the first time; a problem lurks, however, in the absence of any provision dealing with passage of water to non-riparians, so they must often

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[1]This and the succeeding paragraphs are based on Joseph R. Thome, "Breve Historia de la Legislacion Colombiana de Aguas que Afectan La Irrigacion," Dic. 1964, mimeo.

[2]The little man usually does come off badly. A typical sequence of events in the sugar region of the Cauca Valley is that the little producers around the big farms try to exercise their right to some water but the larger farmers pay off the local officials. The small farmers may then complain and if lucky get some water. But soon the officials are likely to be changed and the new ones bribed.

deal with the intervening farms, slowing the process down a lot.[1]

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[1]Another difficulty in this general area is that laws dealing with irrigation districts, e.g. CAR, usually only authorize their creation and provide financing, but say nothing about their administration.

While CAR has the right to control water use and distribution in its area of jurisdiction, it has not used this power much, with the result that upstreamers use too much water to the detriment of downstreamers during the dry season; overall water use is generally quite inefficient.

CAR does try to prohibit some practices but must depend on municipal police to enforce its edicts; this creates problems with the big land owners, and is apparently often simply not feasible, given this framework.

(See Joseph R. Thome, Water Regulation and Land Use: A Colombian Example, The Development Digest, October 1967.)

Land Reform

Government agricultural policy has traditionally done little directed at improving income distribution; overall the impact of its operations has likely had a negative redistribution effect. Till recently the only operative policy with the explicit goal of aiding the small farmer was Caja Agraria credit. Apart from this, and generally ineffective social legislation on minimum wages[1], the history of governmental attempts to redistribute income is basically the history of land policy of one sort or another, and begins seriously only with the Agrarian Reform Law of 1961, which created the Agrarian Reform Agency (INCORA).

History of Early Movements Towards Land Reform

The Land Law of 1936: (Law 200)

The first tentative government reaction to the needs for land reform occurred during the administration of Olaya Herrera, 1930-34; he distributed some land (part of a package which included some cheap housing, and putting an end to interdepartmental tariffs). But these efforts were very marginal. Olaya demonstrated interest in going farther when he introduced into Congress a bill very similar to what eventually became Law 200 of 1936. That law, which looked dramatic at the time although its ultimate effects were far from revolutionary, was promulgated by the government of Alfonso Lopez (1934-1938), who was in effect the first Colombian president of the century to be a maverick to the oligarchic ruling class from which he came.

[1] It may have been effective in recent years in forcing the wage level up for some workers, but if this has been the case it has probably prevented the employment of many workers and thus had an overall negative effect.

He believed strongly in the social obligation of labor and the social obligation of land[1], and his Constitutional reform introduced the concept of the social function of property for the first time into a Colombian constitution.[2] The key idea of the law was that underutilized land should revert to the state and that a person's having occupied and farmed land over a certain period implied he had legal title to it. That the law came when it did was partly explained by Lopez' personal (progressive) attitudes, and partly by a rural unrest during the late 20's and the early 30's[3] which called increasingly for something to be done.

Hirshman attributes the increase in rural difficulties[4], among other things, to the depression of 1929 which created budget difficulties, a retrench-

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[1] The Spanish crown originally granted rights to land which were not absolute; the recipients had to work and live on the land to retain it: despite this original intent, the owners came to look on their domain as an exclusive private right, devoid of any social obligation, and the crown became concerned about large land grants that failed to lead to effective occupation and agricultural production. Its worry led to a number of requirements to the effect that there be, for example, redistribution of improperly and illegally held lands. But the crown was not able to put these into effect much, no matter how seriously it wished to do so. The 19th century saw further expansion of latifundistas, partly through encroachment on Indian lands (most remaining reservations were abolished in 1810) and more importantly by appropriation in 1861 of church held lands, which were largely bought by powerful private interests. But pressures in the oppostie direction were underway as early as the 18th century as growing mestizo and new Spanish settler groups exerted pressure on lands of the large land holders and of the Indian communities. Gradually much of Santander, Boyaca, and Narino were subdivided into small holdings. The strong, though little enforced, legal tradition that the acquisition of property rights on public lands was conditional on their effective economic use remained present.

[2] Ernest A. Duff, Agrarian Reform in Colombia, Frederick A. Praeger, New York, 1968, p. 10.

[3] One of the dramatic examples of rural unrest in the late 20's was the 1928 strike in the banana zone owned by the United Fruit Company near Santa Marta. Police fired on the demonstrating strikers and caused close to 100 deaths. (See Hirshman, op. cit., p. 101).

[4] Some historians have described Colombian history as one of alternating periods of violence and calm. Anthony Maingot, after considerable research, has concluded that rural Colombia has always been very violent, so much so that it would be incorrect to speak of periods of calm.

ment of public works, and a drifting back to the country of the urban unemployed. There are conflicting arguments as to the state of the rural sector at this time. Hirshman argues that the declining coffee prices led to a shrinkage of farm incomes from that source. Unquestionably this was true in terms of current prices, but my evidence suggests that it may have risen (perhaps even substantially) in real terms.

"Intensification of internal migration and settlement was to be expected, but most of the decent public lands in the central portion of the country had already been taken up so settlers increasingly occupied lands which they knew to be privately owned."[1,2] The settlers chances of success in the conflict for land were aided by a Supreme Court decision in 1926 (subsequently reinforced by another decision in 1934) which required the claimant to a piece of land to exhibit the original title through which the disputed property had left the national patrimony. This could usually not be done so tenant farmers were able to take advantage.

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[1] Hirshman, op. cit., p. 102. To my knowledge no study has been done on internal migration which enables us to distinguish how much occurred during various periods before 1951. It would be possible to get some rough ideas on this by comparison between populations of given municipos in 1918 and 1938; unfortunately this would not be sufficiently precise timewise to give support to Hirshman's statement. Hirshman did not state that the migration was large, rather than the forces were there to make it large.)

There are similarly no figures on the extent of urban unemployment in these periods, or the tendency for the people living in the city to go back to the farm.

[2] Apparently, although the campensinos may have been unaware of many of these details of their legal rights "By the late 1920's and early 1930's, it had become common knowledge among the campesinos that the laws of the land allowed them to take possession of unused land and to have small tracts essentially adjudicated to them as private property." (Duff, op. cit, p. 11).

In a second form of conflict the workers, trying to supplement their income, disregarded rules against producing certain cash crops on the plots assigned to them by the owners for production of subsistence items. This conflict was particularly prevalent in the coffee zone of Cundinamarca, the only one in the country where most of the coffee lands were held in large plantations.[1] There the peons, who worked in a semi-feudal fashion, wished to be able to plant coffee trees as well as the usual subsistence crops on their plots. The owners strongly opposed the request, fearing that the peons would turn into a less reliable labor force and that they could only be dislodged, if this became necessary, after being reimbursed for the value of the trees. Hirshman feels that the peons gradually won out in this battle.[2] The peons became somewhat organized in a peasant league -- the apparent precursor of the Communist led farmers' organization which has dominated some coffee growing areas near Viota for most of the past 25-30 years -- and received support from the Minister of Industry, Francisco Jose Chaux, who in 1933 urged the landowners to allow the peons to grow coffee on the plots in question. The owners attacked the minister as wishing to subvert the existing social order (and in this they may have been right).

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[1] Information on size distribution of farms producing coffee was weak until the 1959 agricultural census. It indicated that in Cundiamarca as in the country as a whole, about half of coffee area was on farms of less than 10 hectares -- this does not mean that land was not more concentrated in Cundanamarca than in the rest of the country in the 1930's (or perhaps even in 1959, given that the census data is by operator and not by owner).

[2] He takes as evidence the fact that between 1932 and 1955-56 the number of coffee farms in Cundinamarca and Tolima more than doubled (which he attributes to the liquidation of many plantations), while in the other principal departments the number of farms only increased by 10%. While the conclusion Hirschman draws may be valid the data do leave questions. (Footnote continued on next page).

and counterattacked against the workers in a sometimes aggressive fashion. During the late 20's and through the mid 30's there were many attempts to evict tenants, settlers and squatters, and many were successful due to the support of local officials and the police.[1] There were often full scale battles. Sometimes the landlords organized bands of "fiels " (faithfuls) consisting of laborers who wanted to replace the existing tenants or squatters. (The solidarity of the oppressed groups was, as usual, rather easy to destroy.)

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footnote continued from previous page.
There are grounds for doubting the completeness of the ECLA-FAO study of 1955-56, especially with respect to the smaller farms, and the 1932 census as well. If one compares the 1932 data with those of the agricultural census of 1960, the increase in the number of farms listed was almost 200% (from 149 thousand to 429 thousand). For Cundinamarca it was from 13.8 to 51.3 thousand, i.e. a somewhat faster than average growth; the ECLA-FAO figure in 1955-56 was 276 thousand. Meanwhile production rose, by 150 % for the country (207 thousand tons to 510 thousand) and grew by less than half as much in Cundinamarca -- (24 thousand to 40 thousand). This combination supports Hirschman's thesis. In Tolima the data do not suggest a similar sequence; while number of farms recorded were less than three times as great in 1959 as in 1932 (34 thousand to 13 thousand), output rose about the same amount (in percent). The 1955-56 ECLA-FAO estimate of the number of farms in Tolima was close to the 1959 figure of the census, and a more likely interpretation than atypically fast increase in farms over 1932 to 1955-56 and slow increase 1955-56 to 59 is relatively complete reporting in 1955-56.

[1] The owners had a strong law dating back to 1905 giving them the unrestricted right of eviction, regardless of whether or not a squatter was acting in good faith. Thus the situation was confused, with the Supreme Court decision of 1926 making it difficult for the owner who could not demonstrate ownership, while at the same time the tenant who could not demonstrate a contract was also in a weak position. Police action against tenants took place particularly in Tolima, Cundinamarca and the Cauca Valley. But, according to Hirschman, the successive governments were unhappy at the use of police and army force to resolve these disputes in favor of the land owners, and this motivated them to search for a better system.

After an order of eviction the colono, though he had the right to be paid for his improvements, had little bargaining power. Homes were sometimes burned down in an attempt to prevent reoccupation.[1]

On the surface at least, it is surprising that the land owning interests who were always well represented in Congress, accepted the law at all. Hirschman argues that they eventually did so as a result of:

a) their fear that they were not sufficiently in control to lay down terms. The Supreme Court decision had cast doubt on the validity of almost all land titles, some coffee haciendas were taken over in 1934-36 and were run by the tenants as cooperatives, a number of other compromise settlements were arrived at indicating incomplete owner control, and with the advent of Lopez the owners realized that they could no longer count on unconditional police support;

b) the reform nature of the Lopez administration, which constituted a significant adversary.

Hirschman says that "in effect, the provisions of article 4 of the law legalized the status quo for most situations in which disputes were currently raging."[2] New obstacles were placed in the way of eviction, in particular, the proof of title was made very difficult, the colono was to receive full value in cash for improvements made (of land and installations), the claimant was to be given only a short time limit within which to act, and

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[1] There had been similar disputes about titles during the earlier period of Antioqueno colonization, but the claimants living far away from the disputed lands usually chose protracted litigation to get some monetary advantage from the settlers. The settlers were often too far from where the owners lived for these to maintain effective control.

[2] Hirschman, op. cit., p. 109.

the law was to be administered by special "land judges," instead of ordinary judges. Hirshman claims that as a result most of the existing squatters were left in possession of the lands they had occupied, and acquired secure title to them.[1]

But most Colombians and other commentators argue that in this respect the law was actually counterproductive[2], in that it led to land owners dismissing their tenants and share croppers and even burning their houses. Since it raised the colono from his insecure position, it allegedly made this position desirable in the eyes of the tenant farmer or share cropper, who would normally be less tempted to contest the ownership rights of the patron.

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[1] Ibid., p. 109.

[2] Duff, for example, notes that "The natural reaction of the landowners to the passage of the law was to dislodge tenants and sharecroppers from their land, so that no prescription claims could be made. The pre-1936 paternalistic system of latifundia, whereby farm workers were allotted small plots of land to grow their own food crops and perhaps even to erect dwellings, was replaced in many instances by a more impersonal system involving agricultural jornaleros, or wage earners, who were denied use of the land for their own purposes.

The law failed in execution also because no government bureaucracy was concerned specifically with its administration. A few of the Land Judges mentioned in Chapter III were appointed, but after 1938 their appointments were not renewed. The Ministry of National Economy was the government agency entrusted with the execution of the law, but this Ministry was concerned with the entire economy of the country. A small Division of Agriculture existed within the Ministry, but possessed neither the influence nor the qualified personnel necessary to administer the law effectively. The failure of the agrarian laws is due, among other reasons, to the fact that compliance with laws of a social character cannot be expected without an organization that stimulates, facilitates, and directs individual action. This may well be a basic rule for all attempts at social reform in Colombia and elsewhere as well."

If the effect of the Law was to push people from the "worker with a plot" to the "worker without a plot," present evidence to the effect that the farmer category is still very important would suggest that the effect either was not particularly strong or subsequently slipped from sight as things reverted to their previous state.

Hirshman claims that while this is the "result" discussed almost uniformally throughout the subsequent literature, these events were not nearly as pervasive as reported. He found it difficult to find specific examples, in contrast to the amply documented and continuous violence of the period before Law 200 was passed. (He does suggest that the hacienda owners were more convinced than ever that cattle raising was the only generally safe use for their lands.[1]) While the "conventional wisdom" on this matter could be wrong (as Hirschman argues), even a passing familiarity with rural Colombia makes it hard to believe that in battles over uncertain titles, the small man could frequently win.

The law attempted also to reduce the uncertainties that had traditionally beset the countryside with its highly mobile peasant population. Farmers who in good faith occupied and cultivated privately owned lands would acquire legitimate title within five years. Occupants could be forcibly evicted only if the legitimate owners acted within 120 days from the date of occupation. These aspects were designed to create laws to deal with the difficult situation in which the colonos consider the land as theirs after having exercised certain acts of appropriation like cutting the timber and clearing the land, without the authorization of the owner.

Another Article (No. 6) attempted to get at the problem of cultivated and uncultivated land by saying that all privately owned lands that remained

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[1] In Chapter VI we note that the real agricultural wage appears to have fallen rapidly in the years after 1936. This could be interpreted as a result either of evictions of tenants or switching of large farmers to non labor intensive cattle farming -- both would lead to an increasing supply of labor relative to the demand and a fall in wages. But there are other plausible explanations for the wage fall.

uncultivated for 10 consecutive years were to revert to the public domain, with few exceptions (including properties of less than 300 hectares). This Article drew the most attention and least application.[1] Hirshman interprets this as the theoretical or "lyrical" portion of the law, which, as usual, was not applied, and whose lack of application made it possible later on for people to cast discredit on the whole measure and dismiss it as an empty gesture. The law was criticized for not dealing with all land problems.

Law 100 of 1944

In the late 30's and early 40's social unrest in the countryside subsided, according to Hirshman. As we saw earlier, he interprets Law 100 of 1944, which in general strengthened the hand of the landlord, as a reaction by the government to a need to concentrate on the increasingly serious problem of agricultural production,[2] which implied among other things that the reluctance of the landlords to engage tenants or share croppers had to be overcome. Whether the change in policy direction as between Law 200 of 1936 and Law 100 of 1944 was due to a thought out change of interpretation of the problem by the government or to increasing relative power of the Sociedad de Agricultores de Colombia, a pressure group made up of large land holders and cattlemen, is unclear. Mack points out that the Sociedad was the chief originator of the Law.[3]

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[1] Hirshman, op. cit., p. 111.

[2] Interestingly enough, the ratio of agricultural prices to other prices did not rise in this period. It started its dramatic increase only at about 1944. Nor were absolute prices of agricultural goods rising appreciably until around 1943.

[3] Dennis Mack,

The law aimed at rendering it safe for the landlord to make tenancy or share cropping contracts; the tenant was not permitted except with explicit permission to grow tree crops or other perennials on his plot. Another chapter of the law dealt with "parcelization," the purchase of privately owned properties by the state, and the resale of such properties to settlers. This was usually performed in areas where de facto occupations already had taken place. The owner was paid in cash and the new occupants had to be granted long term credit. This provided a way of giving way to the continued pressure on land where it became strongest, but the cost limited the scope of the program, so that widespread expropriation was not credible. When 1946 arrived, and the article of Law 200 requiring reversion to the state of properties not cultivated over the preceding 10 years should have come into force, nothing was heard or done about it. One chapter of Law 100 of 1944 had in any case lengthened the ten year term by five more years if the owner used tenants or share croppers to bring his land under cultivation. Law 100 did not have major effects on land use patterns nor did it create as much controversy as Law 200. After Law 100, with the advent of the Conservative regimes of Ospina Perez and Laureano Gomez and the dictatorship of Rojas, agriculture in general ceased to be an important concern for the government and land reform in particular was either ignored or actively disparaged (by Gomez). Only in the late 50's, after Roja's fall, did interest revive.

Colonization and Land Parcelization Before 1961

It seems only to be required that the state be the largest land holder in a country for colonization on public lands to be assumed the appropriate solution for land tenure problems. Whether such schemes could be successful in Colombia with high quality management is unknown; it is clear that most of the past experiences have been unsuccessful ones. The first somewhat ambitious attempt (there had been unambitious attempts before this) was undertaken just after the famous Bogota riots of 1948, with the establishment of an Institute of Colonization, Parcelization and Forest Defense. Given neither financing nor personnel, its principal activity turned out to be parcelization i.e. subdivision of privately held lands that were already under some form of cultivation or use. It did virtually nothing in the colonization field.

By the time Rojas Pinilla came to power the violence which had afflicted the rural areas for a decade or more, had created a large displaced population, many of them living in provincial towns. Rojas set up a new institute of colonization and immigration, which absorbed the earlier institute and formulated ambitious and expensive plans for setting up "colonization centers." With poor management, and probably a certain amount of corruption, this exercise terminated within 19 months, with the president's consent that it be terminated being, according to Hirshman, solid evidence that it was a complete failure, since it had been one of his favorite creations.[1] Later Alberto Lleras renewed both colonization and parcelization programs, under the guidance of the Caja Agraria. Ten percent of the deposits of the

[1] Hirshman, op. cit., p. 140.

country's savings banks were channelled to the Caja, earmarked for these programs. Again the resettlement of the displaced farmers was a prime goal, and several centers were established to this end; but, as usual, unanticipated difficulties arose to bog down the program, and eventually bring it to an end. The remnants of the programs were transferred to the Agrarian Reform Institute (INCORA) when it was founded. Probably not more than 1000 families were resettled between 1959 and 1962. The cost of the projects was unknown and the results generally unsatisfactory.

Prior to 1961 there had been some voluntary breaking up of large properties motivated by social, political, or economic pressures; the individuals or companies concerned received payment for their land. In the banana zones the foreign companies had divided their plantations, turning them over to large and middle sized Colombian producers, as well as to old employees of the company.

The Adoption of the Agrarian Reform Law 135 in 1961

Hirshman suggests that the successful passage of the Agrarian Reform Law in 1961 was in part a reaction to some changes in the objective situation which had prevailed during the previous decade. The apparent failure of conversion of some grazing lands to mechanized crop production -- one of the principle objectives of the various tax schemes of the 1950's, -- to improve the lot of the mass of Colombia's rural population raised a new question. This population continued to grow, as the economic base of the cities expanded too slowly to hold it constant; as further land division occurred, and coffee prices went down from 1957 on, some of the rural population became worse off.

The demonstrated inability to push land tax measures which could increase labor use or lower land prices markedly (as opposed to having some effects on the form of non labor intensive use of larger farms) through Congress had cast much doubt on the possibility of such measures. In mid-1960 there was renewed concern over possible peasant movements. The MRL, the left leaning faction of the Liberal party, appeared for the first time in the 1960 elections, and did well in the rural areas as well as in the capital. Finally, two external conditions which also helped to set the stage for the law were the Cuban revolution and land reform, and the fact that agrarian reform suddenly became "respectable" and perhaps even financially rewarding as the "Act of Bogota" first and then the Alliance for Progress proclaimed by the U.S. Government gave it their support.[1] In the light of previous history, it would be hard to believe that the sad economic plight of the rural masses weighed very heavily on the political process; they lacked organization and the politicians had long been successful in ignoring their problems. But the violence, although not yet class oriented, gave cause for thought, as did the Cuban story. Further the landowners were naturally undergoing a secular decline in political power relative to the industrialists and the urban

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[1] In 1960 when the reform was being discussed, Lleras obtained a preliminary agreement on a 100 million peso loan from the U.S. (See Duff, op. cit., p. 33

rent their land even after an initial period during which acquisition of title is itself conditional upon performance. The law also contained much needed provisions about expropriation and limitation of property rights in areas in which public irrigation, flood control or drainage projects are undertaken. Previously some such projects had done little more than enable large scale owners to become millionaires, but had not helped to change the latifundia patterns of tenure and production. Finally, the law attempted to put teeth into the "reversion principle" of Law 200 of 1936 (whereby land uncultivated for 10 years became the property of the State) and transferred the administration and adjudication of public lands to INCORA. Overall, it is fair to say "the law itself corrected the most glaring deficiencies of previous attempts at agrarian reform. It represented a departure from the traditional partial attack on the rural problem, and attempted to provide for an agrarian reform in the sense of total development of the rural areas. Further, the law provided for an administrative entity within the government which would oversee the program of action that the law envisioned; and provide this organization with sufficient funds to implement the program. Finally, in the delicate matter of expropriation of privately owned lands, the law steered a middle course, acceptable to most Colombians, between outright confiscation and payment for expropriated land in cash."[2] And in general, the structure of INCORA as an organization seemed well designed with relatively clear lines of authority, etc.[1]

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[1]See Duff, op. cit., p. 71 for a discussion of this,

[2]Duff, op. cit., p. 61.

The first two reform projects were, respectively, in Tolima[1] (where some of the country's remaining large coffee plantations were located, some of which had been invaded in 1961 by groups of poor landless peasants) and in Nariño (where very grim conditions exist among many of the landless farmers). At about this time Currie's Operation Colombia appeared with its implicit and explicit criticisms of the land reform, and his position became a rallying cry of the opposition. Hirshman contends, nevertheless, that there were still many areas of latifundias surrounded by minifundia which fitted themselves very well to redistribution: i.e. there was substantial inefficiency on large farms, and hence grounds for optimism on both the output and redistribution impacts of land reform.

Since these first steps, the prestige and rate of achievement of INCORA have fluctuated with its political fortunes. It has received powerful leadership and must be deemed one of the few serious organizations which has even dealt with Colombian agriculture. After a decline in fortunes during the Valencia years, the Institute gained ground again under the presidency of Carlos Lleras, to the point where it is now the most important agency dealing with the rural sector -- what it does is very important both because of its large budget and because it is supposed to be attacking the basic agricultural

[1] In the municipio of Cunday, this first project was one where INCORA stood a good chance to make a real contribution and look good in the process. The area, originally controlled by a few large owners, had been severely wracked by violence and its coffee production had fallen away off -- land lay barren, many people having fled the region. By the late 50's the inhabitants had mostly returned but the large land holders did not, so their land had been invaded. Their absence made it less likely that the usual drag-out struggle would occur: in any case they were not powerful landlords.

problem -- land and income distribution.

Needless to say the politically based (i.e. vested interest based) criticisms of INCORA have continued. The important non-political issues (some of which we take up more extensively in Chapter VIII) are 1) can funds benefit the samll farmer or landless worker more when spent in the rural areas or when they foster rapid industrialization and urbanization; thereby creating urban jobs (the position maintained by Lauchlin Currie); 2) if funds are spent on the little man in agriculture, is INCORA's emphasis on land reclamation and irrigation works (and now supervised credit) along with limited land redistribution, the optimal one; 3) are the selected programs carried out efficiently? INCORA has never presented a detailed or convincing interpretation of the nature of the country's agricultural problems; its policies are in fact not based on a solid base of understanding, but rather on a shaky intuitive base. And they have varied over time. These facts, however, do not constitute criticisms. When INCORA was founded (and still) no one had a very thcrough understanding of the problems in question. INCORA's long run contribution will be based much more on its capacity to improve than on its initial starting point.

In the five years after the passing of the bill, the pace of reform slowed considerably due to many problems, among which the most serious were the unswerving opposition to the program by both the large land owners and the MRL[1], tha lack of strong governmental support (President Valencia was quite cool to INCORA and was often interpreted to be in opposition), the inadequate financing,[2] and an expropriation procedure for private lands which

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[1] Movemiento Revolucimario Liberal -- the left wing of the liberal party.

[2] See Ernest A. Duff, "Agrarian Reform in Colombia: Problems of Social Reform," Journal of Inter-American studies, January, 1966.

is often quite complex and difficult.[1] Since the reform was not Valencia's own project, funds and energies were devoted more to his program of rural pacification.[2] The financial difficulties were typified by the fact that in 1962 INCORA received only 20 million pesos from the national budget instead of the 100 million pesos prescribed by the law. It did receive a $10 million loan from USAID in July, 1963 in order to institute a nationwide program of supervised credit and has received considerable support from international sources since then, as well. Meanwhile the calls for colonization of the Llanos instead of the breaking up of adequately utilized land continued apace, but few responsible voices supported them[3].

Whether for political or "technical" reasons, it was not long before INCORA was focusing its operations more on raising production (primarily with irrigation projects) than on distribution. The change in emphasis can be seen in the official publications on the activities of INCORA, and from public statements, at least from the middle of 1964 on. While the statements of high functionaries still continued to place land distribution at least on an equal plane, the tenor even of the second annual report is quite different from

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[1] CIDA felt that after two years of operation neither the finances nor the lack of technical personnel, (it was at first believed that this would be the chief bottleneck in the enforcement of the agrarian reform) constituted the major direct limitations; these lay in the terms of the law itself, as well as a resurgence of the opposition by collective and individual actions to a reform which would seriously contemplate redistribution of privately owned lands. (CIDA, op. cit., p. 221.) Negotiations for the land with the owner can be quite long. Many months or perhaps years have been the typical experience.

[2] In particular, the Valencia administration produced an almost complete halt in the land expropriations, as became clear when the Lleras government took over in 1966 and began announcing executive approval of expropriation decrees dating as far back as 1962. (Duff, op. cit., p. 77.)

[3] This is not to say that none of the serious students of the possibilities of the Llanos were optimistic, but rather that most of the positive statements were politically rather than technically motivated.

that of the first.[1] The first report said that Colombia had large expanses of good land utilized little or not at all, even in the most densely populated regions.[2] In the second report it was indicated that at least 800,000 families now in agriculture could not be remuneratively employed there, that "there does not exist a monopoly on the lands of those (high quality) characteristics" and that the base for an agrarian reform would have to be in a more intensive utilization of the available resources. The first order of business was to be the fixing up of the 3 million hectares of good aluvial soils by means of irrigation and drainage. Irrigation projects involve redistribution of the improved land, but CIDA notes that the first five years' projects of draining and irrigation (a total of 250,000 hectares), would benefit a maximum of 25,000 farm families[3]; a complication which must be borne in mind is that, according to Law 135, having plans to irrigate is almost the only way to achieve the expropriation of the best types of land for parcelization.[4]

A number of factors appear to have played a role in this redirection of emphasis[5]. Lack of dedication by the government to a true agrarian reform, i.e. one whose major goal really is a significant improvement in the distribution of land and hence of income in rural areas was (perhaps tautologically)

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[1] CIDA, op. cit., p. 291.

[2] The second annual report (p. 81) presents figures showing that of 6 million hectares of land whose use was reported on 810 of the farms for which reporting was mandatory, about 3 million hectares were not being used at all; of these almost one half were in forest, about one quarter were subject to flooding, a small part was either too sloped or too rocky, and the rest was (according to the owners, presumably) unused for "other" reasons. It is not hard to see how these figures would lend themselves both to the interpretation that much land on large farms was unused (obvious) and also that not much "good land" was unused -- the emphasis quickly picked up by INCORA. (See INCORA, Segundo Año de Reforma Agraria, 1963, p. 81.)

[3] These figures refer to ex ante numbers; usually the ex post ones are lower; INCORA's quantitative performance is discussed below.

[4] See CIDA, op. cit., p. 293.)

[5] Some of this discussion is based on CIDA, op. cit.

the basic problem ; it was most apparent in the Valencia years. This is not to say that INCORA itself was uninterested, of course. Criticisms of agrarian reform on the grounds that it has not increased production, but rather, in a particularly difficult time for the economy, decreased it, have borne home.[1] Legal and financial influences played their role also; INCORA's experiences of the legal and other limitations gradually demonstrated the difficulty if not impossibility of obtaining enough land for parcelization. On the other hand, getting land for irrigation purposes could be done rapidly and simply, with less opposition to expropriation coming from the land-holders since their own remaining lands increase in value as a result of the irrigation. The financial resources required for the purchasing of large private lands had to come from the national budget, while foreign funds would be easily obtained for irrigation projects; the international institutions prefer the conventional type of investment with more easily perceptible and immediate results on production; some sources of funds are biased against expropriation for political reasons.

The history of INCORA presents a fascinating picture of the obstacles to social change. It started with the advantage of a policy goal (land redistribution and supply of auxiliary facilities) which, whether because of unusually clear thinking in its formulation or not, was certainly a better approximation to an optimal policy than many government initiatives. It got off to a euphoric start, overcame opposition in a legislative struggle,

[1] The opposite argument that success of the agrarian reform in terms of output increase would decrease agricultural prices so that it would not be a financial success, (i.e. it would not increase farmers' incomes) was also heard but undoubtedly taken less seriously. On such emotional issues one might generalize that all possible arguments will be heard, many of them being inconsistent with each other, with mutually exclusive ones on occasion coming from the same person.

and was led by a dynamic, intelligent director. But its weaknesses, relative to the overwhelming forces which could be mounted against it, gradually emerged.

One weakness, perhaps, lay in the difficulty (impossibility?) of proving that land reform would be effective in raising compesino incomes (the ideas were of course, widespread that the compesino had no managerial potential, did not like to work etc. -- the typical views which emanate from social structures like Colombia's), that it would not decrease output, and that colonization would , in any case, be a better alternative.[1] Although the weight of evidence built up in the 1960's suggests that the original policy directions were good ones, this information would probably not have been key to changing many people's minds, given the wealth of misinformation from which it would have to be separated. But one wonders whether a lack of confidence in its original interpretation on the part of INCORA and of its strong backers gradually developed in the face of the continuous attacks of the years to follow -- it would have been understandable. And to the extent that Peñalosa and others involved in the decision to reorient policy did so out of their own convictions, a lack of information or understanding of the dangers of that route and of the alternatives may have been very costly. The psychological need not to fail (and there was by the mid 60's little hope of avoiding failure unless the programs goals were redefined) probably contributed to the increasing rationalization by Peñalosa and others in INCORA of the new directions. They talked themselves into their new beliefs.

[1] Even Alberto Lleras originally put forward the idea of a reform based on colonization; he subsequently changed his mind, but the original position bespoke a lack of information which was inevitably rather general.

But the more obvious explanation is simply that the opposing forces were basically too strong. The large-scale farmers, represented by SAC, made INCORA back away from specific plans in several areas.[1] They became adroit at converting grazing land to sugar in Valle when the possibility of expropriation loomed. They were adequately supported in the press (though not overwhelmingly). Sometimes they made money out of INCORA.[2] The legal framework which made expropriation difficult unless land improvement was planned was part of a system evolved over centuries to benefit the man of property. The financial constraints were severe.[3] And the small farmers did not constitute a strong

[1] For example in Cordoba #1, a project begun in 1962; Peñalosa admitted at one point in the public wrangle with the Cattle Growers Association of the Coast and SAC that INCORA was expropriating adequately cultivated lands, and subsequently had to backdown from doing so.

In Valle #1 it essentially elected not to try to overcome the hostility or power of the organized opposition and expropriate. Instead, it focussed on supervised credit, irrigation and a "technical" rather than a "social" image. (Duff, op. cit., p. 87.)

[2] Originally the price set on land INCORA was to purchase was the assessed value plus 30%. But pressure led to the acceptance of an autoevaluation system which raised the prices paid substantially. People who feel expropriation is possible raise the evaluations. Some owners have waited anxiously for sales to INCORA at above market price.

[3] Evaluating the argument that the country's financial problems were important in slowing the pace of reform is more difficult than dealing with some of the other factors. Colombia's economy was in relative stagnation for a decade after the collapse of coffee prices in 1957, and a chronic balance of payments problem plagued her. The latter was hardly relevant, since the import component of an agrarian reform is low. The more interesting question is whether a budget squeeze like that of 1962 (when INCORA's received only 20 million pesos from the nation rather than the stipulated 100 million) can be partially blamed. The relative expendability of this expenditure indicates that it was not high priority, but does not prove that the funds would have been available with an easier budget. The real question is whether the slow pace of projects due to the constraint simply meant that the reaction of opposing groups and the reorientation of INCORA's strategy to the relatively expensive irrigation projects were a little more delayed than they would otherwise have been. Ever since this reorientation, it could be argued that technically and financially the alternative of a more redistributive approach which would have affected more people than the one actually taken has existed, but been ignored.

counterweight since past experience told them to (correctly) expect little of the government and since their suppressed state was not a likely base for effective political action. Ex post, it is all too easy to explain INCORA's ineffectiveness.

This is not to say that the conservative ranks were solid. The passage of the law in the first place disproved that. There is no homogeneous oligopoly with fully common interests in Colombia. But it was one thing for the various groups like the Church (or part of it) the Commerce Federation, the National Society of Agrononists and so on to stand up and be counted in 1961. It was another for them to maintain comparatively aggressive stances as the years went by or to contribute real support to the reform in the stage of application. The victims of the reform, on the other hand, were most powerful when their interests began to be actually threatened. They were more concentrated, more familiar with the issues and quicker on the draw than any other interested group besides INCORA itself. And INCORA could not overcome them alone.[1] When its support from the President was strong (as

[1]Along with the Colombian organizations and pressure groups which continued to support the reform, but less effectively after the period of legislation, were foreign organizations including the U.S. government, FAO, the OAS and others. (The CIDA study, to which we make frequent reference here, was carried out by a study mission for the OAS, IABD, ECLA and FAO AND THE Inter American Institute of Agricultural Sciences -- the members of the committee; a very serious and extensive study, it came out (as have almost all such studies) against colonization, the use of taxation as an important tool and INCORA's claims (begun by that time) that there was little underutilized land.

The FAO has continually made . technical advisors available to INCORA, and AID has made funds and collaborators available. Colombia's agrarian reform was held up in the early years of the Alliance for Progress as a really promising initiative, and Congressional discussions of the progress of the Alliance for Progress often centered on this and similar rpojects as measuring rods of the program. U.S. aid to the program was not, however, publicized too widely in Colombia, for obvious political reasons. By 1968 (continued on next page)

with Carlos Lleras) things happened faster than when it was weak (as with Valencia); but all this was within a range which never approached a level which could have led to important structural change.[1]

INCORA's history to date raises much doubt as to whether important structural changes in aid of the rural poor can occur without more participation from them. At a superficial level, it can be argued that only they know what they need; at a more basic one, that only they want it enough. Many supporters fo agrarian reform differed only in degree from the opponents in

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[1] (contined from previous page) a total of 18.5 (Tamayo , op. cit., p. 55) millions of dollars had been channelled to it since its inception (loans of 1963 and 1966 for supervised credit and land reclamation). The U.S. funds have undoubtedly helped; if all had been expended by the end of 1968 they would have constituted perhaps 15-20% of INCORA's total expenditures. (BID loans of the same period totalled 37.6 million, and were earmarked for infrastructure, irrigation and colonization projects.) The support has sometimes been less than enthusiastic, not only for the specific program and activities of INCORA (understandable) but also, and more importantly, for the underlying idea that either production growth and land redistribution were not in conflict, or if they were the latter should take some precedence. Lack of conformity of point of view on this was only natural in view of the lack of demonstrability of the propositions. And Americans in general do not find obvious logic for the concept of land reform in their own agrarian history. Hence at least some of the AID officials have either been cool on the reform or been in favor of pushing in towards its more recent concentration on production rather than distribution and on working with farmers who are not really small by Colombian standards. It should be emphasized, however, that there is no reason to believe that the position of individual American officials was substantially important in determining INCORA's policy directions; Peñalosa appears to have been his own man -- not at all addicted to foreign advice.

[1] Delgado (op. cit., p. 14) argues that Law 135 itself was framed in such a way that extensive land redistribution was never really a serious possibility, i.e. the first chapters of the law referred to uncultivated land and national lands, and they appeared to receive more emphasis than "parcelization." Hirschman's counter-argument, that the secret of the program's potential success lay to some extent in its disguising the possible ultimate effects also has its plausibility. Whether the results so far (i.e. no progress) were really predictable from the way the law was written is thus not so simple as it might appear.

their attitude of condesencion toward the campesinos. Duff notes, with respect to the attacks on the campesinos ability to take advantage of the opportunities raised by agrarian reform: "Strangely, this line of attack against agrarian reform was not refuted by its proponents. In fact, the whole tenor of arguments in Congress and in the press seemed to be that 'We will do something for these people, whether they want it or not.'" His interpretation is "If this analysis is correct (and recent events indicate that it is), a basic decision to create support for the agrarian reform must first be made. That decision has not yet been made, and there are few indicators that it will, in fact, be forthcoming. Perhaps the only indicator pointing to the possibility of such a decision is the character of President Carlos Lleras Restrepo. Lleras Restrepo, the father of the agrarian reform program, did, in fact, take his case to the campesinos during 1960 and 1961. His recent pronouncements on agrarian reform indicate that he is prepared to do this again, if he believes it necessary to the success of the program."

"Again, it would appear that the liberal Colombian leaders were faced with a dilemma they did not wish to resolve. On one hand, their social reform program, in order to succeed, needed popular support, which could come only through active involvement of a large number of people through intense propaganda activities. On the other hand, the liberal leaders feared the consequences of such involvement. They did not relish the prospect of throwing open to more and more people the traditionally closed preserve of political action. They perhaps feared that such involvement might eventually lead to a diminution of their own political power at the hands of people who, if left alone, might never become seriously interested in political action. Whatever

their reasons, the groups favoring agrarian reform consciously or unconsciously have steadfastly refused to take the all-important step of attempting to create a constituency for INCORA. Campesino apathy toward the agrarian reform program continues, and the argument that the campesinos are not ready for agrarian reform (in the sense that they have not become its partisans) appears to have some validity."[2]

An interesting suggestion, made by FAO in 1962 and directed at lowering both the monetary costs of INCORA operations and costs resulting from disincentives to current land owners and eventual loss of their entrepreneurial talents, was to pay for lands taken over in the populated interior of the country with larger tracts of government land in the eastern llanos.[1] Along with the budgetary advantages, the proposal reflected the failure of governmental colonization efforts in the east and the success of at least some private operations in an area where cattle ranching, the favored land use of the large scale farmers, secured the only feasible use of the land for the foreseeable future. But the proposal was politically unacceptable.

The upturn of INCORA's fortunes during the Lleras years is amply documented by the expenditure figures presented in Table V-8 . It is now a well established part of the institutional structure, with a series of

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[1] UN Food and Agriculture Organization, Long Term FAO T.A. Programs - Colombia, (Bogota: FAO, January 15, 1962) mimeo.

[2] Duff, op. cit., p. 110.

Table V-8

Incora Expenditures, by Type
(Millions of current pesos)

Year	Accion Comunal (1)	Co-ops (2)	Roads (vias) (3)	Titling (4)	Purchase of Land (5)	Purchase of Land and Titling Costs (6)	Studies (primarily related to Land Development) (7)	Land Development (8)	Land Development Studies (9)	Credit (10)	Investment in Credit (i.e., change in credit outstanding from previous years) (11)	Technical Assistance, Research (12)	Other (13)	Total (data of plan Quinquenal 1968-72) (14)
1962			.960	n.a.	n.a.	2.7	4.3							26.2
1963			12.3	n.a.	n.a.	12.3	5.1	4.9	10.0			9.2		79.5
1964			19.4	n.a.	n.a.	38.3	14.4	20.6	35.0	26.7	26.0	23.0		204.0
1965			19.2	n.a.	n.a.	38.4	15.4	47.2	62.6	78.1	64.0	26.5		306.0
1966			13.5	4.5	18.0	22.5	23.3	61.2	84.5	135.8	99.0	32.5		384.0
1967			22.0	6.1	50.9	57.0	14.5	82.3	96.8	200.2	161.0	48.7		576.6
1968			}			}			}	}	}	}		=897.4[a]
1969 (to Nov.)			59.2			153.3			350.1	606.3	16.0	113.3		=1,168.2[a]
											17.24	248.2	439.3[+]	=2,493.7
Total to Nov. 1968	26.5	24.6	146.6	29.1	295.4	324.5			639.0	104.71	6.50			

[a] estimated. [+] Of which 216.2 was "other operational costs"

Sources: For annual expenditure data 1962-67, Estadisticas Fiscales y Administrativas, Controleria General de la Republica; for cumulative expenditures to November 1969, Oscar Delgado, "La Reforma Agraria: Ineficaz y Regresiva," Flash, Sept. 16-30, 1970, p. 9. Data on credit from Ernesto Velez Koppel, El Credito Supervisado Del Incora, op. cit. p. 10

Since two separate sources were used and the expenditures along various lines for 1968 and January-November 1969 were deduced as the total accumulated to November 69 less the sum of the expenditures during 1962-7, the estimates for those two years may be wrong; but the errors are probably small.

important functions.[1] Its recorded achievements to date and its plans for the next five years are summarized quantitatively in Table V-9. As of June 30, 1969, the number of titles given was about 92,000 with an area of 2,750 thousand hectares. And about 40,000 families had received credit from the supervised credit program. (INCORA uses the services of the traditional development banks (Caja Agraria, Banco Ganadero, Banco Popular) to handle its loans.) As of the end of 1969, new loans totalling 823 million pesos had been conceded; the portfolio at that point was 419 million pesos.[2] As of the end of 1967, part of this credit had gone to help incorporate 250,000 hectares into commercial production.[3]

It is worth noting that the number of families who have actually received title to new land, now (1969) estimated at something over 80,000, is an overestimate of the number who will benefit substantially in the long run

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[1] In the early months of 1965 a subcommission of important people including the legal advisor of INCORA was commissioned to prepare some modifications to Law 135, aimed at overcoming some of the difficulties which had arisen up to that time. The proposals included: doubling of the budget assessment to agrarian reform (the value of the peso had depreciated at least 50 per cent since the passing of Law 135); more flexibility for INCORA in the expropriation of private lands adequate to be cultivated; discontinuation of the exemption of 200 hectares of an expropriation (i.e. the owners would keep this much) when 50 per cent or more of the property is exploited by small renters or share croppers; a change in the exemption rule for irrigated areas so that the minimum amount exempt from expropriation (originally one-fifth of the total with a maximum of 100 acres) will be simply an amount equivalent to that necessary to make an economic farm; and an extension of the timing of payments for lands acquired. In this proposal, there is an item to the effect that the law of exclusion will apply equally to owners who acquire land after the adoption of a zone as a project by INCORA. This disposition will clearly favor the subdivision of large plots by sale to other powerful land holders in order to avoid expropriation.

[2] Ernesto Velez Koppel, El Credito Supervisado del Incora, Incora, Bogota, Junio, 1970, p. 12.

[3] INCORA, Seis Anos de Reforma Social Agraria en Colombia, 1962-67, 1968, p. 23.

Table V-7

Land and Credit Achievements of INCORA

Year	Families Receiving Titles to Land (1)	Hectares Distributed to These Families (2)	Way Distributed Land Was Acquired by Incora: Government Lands[2] Number (3)	Area (4)	Purchase, Expropriation, or Extinction of Private Domain: Number (5)	Area (6)	Land Acquired by Incora in Given Year (hectares): Purchases (7)	Expropriation (8)	Extinction of Private Domain & Cesion (9)	Credit[3]: Number of Families Receiving Loans in Given Year (10)	New Loans (thousands of pesos) (11)	Loans Outstanding (thousands of pesos) (12)	Number of New Loans (13)
1962	4,377	211,924	4,324	211,112			617	154	18,136				
1963	6,550	321,427	6,109	316,865			12,422	1,483	263,427				
1964	8,813	405,888					17,045	7,651	1,044,102	2.556	27.5	26.0	
1965	12,213	383,548					23,655	9,453	384,249	7,621	82.7	90.0	
1966	16,160	458,241					11,611	11,699	95,352	11,993	46.0	189.0	
1967	18,388	455,723					35,047	13,305	393,712	19.269	247.2	350.0	
1968	16,972	362,073						15,130	41,949	26,482	279.1	517.0	
June 30, 1969	8,727	152,477						4,769					
April 69 Process Completed													
Total (including all processes initiated as of June 30 1969.)[a]	92,200	2,751,301	81,188	2,638,531	7,012	112,770	145,632	64,333	3,174,166[1]	17,849* 26,500**	440.814* 778,500**	289.372*	39,094*

a/ Data from DANE, Boletin Mensual de Estadistica, Enero, 1970, p. 119.

* As of December, 1967.

** As of December, 1968.

1/ As of Dec. 1967 this total was 2,209,553 and included extinction of private domain and cession (1,944,910 and 264,643, respectively.)

2/ Of the public lands distributed under the overall program of INCORA, some are distributed directly by INCORA and others by delegations in the departmental governments; the figure here includes both.

three years of grace before beginning. Without denying the very considerable importance of title problems in Colombia, the conclusion is that the number of families getting more land to cultivate under the program (what one normally thinks of as the basic feature of an agrarian reform) has been very small, almost insignificant,[1] -- in spite of the increasing budget and prestige of the institute in the last few years.

Unfortunately it appears that INCORA, perhaps through acceptance of the very questionable interpretation of the problems of the agricultural sector as being primarily slow output growth and low agricultural exports rather than income distribution, perhaps through the feeling that there is no real hope of attacking the land distribution problem in a serious way, or perhaps through a combination of these two, has tended more and more to emphasize output increases as the goal, commercial agriculture and irrigation as the means.[2]

A breakdown of the direction of expenditures over time indicates a change in emphasis over the last few years. (See Table V-8) Over the period 1962-65 land purchase and titling took 92 thousand pesos and land development costs (including costs of feasibility studies, etc.) 104 thousand; over 1965-69. the respective amounts were 233 thousand and 535 thousand (current pesos). Meanwhile credit has become a major program.

While useful, these figures do not reflect changes in INCORA policy in any precise way because of lags between decisions and expenditures. The

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[1]It is even possible that the net effect on agricultural employment in the regions has been negative, since there is some evidence of displacement of some farmers in some projects. (See below.)

[2]This trend was signalled by the nature of INCORA's operation of a project it inhereted from the CVC. Duff (op. cit., p. 87) notes

"The Valle project, although atypical under the original terms of the law, has in fact become a typical agrarian reform project. It is, first of all, a high-cost irrigation project, with an emphasis on land reclamation, rather than on any basic redistribution of large, relatively unproductive estates. Secondly, the project has made extensive use of supervised credit as a means of increasing production, although at the same time giving an appearance of bringing agrarian reform to the area. Third, INCORA projects a "technical" rather than a "social" image for its operations. The emphasis is on increased agricultural production and the technical benefits for surrounding farmers, rather than on any basic redistribution of production factors plus an increase in production. Finally, because of all the above factors, Valle No. 1 is extraordinarily limited in scope and in its effect on agriculture and on socio-economic relationships in the Cauca Valley. It is, in effect, a "tame" project--one which is designed to offend the fewest number of people possible and to assure that those it does offend are not those politically powerful within the current departmental and national power structure. Approval of INCORA's activities is generally expressed by both Conservative newspapers in Cali, as well as among the few who have received land within the project. One of the parcelees opined that "people must have more patience. They must wait their turn, and if they will, they too will benefit from the reform."[27] These sentiments are not shared by those who have thus far not benefited from the project. A farmer in nearby Versalles expressed the sentiments of this much larger group: "We obviously can't expect anything from INCORA here, so our only course is to organize and demand some action from the government."[28] A still harsher criticism of Project Valle No. 1 has come from a group of small landholders and farmers who have had their land expropriated to make way for drainage canals and irrigation ditches within the project. This group, whose cause is being championed by the National Farmers' Federation (Federacion de Agricultores Nacional, or FANAL), claims that while their land has been taken, they have received no compensation from INCORA or from the CVC and that both organizations steadfastly claim that the other is responsible for payment. Through its actions thus far in the Cauca Valley, INCORA appears to have gone to great lengths to avoid antagonizing the traditional power elite of the Valley, but at the same time has created considerable enmity among the very group of people it supposedly is helping."[1]

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[1] Duff, op. cit., pp. 87-88

figures show a higher share of all expenses going to land purchase during Valencia's presidency than during that of Carlos Lleras. But part of the expenditure of 1963 and 1964 had been previously obligated; by Valencia's final year, his attitude showed through in almost no purchases. Lleras' arrival brought a quickening. Thus Duff (op. cit., p. 78) notes that "Executive approvals of expropriations have more than doubled over the previous administration, and a new project law, intended to reduce the legal obstacles to expropriation and to provide for increased payment for expropriated lands in bonds, has been introduced in the Congress."[2]

Over the almost eight years of 1962-69 only about 13 or 14% of all INCORA's net expenditure[1] (some of it indirect, i.e. carried out by other agencies) was for land purchase and titling, and perhaps 16% on expenditures whose nature most suggests that they will be income distribution improving (i.e. titling, land purchase, accion communal and co-ops). The other expenditures could improve distribution but it is perhaps less obvious that this be the expected result.

It is true, as indicated in Table V-9, that INCORA now possesses a good deal of land not yet adjudicated, but the above figures suggest in any case that large scale redistribution of operative control over land is not going to be effected by INCORA -- other evidence suggests that it is not a major goal of INCORA.

The policy of heavy emphasis on irrigation has been defended by some as constituting the only or easiest way to expropriate land. But this has been

[1] Net of repayments on credit.

[2] Duff, op. cit., p. 78.

questioned, and even if true might only imply that if expropriation is this expensive it is not worthwhile. The problem of reaching many people is due in part to production's being a priority goal; it is probably also due in part to the need for such a politically vulnerable organization to look to its public image. Creation of a good image often implies having a few projects which look highly successful, not having a lot which have achieved lower income increases but for more people.[1] This is the "monument psychology," to some extent probably forced on INCORA.

Criticisms of INCORA for not doing more along the lines of land redistribution are not valid if this line of policy is prohibitively expensive, under present expropriation arrangements and if the Institute has no way to alter these arrangements. But since redistribution is the only tool in INCORA's arsenal which might coneeivably help to redress significantly the inequalities in agriculture, inability here means irrelevance to the real agricultural problem, unless some effective rethinking is done about better and more extensive ways to use supervised credit, extension services and the other ways to raise low rural incomes.

INCORA's ex-director and then Minister of Agriculture, Enrique Peñalosa, characterized the tendency to put production first and income distribution second, and also the lack of cost consciousness which seems to have been one of INCORA's failings. INCORA recently described its agricultural development

[1] The same basic phenomenon presents itself on a more specific level as well; for example, there seems to be a tendency for some regional credit managers to prefer continually giving credit to those individuals who have satisfactory repayment records, in order to give an appearance of solidity to their portfolio and program, even if the individuals wish to graduate from credit.

campaigns as "directed toward production on an area of about 100,000 hectares" of products needed in domestic industry or exportable,[1] as well as toward specialization or diversification of regional production.

In 1967 INCORA established the basis for a "program of massive conversion of renters and sharecroppers into owners."[2] In 1966 a campaign to inscribe members of these two groups was begun and the program began in 1968. At the end of 1969 about 32 million pesos had been spent in this category. But a successful attack on the distribution problem continues to be inhibited partly by a priority of the output (and export) goal, partly by the warping effects of political pressure, and also by problems of internal inefficiency -- not surprising in a new organization which has sprung up so quickly.

Despite its dynamic director, INCORA still has enough problems as an institution[3] to raise serious questions about its capability to effect

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[1] Such categories are: avocado, banana, cacao, rubber, citrus fruits, temperate fruits, grapes, vegetables, maranon, african palm, pineapple, other tropical fruits and yuca for industrial use. (INCORA, op. cit., p. 27.)

[2] INCORA, "Seis Años de Reforma Social Agraria en Colombia, 1962-1967, 1968, p. 20.

[3] It seems to suffer, although perhaps in lesser degree, from many of the failings of other agricultural institutions in Colombia. For example, the information on which its decisions are based is very limited, and usually filters to the director through a very small number of subdirectors, who are not always well-informed on agricultural conditions. The director often does not become aware of the problems of his own organization till they have reached a serious stage.

There is a high turnover of personnel; the amount its agronomos working in the city receive tends to be less than they could get in other jobs; and the same salaries are paid in the country as in the city, so few are interested in choosing the country. The result is a rather low quality of agronomos in the rural areas, a poor utilization overall of INCORA's human resources.

INCORA has built up a reputation as rather intolerant to criticism, unappreciative of constructive suggestion and somewhat dedicated to obscuring what it is doing (by limiting access to information on its operations, and advertising its operations in the media with the same sort of misrepresentation one might expect of a private company). It would be naive to ignore the possibility (better the certainty) that complete published accounts would be misused against INCORA, given the nature of Colombia's social system and much of its press. But the secrecy clearly has important costs as well. (See Delgado, op. cit. for a vigorous criticism of INCORA on these counts.)

substantial improvement in the lot of Colombia's farmers, even if its goals were well defined.

What has been the net effect of INCORA's presence and operations on agricultural output? Apart from whether land which actually changes hands is now more productive than before (and there is no reason to question this, especially since INCORA has done considerable investment in irrigation, etc.), the positive incentive effect whereby it is suggested that inefficiently used land may be put into use with a view to preventing expropriation and the negative "scare" effect whereby investment which would otherwise have occurred is forestalled must be evaluated. It is obvious from the output series that neither has been dramatically significant. Crop output, which had been rising at about 2.8% over the years 1958-62, rose at about 3.1% between 1962 and 1967. The more relevant growth rate of commercial crops was markedly slower in 1962-67 (4.4%) than in 1958-62 (14.5%); but part of this was due to the inevitable slowdown in rate of output growth as market constraints began to make themselves felt -- in any case the failure of this slowdown to affect the rate of growth of total crop output indicates that its effects, if negative, were not dramatic.[1] Unquestionably both phenomena exist, but it is not very interesting to know that. INCORA has been criticized for being secretive and unpredictable and thus generating a larger scare effect

[1] Aggregate figures like those presented here are, in any case, a superficial way to judge the importance of the effects in question -- many other factors help to determine output. There is the possibility of significant lags in these incentive and scare mechanisms, the results can be reversed by choosing slightly different periods, and so on. The figures can only tell us that the effects were not striking in the short run. Regional figures would be necessary to test it seriously.

than necessary.

In the last few years the increasing emphasis on production by INCORA has been focussed on commercial products. In 1967 INCORA cited the goal of its output campaign as putting 100,000 hectares into production of needed products like African palm, rubber, cacao, etc. Much of this corresponds to the reclaimed and developed land. Many difficulties have plagued the first few years, due to insufficient organization of the central unit in Bogota, lack of needed technical information and other reasons, so that considerable losses have occurred. Presumably learning will improve the performance of these projects, though the experience to date would suggest that dramatic increases in production should not be expected for quite some years.

Of more interest than INCORA's impact on total output is the benefit cost ratio in terms of the lower income families affected, and the relation between that ratio and the type of program, i.e. its efficiency as an income and wealth redistributive program. The relevant programs to distinguish are probably land purchase and redistribution without (significant) improvement in the populated interior of the country, the same with development (chiefly irrigation), colonization (mainly in the Llanos) and programs not involving land distribution but better availability of inputs, credit, etc.[1] Overall, the amount of income redistribution in effect carried out by INCORA cannot be large, since almost no land has been expropriated, (less than

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[1] This is not to disregard the titling operation.

5,000 hectares as of mid 1969)[1] and since the pattern of land distribution and implicit subsidization of recipients of developed land has not been demonstrated to be reaching the really poor and may have been displacing substantial numbers of people.[2]

Land purchase (at reasonable prices) even if it did not decrease the wealth of the seller could improve distribution. 145,000 hectares had been purchased by mid 1969, but it is interesting to note that in general the purchases were not of very large units, and that the absolute number of large farms purchased must have been quite small.[3] Tamayo concludes that INCORA has

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[1] This figure contrasts with the official figure of 64,000 hectares -- but this is land on which expropriation procedures have been begun. As indicated in Table V-9 such procedings were under way on almost 20,000 hectares by the end of 1968. These figures reflect the legal obstacles in the face of land redistribution. The 60,000 hectare difference is in process, before the Administrative Tribunal, already declared not subject to expropriation by that Tribunal, or reverted to direct negotiation. (See Tamayo, op. cit., p. 8).

[2] The issue of the appropriate size for parcels is a complicated (and heated) one. The fact that average size of adjudicated parcel has been around 16 or 17 hectares, whereas median farm size (based on the 1960 agricultural census) is probably around 3 hectares, raises the obvious possibility that the parcels are too large. On the other hand, many argue seriously that they are too small. Without knowing the land quality and other characteristics in detail it is impossible to comment, but the suspicion is that the beneficiaries wind up rather high in the rural income distribution.

Tamayo argues (op. cit., p. 15) that in the colonization zones (where cattle is the basic industry) even 40 or 50 hectares is insufficient for a family of 7; the average amount titled there is less than 40 hectares. Average size of plot of public land in departments where more than 1,000 titles had been adjudicated by mid 1969 varied from less than 10 hectares (Huila, Risaralda) to around 60 (Antioquia, Bolivar, Cordoba, Magdalena). Thus, many plots were less than 10 hectares.

[3] The average size of purchased unit (when the owner retained part of his farm this would be an understatement of its original size, of course) was around 125 hectares; the absolute number of farms over 200 hectares purchased must have been not more than one or two hundred. Twenty three farms (not necessarily the largest in the group) accounted for 33,000 hectares. (See Tamayo, op. cit., p. 10) The need to purchase small units is associated with the desire to acquire a block of land, especially when irrigation projects are to be established.

basically not touched land under cultivation, except for some smaller farms. Further, it is widely believed that some sales have occurred at such attractive prices to the seller, that he was made better off by the deal (and may have tried hard to bring it off).

The feasibility of extensive resettlement through colonization turns, among other things, on the amount of public land which could be developed in the east, and the costs of such development. INCORA has currently much land at its disposal including public lands which could be titled -- perhaps three or four million hectares.[1] But such global figures are largely irrelevant, since the real issue with respect to colonization is the cost. Thus far INCORA's principal activity has been titling -- auxiliary services reach a much smaller (though increasing) number of families.[2] And it is clear that such services are crucial in such projects; if they are unavailable.

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[1] Tamayo (op, cit. p. 19) estimates a theoretical minimum amount of land INCORA must have by adding the difference between land acquired by extinction of private domain and public lands titled for those departments where the former figure is larger. This figure (in 1969) was about two million hectares. Much of this was in Bolivar, Cesar, and Boyaca.

[2] Thus in six colonization project areas (Cauca #1, Arauca # 1, Caqueta #1, Choco #1, Putumayo #1 and Meta #1) about one third of the almost 20,000 title receive had obtained supervised credit (at the end of 1968). See Tamayo, op. cit., p. 26.

projects (excluding supervised credit, presumably). The total number of families who had received land in INCORA programs in Caqueta, Meta, Arauca and Putamayo by mid 1969 was 12,700, but presumably most of these were spontaneous settlers, so no global relation can be drawn between the expenses and the number of families. Delgado interprets Samper's statement that the average cost per family settled is 200,000 to imply that just a little over 4,000 families had been benefitted. He also notes that Samper foresaw spending 1,400 million pesos in this line during 1970-74.

The high cost of creating a family farm by the colonization and land development routes implies the impossibility of effecting a strong positive effect on the income of the "bottom half." The supervised credit program also seems to steer away from this group; the average sizes of loans is far greater than those of the Caja Agraria.[1]

As is apparent in its mushrooming budget, INCORA has gradually taken on more functions (and a large staff -- numbering more than 5,000 in 1970). Although the bulk of its expenditures in 1968-69 remained in the traditional categories (land redistribution and land development) credit, technical assistance, research, cooperatives and support to Accion Communal took up 35-40% of net expenditures. The increasing relative importance and increasing set of tasks given INCORA seems generated partly by the increasing awareness of the complexity of the needs of rural development and a coordinated attack on them. Thus "This would mean either physical transfer or close and continuing control by the Institute over the host of ancillary programs--credit, cooperatives, education,

[1] Delgado, op. cit., says the average loan per borrower is about 7,000 in the Caja and 25,000 in INCORA. The former figure may be a little low but the difference he indicates seems about right.

extension, housing, communications, public health--necessary in the reform projects. It is felt that perhaps much of this emphasis upon INCORA as the coordinating agency comes from two factors: the high regard, both professional and political, in which Enrique Peñalosa is held; and the fact that Peñalosa, having survived the 1962 and 1966 changes in regime, appears as a rather permanent General Manager of INCORA. In addition, the logical argument has been made that 'INCORA is empowered by law to direct the agrarian reform effort, as is no other administrative entity in Colombia. The INstitute should, therefore, be given the powers necessary for successful direction of the effort.'"[1]

To illustrate concretely a number of INCORA's strengths and weaknesses, the reform project known as Atlantico III serves as an example.[2] The chronology gives a feel, at the micro level, of the alignments working for and against social progress, of the obstacles and difficulties placed in INCORA's way by the conditions of such an area, and of its own internal weaknesses in dealing with them. The project is at the South of the department and has 37,600 hectares (not including an irrigation reservoir). There are at present two very different types of land use, the first being the traditional extensive cattle raising (one head per hectare) with a little yucca and corn; the second is the technified operation on INCORA's parcels where the major crops are citric fruits, pineapple, vegetables, onions, etc. The population (continually on the increase) in the area of the project is 28,500. The campesino has little attachment to his land and is quite willing to emigrate to other

[1] Duff, op. cit., p. 193.

[2] Most of the discussion which follows is based on Hugo Ramos Pena, et. al, Estudio de una Area de Reforma Agraria, Proyecto de Investigacion Presentado como Requisito Parcial para Obtener el Titulo de Ingeniero Agronomo, Universidad Nacional de Colombia, Facultad de Agronomia, Bogota, 1968.

zones looking for a livelihood.

Educational levels are low; in one vereda a teacher noted that there were only 135 desks for the 391 students and that some had to sit on the floor; since many parents did not have enough to buy a bench for their children they decided not to send them rather than have them sitting on the floor. Lack of public school facilities have created the "escuelas de garage" (schools in the garage) where reading and writing is taught for a low fee. The local Padre indicated that the parents did not want to keep their children out of school, but they were an important factor in the work, allowing the parents to avoid paying workers. Probably the degree of illiteracy in the project as a whole is somewhere between 60 and 70 percent.

There is very little protein in the diet -- one cause of the considerable malnutrition; many children are undernourished and even more women. Malnutrition is evidently the cause of many diseases. About 90% of the people do not drink milk and 75% do not eat meat.

The land tenure situation before the arrival of INCORA included campesinos who owned small plots of land, producing primarily subsistance crops like yucca, platano, and corn, and latifundistas who had different forms of sharecropping arrangements with the great mass of landless campesinos; a common form was for the campesino to work one or two hectares for a period ranging from one to two years, then hand it over to the owner sown in pasture. Another important group in the area were the fishermen who had to hand over to the latifundistas half of their take since the latter claimed to be owners of the Cienaga (the lake or reservoir).

The municipal councils are completely controlled by the powerful

people and the potential for political power by the little man is impeded by his relations of compradazgo (kinship ties) with the large owners and the fact that the parties are multi-class.

The increasing pressure on the land (and probably the fishing base as well) eventually generated agricultural unions (sindicatos) whose formation in turn led to land invasions. After Sindicalismo had developed somewhat, primarily reflecting the desire of the campesinos to get land, the CTC (Confederacion de Trabajadores de Colombia -- the large national union, most of whose members are in industry) came into the zone and the majority of these self generated groups affiliated themselves with it. But it was not able to achieve the aspirations for land. Then the UTC[1] arrived in 1957, and initiated a campaign which was supported by the various priests of the area; its Atlantico affiliate, UTRA (Union de Trabajadores del Atlantico) gave its support to the agricultural union of Manati, thereby aiding its realization of the first invasion in late 1961 of previously swamp land which was being drained; as the latifundistas had claimed the original lake and swamp land, they now claimed the drained land. The latifundistas reacted to the invasion with violence as the army dislodged the campesinos on various occasions; the Bishop of Barranquilla replaced the local padre (who had supported the Union) but his replacement was equally zealous in the cause. Various invasions

[1] Union de Trabajadores Colombianos -- a union established in the 40's by the Church to counteract the "dangerous" leftism of the older CTC. Although originally clearly more conservative than the CTC, the UTC has over the last 15 years become more radical, reflecting in part the radicalism of many of Colombia's younger, more socially conscious clergy. But its radicalism has definite limits. Its arrival in 1957 is interpreted by some as an attempt to block the CTC movement which had marked leftist tendencies.

continued. With the gradual draining of the swamps a division between farmers and fishermen arose; the latifundistas took advantage of it by helping the formation of fishers' unions, affiliated with the CTC. But some of the fishermen seeing the success of the campesinos became land invaders themselves. The invasions had created tremendous socio-political problems; many invading farmers were in jail, others had been beaten and were in general suffering the consequences of what they had done. The situation was a sort of stalemate unattractive to everyone, and the two sides essentially reached an agreement to invite INCORA in. The Institute conditioned its working in the area on the termination of the invasions and UTRAL accepted this condition. The campesinos accepted INCORA's arrival on the basis of the understanding that they would all get family farms. But the economics of INCORA, along with the weak and ad hoc nature of the unions which had effected the invasions, combined to nullify these hopes. When INCORA took possession of the lands invaded by the agricultural and fishing unions, they were already parcelled out in plots of 1 to 2 hectares. But due to INCORA's desire to create "family" farms, these were adjudicated in plots of 8 to 16 hectares, leading to substantial displacement of campesinos. These displaced "ex-owners" are now laborers in the INCORA plots. INCORA's participation thus helped the favored group, both by ending the state of violence and harassment, and also by assigning to these families more land than they had received from the invasion. The majority of the families appear, judging from the figures, to have been made worse off in the second respect at least. The validity of INCORA's judgement that medium size farms are more efficient than smaller ones is very questionable (see the discussion of Chapter IV); so is its apparent unconcern for income

distribution within its projects.[1]

What about the displaced families, who had been part of an originally successful invasion movement? The ad hoc nature of the original organization was reflected in the fact that as of 1968 only about 20% of the number of unions members at the peak (1961) remained affiliated. As soon as they got their land they tended to withdraw. Union power had already fallen when INCORA arrived, and more so when the displacement of families hit a significant number. The number of members has diminished because some have given up, and others who now have land no longer consider it important. INCORA has absorbed the natural leaders completely, giving them special concessions. UTRAL always had a paternal type of control -- the clergy apparently has much influence in the community -- and so the unions always lacked true autonomy. So there were no true leaders in the region. INCORA has generally down-graded the significance of these unions.

Within the farmers' unions there is now a sort of division between parcelarios and non parcelarios. The objectives of the unions were re-routed and its current works are primarily accion comunal types of things like working on the Canal del Dique to avoid the floods, constructing schools, etc. This change in direction resulted from INCORA's action and was accepted and promoted by UTRAL through its moral advisers. In 1968 there was one new invasion, probably due to the very slow development of the reform in this zone (Manati), and the fact that the union leaders seem to be special in this area and promoted the invasion to help their companions even though they themselves already

[1] INCORA's logic finds no place for the comment of one local doctor who noted that "if it was desired to give land to all the campesinos on the project of family farm size, the whole Department of Atlantico would not be enough."

had land.

Consistent with its emphasis on production and efficient sized units, INCORA's presence has led to a marked mechanization with the greater part of the machinery in the hands of relatively large farmers.[1]

INCORA's performance in Atlantico III has met with most of the criticisms which might be predicted. It has allegedly pampered the big owners. It may not have the funds to get the high quality professionals needed to carry out an agrarian reform. Typical reasons given by professionals for working in INCORA are to acquire experience, in the hope of getting a chance to study abroad, etc. The Padre of Manati feels that it is too bureaucratic (he notes that the gerente is a relative of the President), too slow and incomplete, and not concerned with the social development of the campesino -- "when INCORA pays there are simply more drunken brawls." The authors criticize the funcionarios of INCORA for lack of understanding of the roots of the agrarian problem and treatment of the campesinos as inferiors. If one notes that almost everyone who could become an INCORA funcionary has, through no fault of his own, been subtly (or less subtly) indoctrinated with the idea of the inferiority of the campesino and manual work in general; that the gap in experience and life between the two groups is so wide as to make it hard to believe that even the

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[1] The authors of this study claim that the latifundistas and relatively large farmers are favored in various ways by INCORA, including payment for improvements they had made on the invaded lands, purchase of land which because of sallinity is not cultivatable, and valorization of some of their lands as a result of the infra-structure constructed. INCORA's argument with respect to the machinery was that, it had had a bad experience in a Cordoba project where it supplied the machinery to the campesionos themselves and let them administer it.

The fact that the landlords are being at least reasonably (and perhaps very) gently dealt with by INCORA reflects the basic limitation of Colombia's land reform. Whether because of the landlords sheer power, or because of the INCORA managers greater affinity to them than to the campesinos, the result tends to be something of a constant.

most empathetic funcionary could put himself inside the campesino's mind, it would be surprising if the picture were not as reported.

The increasingly obvious failure of INCORA to effect any significant modifications in land distribution has led to proposals for modifying the law, putting size limitations on the land an individual or family can own, cutting down the amount of time a project can be delayed in the legal process, distributing land in communal farms, and in general, more careful thought about the requisites of success.[1] Whether any change occurs now will depend on the political evolution of the country; the 1970 elections (in which ex-dictator Rojas received essentially the same vote as President Pastrana) revealed a changing balance of voting power against the parties of the traditional elite, and suggested that the elite would have to become more progressive or see power pass to the opposition.[2]

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[1] Coupled perhaps, with the evidence from Peru and Chile on how reforms may be set up to avoid many of the problems which arose in the Colombian case. Such comparison (see Delgado, op. cit.) bring out in clear relief the very conservative nature of the Colombian law and of its application. There was no implicit recognition of the fact that the problem is not simply the presence of minifundia and landless farmers, but also of latifundia with all their implications for the social structure.

[2] Although ANAPO, the party of ex-dictator Rojas, has certain possible internal contradictions (a basic populist image along with quite wealthy supporters, some of whom undoubtedly would try to affect its policies in non-radical directions) recent declarations by it support a serious reform. (Delgado, op. cit., p. 23)

PART V:

Semi-Public and Private Agricultural Institutions

With the exception of the regional development agencies (e.g. CVC), most of the semi-public and private institutions are organizations designed to promote the development of and aid the producers of a particular crop or group of crops. A striking aspect of the institutional developments related to agriculture in Colombia is the considerably greater success in achievement of goals by private than public or semi-public institutions. Among examples of "success stories" of non-governmental institutions are the fostering of barley production by Procebada (organized in the late 50's by Bavaria, the major beer company), and the relative success of the Coffee Growers Federation in achieving a satisfactory marketing system, in carrying out some successful extension work and rural development, and in periodically pressuring the government to raise coffee prices above the level necessary to satisfy demand. (Admittedly, this organization has a longer history than most.) Other relatively successful institutions include the Cotton Growers Association (Federacion Nacional de Algodoneros), and the Rice Growers Association.[1,2] A number of the private

[1] The histories of these two are well presented in Leurquin's two studies, referred to in earlier chapters. The Federacion de Arroceros exemplifies the case of an organization which began as a private one but later took on functions usually performed by the public sector. Thus, according to an agreement signed with the Ministry of Agriculture it furnishs the services of multiplication and distribution of improved seeds; technical assistance to cultivators relative to the choice and preparation of soils, cultivation practices, management and administration of farms; examinations and regional tests of the seed varieties developed by the CIA (now ICA); collaboration with the official or semi-official organizations in obtaining statistical data on production, cost, distribution and consumption of rice in the country and assistance of the government as a counseling agency on issues related to the cultivation of rice in the country.

[2] Other groups are the Instituto de Cereales, which began operations in 1962, (it is concerned primarily with wheat, barley and corn), the Associacion Nacional de Cultiadores de Cana (ASOCANA), the Federacion Nacional de Cultivadores de Cereales (FENALCE), and several others.

and semi-public organizations cannot be credited with dramatic increases in output or improvements in the technology relating to their product, but these are not necessarily their major goals. The defense of the producers' interest by whatever means is the natural objective; it is what has usually been rather successfully achieved. These groups have arisen partly in response to the absence of government programs of technical assistance, credit, etc. but probably more in response to a feeling that organization aids in attaining better prices.[1] Meanwhile, of the public or nearly public isntitutions, few have been impressive; the Caja Agraria and INCORA have been relatively aggressive but frequently in the pursuit of not well thought-out goals and via not too efficient functioning; further down the performance list would be INA, the Ministry of Agriculture, and others, which have typically lacked dynamism, or thought through goals and efficiency.

The greater success of private institutions results partly from the added incentive given by self-interest and partly from the low public salaries and resulting poor quality of personnel which have characterized the Ministry and almost all of the semi-public organizations. The apparently greater potential of the more or less private interest groups presents a tricky problem for public policy. There are obvious advantages to decentralizing as much as possible and putting much responsibility into the hands of these groups, but the loss of coordination and the sometimes socially inappropriate goals pursued by them diminish the advantages. The lack of coincidence between private and

[1] Lëurquin, op. cit., points out that the original goal of the Rice Growers Association was better prices, but when falling prices put a real squeeze on in Tolima, where alternative crops did not offer a good alternative, the reaction was to attempt to improve efficiency - a case, in other words, of where it was the failure to achieve the preferred goal (high price) which led to the achievement of the originally less sought but socially valuable goal of increased efficiency.

socially desirable goals results partly from the fact that strong producers' organizations usually bring about an imperfect market structure. Cotton provides a good example of the dilemma. Given the technological complexities of cotton production and the relative ineffectiveness of the Government in providing technical assistance, inputs, etc., it is clear that the successful development of the cotton industry was due in part to the organization. On the other hand, it has on occasion been able to push the price above a reasonable or equilibrium level,[1] leading to inefficient fluctuations in production and to decreased competitiveness for Colombia's cotton textile industry.[2] Lauchlin Currie argues that cotton production would have benefited from less protection,[3] as more effort would have had to be put into efficient production (exactly what happened in the rice case). Research, very important in this industry, has not been extensive; and that which has been done has not been handled by

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[1] The cotton market, with the Cotton Growers Federation on one side and the textile firms on the other, is a case of bilateral monopoly with arbitration. The Government has not tried to technify its price fixing operations but only to act as a sort of referee. (Currie doubts if there is enough information of a technical sort to do such a job well in Colombia.) Currie does not feel the industry would maintain an unduly low price in the absence of a strong seller's organization (and cites the example of barley and the beer industry).

The Cotton Growers Federation has suggested that it build storage facilities with ginning mills; Currie (op. cit.) argued that this was not economically rational and could well be aimed mainly at increasing the monopoly power of the organization. And despite the fact that one problem in the case of cotton (as of a number of other agricultural products) is lack of incentive to produce a high quality due to lack of a satisfactory grading system, the Federacion in 1963 actually suggested one single price. At that time, the Government fixed prices and price differentials by grades; but these differentials were small. There were no regional or visual quality price differentials. The small incentive given by the price differentials resulted in a low quality product which hurt the textile quality also; textile firms have had to install expensive bleaching and cleaning machinery as a result.

[2] The Coffee Growers Federation has had a similar combination of positive and negative effects. Among the positive ones are the generally beneficial influence of such programs as technical assistance to the small farmer, rural schools, etc. Among the (probably) negative ones are the inflationary impacts of credit for stored coffee.

[3] See Lauchlin Currie, El Algolon en Colombia, Problemas y Oportunidades, Bogota, 1963.

the Federacion but rather by the Instituto de Fomento Algodonero;[1] this reflects a producer organization's greater concentration on activities which increase its share of the pie than on those which increase the size of the pie.

Most of the effective private producer's organizations are dominated by large producers (e.g. the Federations for cotton, rice and coffee). Where producers are large, organization is easier since there are fewer people to organize; they are educated and of above average wealth; and large producers of a given crop are more likely to be specialized and therefore particularly interested in the profitability of the crop. Although the Colombian Society of Agriculturists, whose members are large crop farmers in general, does have some pressure group power, one might argue that its power exceeds the total power of its members as individuals by less than in the case of the crop organizations. The small farmer is frequently somewhat diversified (for his own protection), and sells a smaller portion of his output than the large one -- what he does sell often goes to local rather than national markets -- this decreases the opportunity to achieve an organized monopoly price.

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[1] The Instituto de Fomento Algodonero was begun in 1947 by three large textile companies, but it subsequently became a public entity with the Minister of Agriculture or his Representative as President of the Junta. The original goal was financing and operating the ginning and classifying operations; to this research on cotton and rotation crops was subsequently added. IFA's program was slow to develop prior to 1957. Until then a favorable exchange rate for cotton imports left little incentive to domestic production. But with the establishment in 1957 of an import exchange rate close to the free rate and further devaluation in 1957, cotton prices rose quite quickly and the textile industry became interested in expanding domestic production. With their support, IFA was able to raise price guarantees, and with the use of seeds of adopted varieties and technical help, production was stimulated very rapidly. (Witt and Wheeler, op. cit., p. 74.) It is not clear whether IFA's contribution to this was large; relatively little research has been done by it. And its extension service has made little contribution, part of the problem being that producers do not feel close to the organization. Its nature has periodically brought it into conflict with the Federacion de Algodoneros.

Given the serious problem of income distribution in agriculture, the facts that (a) crops produced largely by large farmers more frequently have efficient organizations to defend them and (b) where both small farmers and large ones produce the large ones dominate the organizations policy, may be sources of apprehension. The organizations are likely to bargain for changes which will help the large farmer more than the small one; and to the extent that an organization of large farmers is successful (e.g. cotton growers in raising cotton prices or getting more credit for cotton) this may harm the small farmer who produces something else (by raising land prices, lowering the amount of credit left for him, etc.).

"Popular" Agricultural Institutions

Special attention attaches to the few semi-public and private institutions not essentially run by and for large farmers. The Caja Agraria was designed to provide credit primarily to small farmers (though the smallest are excluded) and has certainly operated in a range where commercial banks would not have gone. Other institutions of interest are the Tobacco Producers Institute[1], the Community Action Groups (Accion Comunal) and the rural cooperatives (FANAL).

[1] The National Tobacco Institute was founded in 1954 as a semi-official body to defend the small tobacco grower. (See Ronald L. Tinnermeier, The Role of the National Institute of Tobacco in Increasing Tobacco Production in Colombia, Research Paper, The Land Tenure Center, University of Wisconsin, November 1964.) Its major functions are to increase tobacco production by offering technical advice and assistance to promote improvement of soil cultivation and handling and to search for the best prices in the markets. (Tobacco growers are indeed very small. The average tobacco farmer in 1955 had two hectares, with tobacco on one quarter of the land. In no department was the average farm size greater than 8 hectares. Only 25% of the producers owned their land and the rest were share-croppers. In 1962 the average tobacco planting was still about a half hectare, little changed since 1955.) It is financed by taxes, partly by tariffs from the importation of cigarettes and partly from government subsidies. How much of the successful growth of tobacco production can be attributed to it is unclear;
(footnote continued on next page)

Of these five the first two are almost entirely the result of action from above -- the last three are mixtures, with no easy generalization possible; overall the two with the greatest relative importance of the supposed beneficiaries in organization and operation are Accion Comunal and FANAL. The cooperatives are of many types and origins and may be associated with the other groups referred to; like cooperatives elsewhere, they are generally concerned with market problems. Accion Comunal has a wider range of activity; but its major area is in the provision of rural infrastructure (roads, schools, etc). FANAL is the only one of the groups which might be described largely as a pressure group, though the others clearly could move in that direction. Given the long run limits to the advancement of the rural poor in the absence of changes in land distribution, and given INCORA's gradual backing away from that issue (which was easy and smooth since the supposed beneficiaries did not constitute a pressure group which could have made such a retreat politically difficult), special interest attaches to the organizations which are or could become powerful pressure groups. For the shorter run, there is no question that incomes of poor farmers can be increased substantially by improved technology, better input markets, education and so on; the cooperatives and Accion Comunal are specially interesting in this light.

Accion Comunal, by now a famous institution in Colombia, refers to the community action groups which organize to achieve certain goals (e.g. schools), often supplying the labor themselves while trying to raise funds both locally

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that growth has been rapid -- a 90% increase between 1950-1954 and 1965-68. Growth of land cultivated and of output seems to have been faster for the larger farms (those above 2 hectares), however. Whether this is wholly explainable by the shift of cultivation from Santander to the coast departments (especially Bolivar) is unclear.

and from outside organizations, public or private. At its best, it is a grouping of the little man to overcome the disastrous effects of the essential non-existence of municipal government and the resulting lack of local co-operation through the public sector; at the other extreme it seems that some groups have done little construction and have principally become associations to beg for funds.[1] Mathew Edel, in one of the few in-depth studies to date, came to a generally favorable conclusion.[2] He found an economic rate of return to resources invested in the building of roads, schools, and so on of around 20 percent. Further, the achievement of getting people to work together and feel that there is something beyond their own self-interest, may legitimately be treated as a goal and may be more important in the long run development of the agricultural sector than the actual economic assets developed through the cooperative ventures. The Accion Comunal development had its original impulse at the government level as part of an overall attempt to help to overcome the rural violence and its after effects, and to secure the allegiance of the peasants.[3] It proved viable enough to outlive that crisis, and it has, in

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[1] Since considerable local initiative is involved in the Accion Comunal groups, it is not surprising that they differ from one to another. Some do involve government "promotores" as important founding forces, so the disadvantages of some degree of paternalism can be present; in other cases subversion or blocking is attempted by large farmers. In short, the range of experience is indeed broad.

[2] Mathew D. Edel, "The Colombian Community Action Program: Costs and Benefits," Yale Economic Essays, Vol. 9, No. 2, Fall 1969.

[3] Mathew Edel, op. cit., p. 8. "The impetus for the law came from a wide range of demands placed on the public sector by rural communities following the Violence (which the regime knew it could not meet from its own resources); from the suggestions for community institutions made by a French priest, Father Lebret, in a report to the Colombian government on social conditions; and from the experience of rehabilitation teams sent into areas of violence, who found a favorable response to community organization . But the law, once in effect, applied to the entire country, to peaceful as well as to violent areas; to urban barrios as well as to veredas, the typical dispersed rural communities of Colombia."

Edel's judgement, provided substantial evidence of the possibility of the development of serious pressure in the rural areas, (at least up to a certain level of regional organization -- whether it could easily go beyond a fairly narrow region is much more open to question), that the rate of return both to the investment by the community itself and to the promotional input made by the national government has been good,[1] and that it is partly because the members of the community are capable project selectors and are relatively efficient at carrying projects out that these payoffs are high.[2]

The investments carried out by the community boards in 1964 (between

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[1] Edel, (op. cit., p. 33) averaging over all types of projects, found a benefit cost ratio to the communities themselves (i.e. not counting promotional costs) of 2.8 for the 12 percent interest rate and 1.2 for the 18 percent rate. The corresponding ratios for road building were 2.0 and 1.3 and the return was also high for water systems. The strictly economic return is not so high but still satisfactory when promotion costs are included; perhaps a little (but not much) below 18%. The major types of investment where the rate of return was open to some question were the electric systems, where the high cost of gasoline and repairs have made many of those installed unfeasible and eventually they have gone out of service, and the health posts, where the investment usually occurs with a hope that the construction of such a post will induce the government to assign a doctor to serve the community. This introduces an element of uncertainty which, from the community's point of view, is presumably unavoidable. The benefits are sufficient, simply in terms of days of work not lost to give a benefit cost ratio of over one for a 12 percent interest rate if a doctor is in attendance. But here as in the case of education a very large part of the benefits may be missed by such quantifications.

[2] A comparison of the costs of construction of similar structures found it to be much lower when carried out by the community boards than by the government via professional contractors. One factor in this differential was the utilization of surplus labor in the community projects, but this was not the dominant one, since only one-third of the investment attributed to the communities themselves took the form of labor (while their share of the investment in the projects they carried out was on the average somewhat less than half of the total, the rest coming from the government). Yet the total cost of construction appears to be 40 or 50 percent lower; as Edel notes, these savings alone in 1964 were more than enough to repay the costs of activating this entrepreneurial ability through community development promotion, as long as the projects themselves are worth building. He attributes the advantage to greater familiarity with local conditions, materials, methods of construction, and so on.

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Edel, in a different article, observes,"This difference in costs, if not due to use of surplus labor, must be attributable to the superiority of some other local factor in production. But what is that secret ingredient? Some Colombians would allege government corruption as a factor in the higher costs of public projects. However, there is probably a major saving to be derived from local control of projects which is independent of any possible deliberate mismanagement. The community is a better manager than an outside contractor, it might be argued, for a number of reasons. In the first place, it is able to make better use of specifically local opportunities for cost saving, materials procurement, and efficient design than an outside contractor could, even one with more technical skill in architecture or engineering. In the sample, a number of communities were found to have redesigned plans that had been drawn up externally, and effected considerable savings with no reduction in the quality of the output. A government agency attempting to establish uniform plans for schools in a country with geographic and climatic conditions as varied as those in Colombia cannot possibly hope to specify a design that will be suitable to all regions.

In the second place, community entrepreneurship or management of a project is less likely than central government management to be lured into construction of something showy rather than something functional. The Federation of Coffee Growers and a governor who supports a project generally want something that they can put a plaque on and point to as their gift to the community. Community leaders, may, to some extent, also want to leave a monument to their work. But this tendency is limited severely when they must rely on the voluntary support of the community, rather than on taxes spread over an entire economy, or friendship with some outside politician to secure the construction of the project. A popular story in the Colombian countryside relates how a politician once offered a bridge to a community. When told by the community that they did not need a bridge, since there were no streams to cross, the politician responded by offering them a river. This could well be true of government construction project planning; it does not work within a community.

Finally, and perhaps more important, the entrepreneurial skills of the community can be offered to the project at no cost beyond the simple opportunity cost, in terms of unskilled labor, of the time spent in managing the project. On the other hand, a contractor from a city who goes to the country for a project, or even one who must commute from his comfortable home to a slum barrio for the job, will naturally expect a high fee for his pains; he can demand it since such skills, on the professional level, are still in short supply. But if, as it turns out, slum and rural communities have the ability to carry out the projects, the entrepreneurship is costless even on the assumption that the marginal disutility of the rural entrepreneur should be considered as the cost of his effort."

(See Mathew Edel, "Mobilizing Human Resources: The Colombian Community Development Program," in Frank T. Bachmura (editor) Human Resources in Latin America: An Interdisciplinary Focus, Graduate School of Business, Indiana University, Bloomington, 1968, p. 27.)

106 and 131 million pesos)were greater than direct investment by departmental governments (17.7 million pesos) and of about the same magnitude as total departmental investment including funds channelled to nationally and municipally executed projects (129.4 million pesos). The most important type of investment by far was roads, accounting for almost 70 percent of the total; schools were next with around 10 percent, water supply systems around 4 percent and electric systems, health posts and clinics, and a miscellany of other types of investment following.

Along the less strictly economic lines, Edel reported that the juntas seemed to have played a role in the pacification of the countryside, as feuding groups sometimes united around community projects[1]; founding of teams to compete in sports was a frequent result, as were help for families in specific emergencies, and a general awakening of members of the community to the possibility of change and acquisition of confidence in their ability to innovate (as reflected, for example, in increased receptivity to agricultural innovation). There was evidence that this sort of receptivity depended on the previous existence of the juntas, suggesting that there is a sequence of stages through which communities may go. There is evidence of a possibly important learning process whereby communities appear to build up decision making power and

[1] Further, in a community undertaking public construction, individuals seem to be stimulated to improve their homes. And the juntas have helped the malaria eradication service in areas where people were dubious about it.

entrepreneurial ability through the process of learning by doing.[1] And community action has been very important in the founding of agricultural, marketing, and consumer's cooperatives.[2]

Although the ministry of government is responsible for the Accion Communal program it has waged a sort of campaign trying to interest other ministries and decentralized institutes to participate and contribute some funds to its projects. As of 1966 this had begun to happen.[3,4]

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[1] "The third indication of community decision-making ability, and the source of the indirect benefits, has been a growing propensity by the communities to invest new functions for the juntas. At their founding, most of these boards are concerned principally with building projects; these are the community activities most often presented by promotores. They are also the simplest projects from an organizational standpoint, and if the works constructed are public goods, they do not lead to conflicts within the community over their use. Once, however, the ideas of work in a group and the use of an organization have been instilled in a community during the first project (and these are ideas which have not been familiar in low-income sectors of Colombian society), community boards are more likely to move on to other activities. In the communities studied, activities of the juntas were found to form a Gutman Scale, with construction projects as the first activities undertaken. Fund-raising events and petitions for aid and charitable programs are other early activities. Health, literacy, agricultural, and housing programs are begun by juntas which have already carried out simpler projects, and those communities which have passed through the entire scale are the only ones to form the more sophisticated institutions of cooperatives and federations of juntas. Comparison of the ages of the juntas which had reached different levels on the scale as of 1966 confirms that an evolutionary process is at work." (See Edel, "Mobilizing Human Resources", p. 32).

[2] One quantitative comparison of the success of cooperatives organized in communities with and without prior community action projects indicated that in communities with no prior project experience only 29% succeeded and in those with it the percent was twice as great.

[3] Gabriel Pelaez, Algunas Consideraciones Acerca de la Accion Communal en Colombia, Term Paper, Universidad de Los Andes, August 1968, (mimeo), p. 3.

[4] Edel, op. cit., p. 10, notes that "In addition to promotion, the government and private groups such as the Coffee Growers give meterial aid to community projects. This aid has risen from small initial sums to more than seventy million pesos in 1964, and slightly higher figures since then. This expansion is in part due to deliberate decisions to spur development, but it has also been affected by pressure put on the government for these subsidies. Set up as voluntary agencies, not dependent on the government for their existence but sensitive to financial support for their activities, the Juntas have, to some extent, become a pressure group for the hitherto unorganized."

As of 1968 the community action division of the ministry of government reported that there were 13.5 thousand juntas in the country, about 9,000 of which were legal entities; 1.8 million people were calculated to be participating and 5.8 million to be beneficiaries. (These figures include juntas in urban areas).

A few years after the formation of Accion Communal juntas in the veredas of municipios, federations of such juntas began to appear; by the mid 60's[1] they existed in between 5 and 10 percent of all the municipios in the country.[2] Edel explains this development as resulting from the fact that the juntas themselves have certain limitations in achieving some of their goals; most of the works which they undertake require financial or resource support not to be found in the community, such as machinery for highways, teachers for the new schools, etc. The boards generate many complaints of dishonesty or failure by public employees and they are beginning to discover what activities can or cannot be engaged in successfully. This is a new aspect of Colombian organization and indicates that the learning effect of community action has been considerable. Edel studied in some detail the formation of such a federation in the municipio of Cabuyal (pseudonym) in Huila; here an important antecedent was an agricultural union or sindicato, formed in 1948 and affiliated with FANAL; the union never had many members but it did form a group of leaders who came to play a key role in accion comunal, a vehicle now considered more appropriate than unionism. Urgent needs of the community which the accion comunal juntas

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[1] Mathew Edel, "Federaciones de Juntas communales: Una Nueva Institucion Colombiana," edited by Jose R. Sabogal Wiesse, Instituto Indigenista Americano, Mexico, 1969.

[2] Edel, op. cit., p.

themselves have not been able to take care of are the extension of the road network which would require the use of heavy machinery which the juntas do not have, agricultural credit (the INCORA program was limited to very few families) better marketing, etc. Sometimes the communities have been able to build roads, as when they were able to borrow a bulldozer when a road was being put through nearby. But this is a question of luck, and repairs subsequently become a problem. Here they become a problem partly because the three large land owners to whom the road was of greatest benefit contributed almost nothing despite all having cars.

A problem with the federations is their lack of legal personality and resulting inability to collect taxes, etc. Their most frequent activity has been to promote discussions among the heads of the juntas veredales and to help them get funds (though with little success to date). Usually they are founded with limited goals, generally the construction of a specific work or the attaining of national funds. But, like the juntas themselves, they frequently are able to sustain themselves by learning how to be relevant. Partly because of their lack of legal personality, the federations have a substantial measure of democracy; those which were formed by agreements among municipal councils or small groups of town leaders (and then undertook to speak in the name of the veredas) have frequently failed. Success is more likely, also, when local mayors and priests and the representatives of entities like INCORA are in the minority. Both the fact that this is the case, and the relative apparent seriousness of these federations suggests that there is no lack of entrepreneurial and management ability. There seems little evidence that they will create unachievable hopes, (although this position is held by some observers)

since they tend to have concrete goals.[1]

[1] An example of the relative quality of the decision making of these organizations and of the municipal councils is described by Edel. In 1966 a municipal council gave 1,000 pesos for the celebration of the "day of the campesino" whose celebration had been recommended to the municipos by the national government. The mayor set up a program of speeches by the municipal authorities. The community action association objected and asked for speeches by community leaders, prizes to outstanding farmers, etc. They convinced the mayor but then, after more thought, they decided instead to have an agricultural demonstration in the form of a "dia de campo", invested the 1,000 pesos in chemical fertilizers and began a program of visits to the veredas. There was a "dia de campo" in each vereda in the form of an agricultural demonstration in which a coffee plot needing renovation was chosen and improved.

Co-operatives

Rural co-operatives in Colombia have, unfortunately, had little success. Compared either to the Accion Comunal groups of recent vintage, or even such pressure groups as FANAL, they seem to have produced few ripples. Successful development of a cooperative movement, even to the point of contributing modest economic benefits to small relatively poor farmers, much less exerting political pressure, faces many and serious obstacles, as has been continually evident (though not always admitted by the authorities) in the history of the movement. There have never been many really functioning rural cooperatives; a considerable number of those initiated seem to have lapsed into failure fairly quickly.[1] As of 1968, when the Superintendencia de Cooperativos carried out a census, the number in agriculture was only 66, of a total of 1,826 in the country.[2] Of these 27 were in the agrarian reform projects; in the

[2] Maria Teresa Findji, "El Caso de Caney: Reforma Agraria y Cooperativo," in R. Pugh, et. al, Estudios de la Realidad Campesina: Cooperacion y Cambio, Volumen II, Instituto de Investigiones de la ONU para el Desarrollo Social, Ginebra, Marzo 1970, p. 125.

[1] In an attempt to get things moving, laws on agricultural co-operatives were reformed in 1963, and a Cooperative Bank was set up. But one year later it still had not yet begun to operate. In 1962 there were almost one half million members of co-operatives according to one estimate and they had a capital of $129,000,000 with 937 separate cooperatives. (See Espinosa Valderrama Agosto, "El Incremento de las Cooperativas." El Tiempo (Junio 18, 1964), p. 4.)

But this was the population attached to all cooperatives; only 0.4 percent of the rural population was so affiliated as of 1961 according to one estimate. (See Velez, Ernesto y Ernest Feder, "The Growth of the Cooperative Movement in Colombia," Bogota, Servicio Tecnico Agricola. Colombo Americano Mimeografiado, 1961, p. 2.) In the middle of 1964 the Superintendencia de Cooperativas and the Consejo Nacional de Cooperativas were not functioning for lack of resources. In 1965 the Superintendencia resumed its functions, but in sum the cooperative legislation seems to have been of relatively little use.

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last few years INCORA has been undertaking an ambitious program of cooperative development.

A number of characteristics of the rural economy and society in Colombia militate against the success of cooperatives. The strength of large-scale landowners, merchants, and so on are usually sufficient to prevent even those cooperatives which have good leadership and well defined goals from maintaining strength over any length of time. The local merchants are usually antipathetic since the cooperatives constitute competition; traditional power groups are almost certain to oppose those cooperatives which try to exert pressure on behalf of small scale farmers (renters for example) or landless workers. Perhaps equally damaging is the continued acceptance of the patron-client relationship by the presumed beneficiaries; they are used to having decisions made for them and to thinking of the traditional institutions as protective ones. Finally, a basic atmosphere of cooperation is lacking in most areas of Colombia, in part because of the violencia which divided groups, and in part simply because communities tend not to be independent organic wholes, but rather the bottom layer of a superstructure which goes up through the urban social and political elites. Existing municipal government institutions have usually been an obstacle to effective community action as they dominate the field.

Low absolute incomes, keeping people close to the subsistence level, and lack of education also militate against cooperative organization. And the historical reality that "palanca" (nepotism or leverage) has usually been the way to get things in Colombia, and that some level of administrative corruption is assumed to be present in government agencies so that they are not expected to benefit members in general but rather the bureaucrats, creates the partly self-fulfilling expectation that unless an entity is managed by an individual and for him it will be corruptly handled.

Despite the difficulties implicit in these characteristics of the situation, INCORA is very anxious to develop cooperatives, partly with a view to organizing people to help themselves, partly even with a view to helping them organize to pressure parts of the governmental system, and also to have some functioning entity ready to replace INCORA when its withdrawal from a given area becomes appropriate. But both INCORA's own lack of familiarity with the necessary conditions for effective cooperatives and the difficulty of the objective situation throw considerable doubt on the future of this effort.[1]

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[1]Some tangibility may be lent by the chronology of a cattle cooperative in the municipio of Caney, part of INCORA's first project area--Tolima No. 1. In 1963 and 1964 Accion Comunal constructed many schools in Caney but in 1969 a number of these were not functioning. And by 1969 the considerable activity brought to the area by the project had almost disappeared. "In 1963, the town had an unaccustomed activity due to the arrival of INCORA in the zone. The installation of INCORA brought with it the opening of new channels of communication, an increase of commerce, development of education, pride on the part of the inhabitants for being the first center of application for the agrarian reform law, and a hope of 'pacification' which almost everyone longed for after the years of violence. In 1969, the town appeared to be stagnating and the people pessimistic." (Findjo, op. cit., p. 134) What lay behind this unconvincing performance? A little background is helpful.

The region had already gone through one product cycle, moving from

coffee to cattle production; in 1936-38, after Law 200 of 1936, there was invasion of private lands in parts of the region; Law 200 was, however, never really applied, and the "coffee company", a society of Bogota families which controlled several of the large farms began, (at least according to some commentators), to dislodge the renters and sow pasture for cattle; coffee production decreased substantially. In 1963 there were new invasions, this time apparently organized by two unions in the area, one founded under the auspices of FANAL in 1961. After the invasion of one hacienda, the military chief of the region discussed agrarian reform with the campesinos and the possibility that the Caja Agraria could help resolve their problems; a delegation went to the Caja and to the Minister of Agriculture and was allegedly promised land division under the condition that they first abandon the land. They did so, but then found that the owner did not wish to sell to the Caja, so they reinvaded; this time the owners reacted by bringing in cattle which damaged the crops of the small scale farmers. (Findiji, op. cit., p. 139) Attempts were made to achieve peacable arrangements involving purchase of other invaded farms by a public entity but apparently with little success (or none?). The stalemate and considerable tension led to INCORA's decision to "start" there.

On beginning the project INCORA opted in favor of an orientation toward intensive agriculture with corn, sesame, cocoa, sugar cane, etc. But the agricultural technicians, all from outside the region and some foreigners, did not know the zone well and their decision was an unfortunate one. The crops failed, the investment was lost, and INCORA decided to switch once again to cattle. It was felt, for various reasons (some technical and others organizational), that the area dedicated to cattle in the region should be managed by a cooperative. At the time this decision was made INCORA already had some negative experience elsewhere with this sort of venture.

The Marketing System and Price Policy

The successful development of any industry or sector depends partly on its achieving high factor productivity, and partly on there being effective distribution of the good to the consumer. Thus in agriculture the farmer's income depends in part on his own productivity and in part on how well the marketing system works, i.e. on the margin between the price he receives and that paid by the consumer. The price to the farmer can be held down either by high real costs sustained in moving the product from the farm to the consumer, or by more or less artificial costs being introduced between the producer price and the consumer price, such as government indirect taxes, or monopoly/monopsony profits in commerce. Finally, the Government may have a policy of keeping consumer prices below equilibrium so that producer prices are kept artificially low, although not as a direct result of a high margin between producer prices and consumer prices.

An efficient distribution system can meaningfully be defined by a small producer price--consumer price differential on the average (unless the differential results from indirect taxes[1]), and relative price stability to both groups. Producer price stability is especially important to allow the farmer to plan and specialize. The first factor determining the producer-consumer price spread--the production function of the marketing system--or the real factor cost per unit of marketing service may be thought of as

[1] Positively it means low real costs and little market imperfection (monopoly-monopsony).

including not only the service of commerce itself, but also transportation and storage; efficiency means few factors used per unit of marketing-storage-transportation service. The other major factor of relevance, as noted above, is the extent of market imperfections, i.e. monopoly and monopsony.[1] Information

[1]The two factors are not fully independent, since some imperfections in market structure--especially monopolistic competition--can lead to a high use of real resources per unit of output.

on markets of agricultural goods in Colombia is limited; the few studies of overall margins for specific products have not tried to ascertain what part of the margins are due to real costs and what part to market imperfections. We present here some evidence and some speculation on the nature of the marketing system in these two respects, and on price fluctuations, as well as looking at government pricing policies--i.e. the government's attempts to improve the marketing system--of which the major institutional arms have been INA (now IDEMA) which supports producer prices in some cases and tries to hold consumer prices down in others by selling from its stocks, and the Superintendencia de Regulacion Economica which is the basic price control institution in Colombia, and has focussed on controlling the consumer prices of some agricultural products.

It is worth noting that in L.D.C.s in general, despite the high real costs, especially in terms of labor, sustained in the marketing process, marketing margins tend to be low, partly because few services are rendered, and partly because the cost of the labor involved is very low.[2] Price

[2]John W. Mellor, The Economics of Agricultural Development, Cornell University Press, Ithaca, 1966, p. 334.

fluctuations are a typical aspect of such economies, but Mellor notes that most of the studies done to date indicate that these price fluctuations no more than account for the storage costs.[1] Marketing cooperatives in low income countries are often pushed by governments, but the membership tends to be uneducated, contributing little of managerial talent, local know-how, or even control over corruption. Governments often give cooperatives monopoly power in marketing to offset their market disadvantages, thereby making their probable social contribution more likely negative.

[1] He also notes that sometimes the price fluctuations are generated by ineffective prediction by various participants in the market, even though there is no collusion. Credit to allow farmers to store their products may in some cases worsen the price fluctuations, when their information is weaker than those who would otherwise do the storing. He feels it is questionable whether government operated price stabilization programs can be run effectively on a purely seasonal basis. Government price reporting may be a partial answer in some places, but it must be quite detailed and accurate to better the information available to private operators, and this means it must be a reporting on the basis of grades and standards which are accurate and well and generally understood.

Summary of Information on Margins and Some Other Characteristics of the Markets

Lack of detailed information makes it difficult to say whether the agricultural marketing system in Colombia is better or worse than average for developing countries. And there is considerable disagreement as to its efficiency, partly because different studies have looked at different parts of the system.[2] ILMA, at the one extreme, concluded in 1964 that marketing

[2] The average marketing margin is not a perfectly valid measure of efficiency, either social or private. The more efficient a system is the greater the distance, time, or other obstacle possible between producer and consumer and hence the bigger the "hinterland" a given market will have. Usually

average margin will fall with efficiency, and possibly even the marginal margin (i.e. the largest differential between producer price and consumer price existing) but not as much as they would in the absence of the above offsetting effort. Certainly some things (like better information) which improve a marketing system may not lead to smaller but even to larger average margins; in the case of information this would be true if the lack of it occurs especially with respect to distant markets; as products are directed to these markets instead of to ones which are close by, the differential can widen.

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margins at all levels in Bogota were reasonable and in most cases lower than those prevailing in other countries.[1] But it was based on interviews with

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[1] ILMA, Supply Problems of Basic Agricultural Products in Colombia, Bogota, 1964.

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large commercial farmers who have knowledge of or access to a large number of markets so the margins calculated cannot be taken as applicable overall. (There is good reason to believe that, due to greater difficulties with respect to transportation, storage, and credit, smaller farmers are more dominated by middle men.[2]) In any case it was estimated that the producer got be-

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[2] A study of a CVC land reclamation project illustrates this point. See Carlos E. Solorzano A., Sistema de Mercado de los Principales Productos Agricolas del Area Roldanillo-La Union-Toro, Tesis de Grado, Facultad de Ciencias Economicas, Universidad del Valle, Cali, Julio 1965, pp. 45-48.

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tween 59 and 80% of the final retail price for crops needing little processing (rice, dry beans, yellow corn, potatoes, and beef); meanwhile, the wholesalers got 5-8% and the retailer 9-14%.[3] The latter figure compares favorably

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[3] These figures are consistent with those of Robin Henning (Ministry of Agriculture) who feels that marketing margins usually range between 20 and 40% of retail price--a fairly low margin in absolute terms although not particularly so considering the little servicing and processing built in.

He feels that dealers, handlers, and sellers are usually ignorant of commercial technology, such as grading and that there are few technical assistance programs directed at people working in commercial channels. The lack of grading creates serious problems for the long distance buyer.

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to other countries though is not as low, for example, as foreign supermarkets. The markets for beef, corn and panela--three of the commodities with the greatest excess of middle-men--were found to leave the producer a bigger share of the final price than the markets for other commodities. Castillo and Trant[2]

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[2]Castillo, Jose Americo and Trant, Gerald Ian, Notes on Recent Developments in Colombian Agriculture, Seccion de Economia Agricola, Universidad del Valle, Cali, 1967.

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comparing retail prices of various grains with producer prices for the period 1960-66, found that the retail prices tended to be 200 to 250% above the producer prices. They concluded that, even allowing for high rates of spoilage, etc., it would be hard to believe that these markups represented an efficient marketing system. Castillo and Trant use secondary data; conceptually the producer prices they worked with would be averages including the small farmers, so one would expect higher markups than in the ILMA study. But the weak data and difficulties of interpretation leave us with much uncertainty in this whole area.[3]

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[3]The only national producer price series known to the author is that used by the Banco de la Republica in the estimation of the national accounts; but it is my understanding that not too long ago one of their procedures for estimating producer prices was "urban prices minus an assumed commerce margin." Further, without detailed information on processing costs consumer price-producer price differentials are quite hard to interpret.

What makes some markets in a given region or country relatively efficient (in the sense of having low mark-ups) and others not? One would expect margins to be smallest when the number of producers is relatively small, there is competition (but not monopolistic competition) in marketing, and little in the way of transportation, storage or processing has to be done.

Crops with relatively few producers include most of the industrial inputs (cotton, soya, sugar for refining), rice and perhaps a few others. Only in the case of rice has a detailed study of distirubtion been done.

The marketing margins for rice in Bogota according to the ILMA study found producers getting 68%, rice mills 18%, wholesalers 5%, and retailers 9%.[1]

[1]Some observers have pointed out that they would not expect this rice margin to vary a great deal from city to city in Colombia.

But a study relating specifically to the rice marketing system suggests that the ratio of the price received by the farmer to the final price in the tienda is between 40 and 45%.[2] There is a wide range of sales prices at the wholesale

[2]Lucia Cruz de Schlesinger y Jorge Ruiz Lara, Mercadeo de Arroz en Colombia, CEDE (Centro de Estudios sobre Desarrollo Economico) Universidad de los Andes, Bogota, D.E. 1967. This figure of 40-45% includes in some cases non-production costs (see Table V-6, p. 159). The price received excluding transport, packing, storage and insurance costs by farmers in the Llanos was 34 cents per 500 gram pound whereas it reached as high as 51 cents in sales from farms around Barranquilla. The average was probably around 45. This implies a ratio of farmer price/retail price of about

and retail levels for several cities,[3] being especially high for the wholesale

[3]Cruz and Ruiz note that there is a classification problem involving the fact that at the retail level quality is attempted to be conveyed only by

the name of the rice. Usually the millers classify into three quality categories but confusion arises at the later levels where mixing occurs and where the supposed qualities do not necessarily represent real ones. Almost all the retailers including supermarkets and tiendas consider it necessary to "redefine" the quality of the rice they purchase before reselling it. It seems fair to agree that there is something of a problem here, although one could argue that if the consumer cannot recognize differences they do not really matter to him. The problem is really serious if given brands or retailers do not mix in a predictable way.

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levels in Medellin and Bogota.[1] The major part of the retail price goes to

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[1]The supermarkets had lower margins than the tiendas in all cities except Cali, where this result was reversed. It seems in general that the margins of the wholesalers diminish as quality diminishes. These relationships do depend somewhat on the city. Medellin retailers have much larger margins than those in any other city, and those in Bogota are much less, an almost incredible one sixth the margin in Medellin. Cali is close to Bogota and Barranquilla is between Cali and Medellin. For the wholesalers Cali and Medellin are the highest; Barranquilla and the other cities included are lower.

the big majority of the margin of the tiendas is "otros costos y ganancia" in Medellin and Barranquilla, where as at the other extreme in Bogota most of it is transport cost and packing and the average margin apart from this is very low. The margin varies tremendously. The authors consider only the profits in Medellin to be really high.

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costs of production and milling, indicating that relatively speaking the margin of commercialization is rather low.

Crops with relatively strong producers' organizations (often not having too many producers) may be expected to have relatively small margins, or consumer prices above the level which would prevail in the absence of the organization, or both.

The marketing arrangement for cotton is an example of this.

no ¶) Diagonal (Distribuidora de Algodon Nacional), is made up of representatives of the Colombian textile mills and is in charge of

distributing fibre to the textile mills.

Sugar constitutes a special case; much of the cane used for refined sugar is produced on lands owned by the sugar mills, and much of the rest is produced by colonos who have contracts with the ingenios, normally for about ten years, usually at a fixed price per ton with adjustments according to sugar content; they are obligated by the contracts to sell to the ingenios; if the world price declines the ingenios lose and vice versa. Other producers with informal contracts are subject to year-to-year price fluctuations but they retain the opportunity to market their cane as panela. Apart from the (unknown) impact of this long term contract system on the average producer price, it tends to decrease price uncertainty (at least in monetary terms)--presumably a beneficial effect--but may introduce an undesirable rigidity if it inhibits short-term shifts to other crops such as corn.[1]

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[1]Castillo and Trant, op. cit., p. 14.

The system is difficult to police when the price of cane for panela rises above that for refined sugar and people under contract would gain by selling in the other market. That market has considerable instability since much of the cane for panela in the Cauca Valley is grown as a supplementary crop to coffee on small farms in the mountainous areas. Prices tend to fall in the coffee off-season since farmers put more work on the panela.

For a group of "new" commercial products processed by industry the typical market form is also a contract between the farmer and buyer. The production of sorghum, for example, has been directly stimulated by companies mixing animal

feeds; nearly all of it is marketed with these companies under contract for fixed prices. The same is true with soy beans; there are no intermediaries. And in the case of African palm, direct contact with an extraction plant is an essential for success. [1]

[1] Grunig, op. cit., p. 360.

The more traditional crops grown by a large number of small producers are usually characterized by higher margins[2] and, perhaps more significantly,

[2] In the study of the distribution of foods in Cali, the authors concluded that in general the spread between producer and consumer prices is high for fruits like oranges, tomatoes, etc., and was high for potatoes compared to their price in Nariño (an important producing area). The production of fruit and vegetable crops involves large numbers of small farmers earning something around the subsistence level and geographically scattered. This makes the cost of marketing high. Two of the commodities considered (oranges and Pineapple) have a rapidly developing commercial segment at present. In general the assembly system relating to the small-scale production system has many of the same characteristics as the distribution system in general, i.e. the firms tend to be competitive even though a small percentage handles most of the total volume. Again channels with fewer more highly coordinated firms are emerging for some products such as oranges, pineapple, and tomatoes. A matter of great importance is whether the apparently higher commercialization costs of the products of small farmers is due more to their geographic dispersion (in which case it is to be expected and not particularly discouraging in terms of the potential of small farming in general) or due to higher handling costs, in which case, unless innovations can be effected, its complications may be rather negative.

by greater seasonal price fluctuations. Fluctuation in bean prices apparently results largely from yield variation. The ILMA study found that the producer got 59% of the Bogota retail price. Beans pass through a large number of middle men.

In a recent study Christopher Andrew[1] found the Bogota potato market rather badly coordinated and inefficient. His study did not find any group, with the possible exception of the Carulla supermarket chain,[2] making a large profit margin. His findings, with those of other studies of the potato market, are reproduced in Table V-10 . It appears that the producer gets about 75% of the final amount paid for potatoes by the consumer; inefficiency (if it is severe) shows up more in the form of spoilage loss during distribution than high margins.[3] Transportation costs within the city appear to be very high. Tiendas (small stores) have trouble moving the potatoes from the center to the tienda and the cost of the moving is high; this contributes considerably to the producer price-retail price margin. A further inefficiency results from the lack of grading. A supposed "bulto" could vary between 50 and 70 kilos and is not opened at the wholesale stage of the process. The potato market is a notoriously unstable one, and Andrew's data indicates substantially greater seasonal price fluctuations at the producer level than at the retail level (op. cit., p. 132).

[1] Christopher O. Andrew, Improving Performance of the Production-Distribution System for Potatoes in Colombia, Instituto Colombiano Agrario, Boletin Departamental No. 4, Oct. 1969.

[2] This chain has many stores in Bogota and a quite large total sales figure.

[3] Andrew's estimate (the first column) shows a low producers' share since it is calculated using the price per unit weight sold at each stage; when converted to shares of the consumer dollar, his figures are very close to those of the other sources.

TABLE V-10

Price Spreads for Potatoes in the Bogotá market

	Price Survey[a]	General Survey[b]	ILMA 1964[c]	CEDE 1959[d]
	(percent)			
Producers share	58.6	74.0	74.0	71.4
Producer to wholesaler intermediaries	3.7	5.7	7.0	--
Wholesalers	11.1	8.0	6.0	14.3
Wholesalers to retailer intermediaries	2.2	--	--	--
Retailers	24.4	12.3	13.0	14.3
	100.0	100.0	100.0	100.0

[a]Andrew, op. cit., Table 36.

[b]ICA Potato Marketing Survey, 1968.

[c]Instituto Latinoamericano de Mercadeo Agricola (ILMA), Supply Problems of Basic Agricultural Products in Colombia, Bogotá, Colombia 1964, p. 185.

[d]Guillermo Franco Camacho, Mercado de la Papa respecto a Bogotá, D.E., Centro de Estudios sobre Desarrollo Económico (CEDE), Monografia #2, Bogotá, Colombia 1959, p. 26.

SOURCE: Andrew, op. cit, p. 136.

While there is no general observable relationship between size of farm and price received, it seems likely that for comparable quality of product, distance from market and credit characteristics of the transaction, etc., the small farmer receives a lower price. This result would be anticipated for two reasons; first, economies of scale appear to be important in commerce systems, and it must be expected that large operators in the commercial system will find it desirable to gear in with large scale producers, implying the possibility of above average prices for them; second, the small producer will, on the average , more likely be facing a buyer with monopsony power than will a larger one. Scattered evidence bears this expectation out; this was observed to be the case in the corn market in one area of Valle;[1] in the

[1]The region was Roldanillo-La Union-Toro. See Carlos E. Solorzano A., "Sistemas de Mercado de los Principales Productos Agricolas del Area Roldanillo-La Union-Toro," Universidad del Valle, Facultad de Ciencias Economicas, Cali, Julio, 1965.

case of red beans in Valle, it resulted one year from INA's above equilibrium support price apparently favoring the larger farmers; at least some farmers felt that INA, which lacks storage and financial resources, applied strict quality requirements to avoid purchasing from them--apparently after large farmers had been able to sell.[2] FAO-ECLA reported a relatively small price differential for coffee as of 1955.[3]

[2]Hugo A. Torres,"Analysis of the Marketing Structure-Conduct and Performance of Grains in the Cauca Valley--Colombia," Paper #15 presented at the Cornell Workshop on Some Emerging Issues Accompanying Recent Breakthroughs in Food Production, 1970, p. 5.

[3]ECLA-FAO, op. cit., p. 78.

Size of adult planting	Price in Colombian pesos per arroba of parchment coffee, 1955/56
Less than 1 hectare	35.53
1-10 hectares	36.86
11-50 hectares	37.43
Over 50 hectares	38.17

This is due to the fact that small-scale growers are ill-informed about market prospects and prices while their economic position does not allow them to store coffee in the hope of better prices. They usually sell their crop to local middlemen, many of whom can fix prices at comparatively low levels.

On occasion small farmers receive higher average price because they sell a higher quality product--especially where some of the product is consumed at home and only selected quality is sold. In general, however, it appears likely that they receive lower prices. This phenomenon is not brought out in our data since most of the commerce studies have obtained producer price data from relatively large farmers.[1] Wholesalers frequently have monopsony

[1] e.g. ILMA, op. cit.; Andrew's study of potato marketing, etc.

power in dealing with particular villages and act in support of each other to assure that it is maintained; the producers of one village tried to band together to raise the price and wholesalers subsequently black-listed it; it has been unable to sell its potatoes since.

Corn marketing has traditionally involved many middlemen. In studies

referring to Bogota, to Valle and to Meta, it is significant that in no case did much, if any, of the corn go through INA.[1] Little corn moves from subsistence

[1] Grunig, op. cit., p. 350.

farms to commercial channels and the few fairly large commercial producers sell primarily to the feed and food industries.[2] Probably the bulk going to

[2] Even corn which enters commercial channels is picked, husked and bagged by hand, the picking being a consequence of the need for long in-field drying of the standing corn, which because it falls over after standing for so long makes it difficult to harvest by machine.

the cities for sale without processing comes from medium sized farms (e.g. 5-50 hectares); this, in fact, is probably the case for quite a few staple food crops. Grunig indicates that the setting up of producers of animal concentrates and corn products in Valle has done much to eliminate the corn cycle there; these firms buy under contract for a fixed price.

Animal product marketing has plenty of problems too. The system for beef is very fragmented right from the level of small buyers and commission agents dealing with the ranchers, through the slaughter houses and through the small stores selling it; some of the reasons for the fragmentation suggest that it is efficient, others not. For example, the large number of slaughter houses has resulted in part from the tropical climate and the lack of refrigeration. But it is also due to the fact that most of these are owned by the local municipalities and often provide its major source of income; this suggests the multiplicity may be inefficient. There are some modern plants, as for example the refrigerated ones in Bogota, Barranquilla and

Villavicencio. Slaughter houses normally operate on contract for meat wholesalers, who are often quite limited in number. It was this characteristic of the market that has prompted the Ministry of Agriculture and others to argue that livestock slaughter has been an oligopoly. The picture is similarly mixed at the "feria" level--the ferias are regional sales involving both cattle for slaughter and younger animals. Some, like the one at Medellin, have good physical facilities; others do not. And market imperfections may be present, as in Bucaramanga where the feria seems to be controlled by half a dozen people, some of them local politicians. The laws with respect to handling are very bad and in various places cattle are left without food or water for as much as 48 hours. This sort of thing particularly hurts the small producer, for example in the Cesar Region.

Production of quality beef is discouraged by the fact that animals are bought on the farm and wholesalers prefer older animals which lose less weight during slaughter.[1] Price differentials in Medellin as of February 13, 1963,

[1] A. W. Anderson, La Industria de Carne en Colombia, Ferrocarriles Nacionales de Colombia, Bogota, 1961, p. 11.

were extra quality, 2.68 Ps. per kilo; first quality, 2.65; second quality, 2.55; and third quality, 2.31. At the retail level also, the differential is much less than in other countries; 3.3 times between the best and the poorest in Colombia, 195 times in France, and 130 times in Norway.[2]

[2] Grun ig, op. cit., p. 342.

Little information is available on commerce margins, partly because of the complexity of sorting out processing costs at the various levels. The FAO study of the Llanos estimated that for Colombia as a whole 46 to 56% of the sale proceeds go to middle-men.[1] This conclusion is not surprising, in view of the transportation and communication barriers between the Llanos and Bogota or other market centers. Data from the study of the Rio Sinu by L. Currie[2] indicate that the commercialization margin between the area of production and the sale in Medellin was about 16%, constituting a rate of return to capital investment by the intermediary of 8%. Some farmers did their own selling and came out about the same. In other words, there was no apparent inefficiency or exploitation on the part of the intermediaries.

In the case of the Bogota hog market, Littman[3] estimated in 1965 that the producer gets 77% of the final consumer price. He summarized as follows ILMA's study of the hog market in Bogota: "The sale of pigs which reach the Bogota slaughterhouses is principally in the hands of intermediaries who purchase the hogs on the farm, transport them on their own account to the sales in Bogota, where they are sold to the 'colocadores'. In the principal slaughterhouses in Bogota where about 300 pigs are slaughtered each day, 15 colocadores deal in hogs but only 3 or 4 are specialized in this." (p.8) In 1965 Littman estimated that the intermediary buying on the farm made about 4 or 5% of the purchase price. The actual slaughter yield was about 75%, about that in European bacon countries. There was, however, a loss of 8 or 9% of the animals' weight in the couple of days

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[1] FAO, Reconocimiento Edafologico de los Llanos Orientales, Colombia, Rome, 1964.

[2] L. Currie, ...

[3] Littman, Ernst-Ludwig, Consideraciones Sobre la Ganaderia Procina y el Mercado de Carne de Cerdo en Colombia, Instituto Latinoamericano de Mercadeo Agricola, Bogota, Julio de 1965, Mimeo.

before slaughter. The colocador had a gross margin of about 6% of the purchase price. After paying "derechos de feria" and "derechos de deguello" he was netting 2 or 2 1/2% of the purchase price. The gross margin of the "carnicero" was about 25% of the purchase price, not counting weight losses, etc.; counting this it would be 16-18%. This margin coincides with that calculated by ILMA in 1964 for beef.

Real Costs of Commerce

The real costs of agricultural marketing can be high due to lack of efficient organization of markets (e.g., lack of standardization, lack of grading, lack of information, etc.) high transportation or storage costs, (or high wastage due to inavailability of storage space) or from too many firms in a monopolistic competition situation. It is generally believed that there is a fairly severe shortage of storage space for agricultural products in Colombia;[1] although this may be true for certain crops, and certain regions,[2] it does not seem safe to conclude that the shortage is extreme; there is considerable underutilization of existing space, and there may be a tendency for some observers to overestimate the real economic demand for this service.[3] But it is true that on farm storage is difficult because of tropical conditions in Colombia, with both spoilage and insect damage being common. Lack of medium and long term agricultural credit also hurts. Crop credit is extended only for the crop season and has to be repaid immediately. INA's share of total potential storage space tends to be small; as of 1965, for example, it had only 14,000 square meters of a total of

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[1]Grunig (Op. Cit., p. 353), for example, notes that there is an overall shortage of commercial and public storage together with poor management of existing facilities.

[2]The concept of a shortage of agricultural storage space is ambiguous since considerable space would be technically available for either agricultural or non-agricultural items. In Valle, for example where commercial storage houses make up a large portion of all the capacity, there are more oriented to industrial and commercial organizations than agricultural ones.

[3]Grunig (Op.Cit, p. 366) notes that producers in Valle claim that some storage space owned and operated by private organizations is too expensive to justify renting it. In this sort of situation, where products go voluntarily unstored, observers may interpret this as involuntary inability to store. Certainly more would be stored if a subsidized price prevailed, but this would not necessarily be a desirable policy--its payoff would have to be subjected to the usual beneift cost criteria.

221,000 in Valle.[1] And one of the inefficiencies is that INA storage facilities can be used only for grain INA purchases, a quite limited amount.

Hopefully, INA Agraria, a cooperative effort of INA and the Caja Agraria will resolve part of the credit cum storage problem; its purpose is to offer storage facilities to producers along with credit during the time the crop is stored.[2] Private organizations offer the same services in both Valle and Meta. Individual producers complain that the costs are too high to justify their storage.

With respect to the service of commerce itself it appears that whether because of inherent inefficiency in the distribution process or because of a monopolistically competitive situation the distribution channels are inefficient, and that there are too many people there.[3] The only detailed figures on this are from the 1954 census of commerce (although there are more recent figures for 1969 in Cali, see below). These indicate that average annual sales per establishment in 1954 was about 20,000 pesos with sales per person about 13,000 pesos (i.e. about 8,000 dollars and 5,000 dollars respectively) see Table V-11a. About half of all sales were by establishments with sales of less then 50,000 pesos, sales per person of 7000 pesos and persons per establishment of about 1.5. (See Table V-11b).

A prominent characteristic of trade in many agricultural products, especially the traditional ones, is the confusion of weights and measures,

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[1] Hugh Torres y Carlos Estrada, Estudio sobre la Capacidad de Almacenamiento en la Zona Geografics del Valle, Comite Integral de Mercadeo del Valle, Cali, November 1965.

[2] Grunig, Op. Cit., p. 366.

[3] There is, of course, a question as to whether many of the people involved in this commerce sector in fact represent a real social opportunity cost. If, as many people would argue, they do not, then the real cost of commerce is very low. The real cost might boil down to the fact that because of the wide spread between producer prices and consumer prices generated by the existence of monopolistic competition, there is a lack of equality between marginal cost of production and price, and this leads to less of various goods being produced than otherwise would be.

Table V-11a

Structure of Retail Commerce: Food and Beverages

Type of Product Sold	Number of Establishments	Sales (millions of pesos)	Persons Occupied	Persons Remunerated	Total Wages Paid (thousands of pesos)	Sales per Establishment ('000)	Sales per Person ('000)
Grocery	49,954	859.6	80,945	7,261	8,726	17.2	10.6
Meat	7,747	372.4	11,120	2,093	2,747	48.1	33.5
Fruits and Vegetables	7,343	53.6	8,291	124	115	7.3	6.5
Milk and Milk Products	1,310	29.3	1,904]	496	532	22.4	15.3
Delicatessen, Liquor and Tobacco	775	78.0	2,381	1,344	2,438	100.6	32.8
Bread and Pastry	834	15.9	1,412	519	565	19.1	11.3
Other Foods	1,856	34.8	2,521	360	577	18.8	13.8
Total	69,819	1,443.4	108,574	12,197	15,670	20.7	13.2

Source: DANE, Censo Nacional de Comercio y Servicios, 1954, Bogota, April, 1967, p. 27.

Table V-11b

Retail Food and Beverages Stores by Amount of Sales, 1954

Scale of Annual Sales (thousands of pesos)	No. of Establishments	Sales '000 of pesos	Persons Employed (in the week of November 15)				
			Total Employed Labor	Owners and Partners	Unpaid Family Members	Paid Workers	Total Wages Paid ('000 of pesos)
Total	69.819	1.443.391	108.574	67.468	28.909	12.197	15.699,5
< 5	20.066	65.772	35.377	24.790	10.009	578	260,3
5 to 25	30.329	356.050	45.999	29.358	13.772	2.869	2.141,4
25 to 50	7,609	263.950	13.036	7.471	3.121	2.444	2.390,0
50 to 100	3.662	249.092	7.290	3.646	1.347	2.297	2.919,8
100 to 250	1.639	239.374	4.209	1.640	491	2.078	3.450,3
250 to 500	354	118.863	1.533	371	130	1.032	2.142,2
500 to 1000	116	75.376	707	137	32	538	1.236,1
1000 to 2500	34	44.114	333	41	6	286	852,6
2500 and up	10	30.800	90	14	1	75	306,8

Source: DANE, Censo Nacional de Comercio y Servicios, 1954, Op. Cit., p. 32.

qualities, etc. This presumably increases real costs of commerce though it is not clear by how much ; the increase will be less the greater the degree to which the effect of these problems is simply to use the excess man hours of people in the sector who are partially unemployed ir any case. This sort of inefficiency seems to be wiped out fairly successfully in the transition to economies where the marginal product of labor is high. Where the obstacle to efficiency is not easily overcome by the private sector itself, as in this case, there remains some reason to believe that it may really do substantial damage.

The major inefficiency of the distribution system is usually assumed to be associated with the small scale of operations--which occur in the monopolistically competitive framework. This characteristic is most prevalent in the distribution of food at the retail level; in the most complete study of food distribution in an urban area, carried out recently in Cali, it was found that there were about 9,000 retail food outlets,[1] (for a city of about 800,000). Most of these outlets fell either in the category of personal service stores (usually fairly small) or public market retailers (i.e., people operating at the market plazas--either the main one in the center of the city or the various satellite ones). In terms of value of sales, the personal service stores are by far the most important (55 percent) the public markets next (20 percent) and the self-service and speciality stores, the other two categories separated in this study, each having about 12 percent. Both the public market retailers and personal service retailers are typically family enterprises; in the first group the average number of employees is 1.2 (with 1.1 of these non-paid); in the personal service outlet

[1] Harold Riley, et al., Market Coordination in the Development of the Cauca Valley Region--Colombia, Research Report #5, Latin American Studies Center, Michigan State University, 1970, p. 39.

the number is 1.9 (with 1.5 non-paid). The most characteristic retail institution, the tienda, of which there were 2,700 had an average monthly sales (February 1969) of only 7,000 pesos and accounted for 13.6 percent of all the retail sales in Cali. Their main products are beverages and processed foods.

Although these figures speak for themselves as to the low productivity of the labor engaged in the small scale outlet,[1] they do not imply that it is inefficient in the economic sense. The first piece of evidence to this effect is that the large scale units apparently cannot compete except in the upper income areas.[2] Prices are somewhat higher on the average in the tiendas but this difference results primarily from higher purchase prices,

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[1] When all operating profits are attributed to capital, its rates of return appear to be fairly high in all types of stores, although average return to labor and capital is low in the smallest tiendas; for example, public market fruit and vegetable retailers earn less than the 450 per month minimum wage and tienda operators earn slightly less than minimum wage and substantially less if the number of family members involved in the business (1.6) is considered. Riley, Op. Cit., p. 68. There is a rapid rate of turnover in personal service outlets--approximately 30 percent of those interviewed in this study had been in business for less than a year. (p. 43).

Commercial bank credit is not available to the tienda operator nor is supply credit very likely to be forthcoming; these individuals appear to be marginal operators waiting for better employment opportunities. A policy of small price reductions to achieve volume is untenable since other tiendas will fight back.

[2] The people in the lowest income brackets are the ones who buy primarily at the neighborhood stores (almost half of their total purchases); the other major place of purchase for these people is the central gallery area; they frequent the self-service stores relatively little, whereas the upper income group (defined here as families with monthly income above $10,000 : 1969 pesos) effects 45 percent of its purchases from them.

not higher gross margins.[1] Higher tienda costs in outlying areas are natural due to higher transportation costs.[2] It is interesting that in the Cali study, credit was not highly important in food purchases.[3]

Observers differ as to how serious a transportation problem there is for agricultural products. Transportation costs, in spite of the difficult terrain and so on, do not seem to be out of line.

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[1]Purchase prices vary with the type of product and the type of retail outlet and its location; the galleria central is on average the lowest priced place to purchase, while the tiendas in the slum areas range from a few percent higher for some products to 40 to 60 percent higher for things like tomatoes, etc.; in general the highest prices are in the tiendas in the poorest slums with the difference between tienda prices in the other zones and in this zone being typically 2 to 10 percent for meats and cereals and somewhat higher on occasion for fruits and vegetables. There may also have been some lower quality in the tiendas in the lower income areas, although as far as possible prices were collected on equivalent quality products.

Gross margins (defined as the price spread minus spoilage loss) ranges between 7 and 14 percent according to the type of product and type of outlet. The price spread is highest for the public market retailers and lowest for self-service and personal service, but the gross margins are rather comparable across the board. The fact that supermarkets can sell at lower prices is explained by their buying at lower prices; their price spread is about the same as that of personal service; for example, the supermarket spread is 14.5 and that of the tienda is 13.7.

[2]To some extent these are reflected by the costs the slum dwellers sustain when they buy outside their own zone. Transport costs as a percentage of total costs are high for the slum dwellers, reaching 5.1 percent whereas they are only .8 percent for the highest income bracket. (Though there is some understatement for the upper income group since cost of the use of their own car has not been included here.) For the tienda the radius of influence is much less than for the central plaza or the satellite plazas, tending to be only a couple of blocks except for very special tiendas; prices are lower in the galleria central so that people may come from as much as 3 kilometers away.

[3]Thus, less than 10 percent of the food budgets in the two lowest income quartiles were purchased on credit, although the possibility of such purchases can still be important for a family headed by a casual laborer with uncertain income. Actually however, the credit given consumers, as well as being on a very small scale, is given more frequently by the self-service stores than by the personal service ones or the public market operators. Eighty percent of cooperative sales are made on this basis, but the cooperatives can garnishy wages; over half of the supermarkets give credit (on 15 percent of their sales) 40 percent of the personal service stores (on 22 percent of their sales) and less than 30 percent of the public market retailers (on 20 percent of their sales). The terms are 10 to 14 days typically.

Trucking structures are regulated by the Superintendencia de Regulacion Economica but are not generally enforced and rates depend more on the demand and supply of trucks.[1] Trains are cheaper and have fewer risks in weight losses than trucks for cattle transportation, but trucks must still be used from farm to rail loading points. Larger farmers tend to use more public and private transport, with small farmers having to use buses and animals a great deal.

Currie feels that, except for the National Railroad, the system is in general adequate, and that it is often underused, (especially since the paving of the road between Villavicencio and Bogota, which was necessary). Although a few very high payoff, major roads may remain to be built, in terms of the double goals of output/distribution there seems no doubt that highways will have low payoffs relative to feeder roads, which are scarce. Of penetration roads which do exist, many become rather inaccessible in many parts of the country in the rainy season. The effect of the absence of these roads is sometimes not to raise average transport margins but simply to cut some isolated producers right out of the market. For some products low quality transport is more serious than any lack of it; thus the Ministry of Agriculture estimates a 10% loss in transit of cattle from farm to markets, while Adams estimated 20% for cattle coming in from the Llanos.[2]

Marketing Imperfections and Their Changes Over Time

Imperfections in the marketing system are present both in some national markets (e.g. cotton) where a producer's organization has monopoly power and

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[1] Grunig, Op. Cit., p. 371.

[2] Dale Adams, Public Law 480, p. 50.

and an industry has monopsony power, and also in isolated rural areas where local monopsony and monopoly power is frequent. One would expect some of these local imperfections to diminish over time with improvements in transportation, communications, initiation of government buying agencies, etc. and there is evidence that this has been the case. With respect to coffee and rice marketing, for example, Carlos Lleras has pointed out that for a long time people owning coffee threshing machines and rice mills had virtual monopolies on the purchase of these respective crops in their areas.[1] Similarly, the intermediaries in the coffee trade had monopsonistic power before the Federation of Coffee Growers was created. The Federation was created primarily to defend export prices, but also to stabilize prices in the interior. By the construction of a number of storage points, and by offering the threshing service, it has introduced substantial improvements into the traditional market mechanism. Overall, a number of stages in the coffee marketing sequence seem to be considerably more competitive now than they were 25 or 30 years ago.[2]

A dilemma arises in the fact that monopsonistic buyers are able to make certain types of markets more efficient (with low real marketing costs and greater price security) than there would be if more "competitive"

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[1] Carlos Lleras Restrepo "Estructura de la Reforma Agraria," Tierra, 10 Ensayos Sobre Reforma Agraria in Colombia, 1961.

[2] "Mills for sizing, sorting, cleaning, and are the most commonly found type of coffee processing facilities. They tend to be concentrated in the coffee crop regions. There are probably enough to them, if they are fairly competitive. A smaller but sufficient number of roasting plants are scattered through the cities and towns. Colombia also has facilities for the production of instant coffee of high quality. For a number of years, coffee quality control and grading has been well organized and effective." (See Castillo and Trant, Notes on Recent Developments in Colombian Agriculture, page 7.)

e.g. Bavaria and barley. Although there is clearly no general rule which public policy should follow in such cases, the efficiency gains seem to outweigh the disadvantages.

From a legal point of view, Law 155 of 1959 (which referred to the economy as a whole) was the first attempt to "prohibit prior accords tending to limit production, distribution, and consumption of goods and services" and to place under the vigilance of the government the companies with sufficient capacity to determine prices in the market. It also established that the government would determine the regulations for weights, qualities, packaging and classification of goods in order to protect the consumers and producers of raw materials. Law 155 was complemented by Decree 3236 of 1962, which determined that any manufacturing process involving the satisfaction of food requirements would be considered a "basic sector" and that the Superintendencia de Regulacion Economica would attempt to prevent restrictions of free competition via a delegation of its control functions to the governors of departments and to mayors of cities. Although the thought is laudable, it goes without saying that neither the detailed understanding of how market imperfections might be attacked nor the administrative capacity exists in the Superintendencia (or elsewhere) to exert satisfactory control. Probably a further lessening of the inefficiencies associated with these imperfections will await greater market integration or more massive government entry into some of the markets.

Price and Income Fluctuations

Adding to the difficulties associated with the low average incomes of many people in the agricultural sector of Colombia are fluctuations in those earnings. In the case of coffee the price swings tend to be

rather long and are determined exogenously--in the case of domestically consumed products they are more in the nature of cobweb cycles. There are also, of course, seasonal price fluctuations; these may be less important to the producer, since the price shortly after harvest is likely to be the only one that really matters to him. They are of more relevance to the consumer, and tend to reflect the amount of credit (of say medium term) to permit storage, the amount of storage space and the efficiency of the storage system.[1] Those longer run (non-seasonal) fluctuations not transmitted from the international market are also due in some cases (those of quite non-perishable crops) to lack of storage; but more importantly they result from the inherent instability in some markets where current output depends on price of previous periods. They tend to push farmers toward crops with fixed prices such as soybeans, cotton, sugar cane and sorgum, even though average returns may be lower here. (Prices for a number of other crops are theoretically fixed, but in practice not.)

In the case of coffee, the best that could be hoped for in terms of stability would be some mitigation of the exogenously determined fluctuations by a domestic price stabilization policy. The fluctuations are determined exogenously to the domestic supply and demand though not entirely exogenously to the country. If the goal sought were stability of the domestic purchasing power of a bag of coffee, then the sources of fluctuations which would have to be "leaned against" could be:

a) changes in the international coffee price

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[1]Producers could, of course, benefit from the steps which would end these seasonal fluctuations, if their ending raised the average price he could expect to receive. But his gain comes from the higher price he gets and not necessarily from less insecurity. Seasonal fluctuations can be extreme but predictable.

b) changes in the domestic purchasing power of a dollar[1] (occurring usually when the rate of devaluation is different from Colombia's differential rate of inflation vis a vis its trading partners). The most abrupt such changes are likely to occur at devaluation time (an endogenous variable).

In Colombia the coffee price actually received by the farmers is not determined solely by the above factors plus whatever smoothing tendency the government would prefer to introduce; it is, rather, a result of negotiations (or tests of power) between the government and the Coffee Growers Federation. While the latter has stabilization as a more or less officially stated goal, it is more interested in maximizing the price received at any point of time.[2] Possibly more pressure is exerted in the stabilization direction by the government or possibly it only appears this way since it is easier to "tax" the coffee growers (in the form of a differential exchange rate) when the world price is high, and getting more

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[1] Even without any stabilization policy the world price in dollars would not determine wholly the real coffee price paid to the farmer in Colombia. The dollar coffee price determines fully the purchasing power in terms of imports of a bag of coffee only if the dollar price of imports is constant; it only fully determines the purchasing power of a bag of coffee for the farmer if, further, the relative price of imports and the domestically produced goods entering his market basket is constant.

Changes in the relative price of coffee and imported goods can be considered exogenous to the country. Changes in the real purchasing power of coffee will occur, however, even with that relative price constant, whenever the relative price of traded to home goods change. This ratio may have a secular upward trend due to the higher income elasticity of demand for imports to a country like Colombia, and will tend to have sharp fluctuations if the government follows an "adjustable peg cum devaluation" policy rather than the use of a floating exchange rate.

[2] If stabilization were taken as a serious goal, funds could be built up during periods of high coffee prices and run down when these prices were low. Given that the goal is not taken this seriously the limitations on stabilization (i.e. holding domestic prices up when the world price is low) are the severity of fluctuations in the world coffee price, and the limitation on the resources made available to the Federation in the form of credit from the Central Bank, and also by its own unwillingness to keep the domestic coffee price low when the world price is high (it is, after all, a federation of coffee producers).

tax revenues is something the government always wants to do (i.e. perhaps this is a more important consideration for it than coffee producer income stablization[1]).

Stabilization is certainly a stated goal.

Witt and Wheeler argue that dampening price fluctuations for export crops has been an important policy. In 1932 a coffee export premium of 10 percent of the official exchange helped to raise internal prices in a low price period.

An appropriate measure of net stabilization resulting out of the government's domestic coffee policy, assuming devaluations to be an exogenous phenomenon, (and noting that the policy is a result of an interaction between the government and Fedcafe) involves the comparison of the real coffee price received by the farmer (as estimated by the Banco de la Republica) and an index of the price the farmer would have received if dollars earned from coffee had been converted at the official exchange rate and paid to the farmer.[2] ; the actual price series is somewhat the more stable of the two, so, as judged by this rather easy standard, one might say that the net effect of the intervention had been stabilizing.

The most meaningful measure of the extent of stabilization (or destabilization) by the overall intervention of the government (i.e. including its intervention in the exchange market in the form of maintaining disequilibrium rates) and the Coffee Growers Federation would involve a comparison of

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[1]Another factor in the government's objective function is the desire to avoid inflation--this too would make it desire to siphon off more coffee income when prices are high, since at that time the increase in aggregate demand could otherwise be considerable.

[2]No estimate was made of the price the farmer would have received under a free exchange rate regime as the author did not have enough evidence to estimate a reasonably precise series.

the implied peso price of coffee if there were a uniform exchange rate, and the actual price. To the extent that one considers a free or perhaps "guided" exchange rate as the natural situation, the peso price series implied by conversion of the world coffee price to pesos using that rate would be the appropriate one to compare with the actual peso price. This allows for the fact that in a sense one of the biggest destabilizers of the domestic price of exports is discrete changes in the exchange rate.

For non-coffee crops, price swings are endogenously generated. Though they are thus more amenable to domestic control, and though some attempts at stabilization have been instituted, they nevertheless remain quite severe for a number of products in Colombia, especially those in which the small farmer specializes.

Table V-13 shows the annual average real prices received by farmers for a variety of crops including potatoes, tobacco and beans (tending to be small farm crops) and barley, rice and cotton (large farm crops). Corn is grown extensively on all farm sizes. Price fluctuations are relatively small for the crops more commonly grown on larger farms, especially for barley and rice, and are notoriously severe in the case of potatoes--less so but still rather severe for corn, tobacco and beans.[1]

The fact that the real price of one product has fluctuated more than that of another does not mean that the execution of price policy as conceived by the responsible agency has necessarily been less successful, since

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[1] Conceptually, what we want to measure here are price movements from one crop period (shorter than a year for most crops and regions of Colombia) to the next in the same region. But figures are not available. The fluctuations measured by annual, countrywide figures may be less than one-region harvest to harvest fluctuations as they may average out fluctuations in opposite directions for different regions of the country, or fluctuations occurring within a year for items of which two or more crops can be grown in one year.

Table V-13

Real Producer Prices[1]
(Base 1950-1965=100)

Year	Coffee	Yucca	Beans	Platano	Panela	Corn	Potatoes	Wheat	Tobacco
1950	88	82	129	93	84	120	159	129	121
1951	101	88	107	91	85	105	121	119	102
1952	106	66	86	89	95	76	90	119	115
1953	106	68	91	86	100	85	112	114	94
1954	129	98	95	100	85	105	115	115	98
1955	113	110	89	103	76	95	76	105	98
1956	138	105	105	97	76	103	105	102	91
1957	131	97	95	97	117	108	89	97	106
1958	114	80	84	89	122	85	94	99	94
1959	85	94	77	97	106	94	72	100	90
1960	86	105	102	76	83	92	77	87	87
1961	84	121		95	74	112	102	89	81
1962	77	102	97	108	100	88	56	82	103
1963	78	97	87	110	149	108	113	73	92
1964	84	158	128	138	146	122	141	83	108
1965	78	128	99	129	105	98	75	84	119
1966	78	115	89	130	102	102	104	83	106
1967	74	105	92	128	95	98	83	89	98

[1]Deflated by the implicit deflator of Gross Domestic Product.

Source: Jay Atkinson, unpublished calculations.

Table V-13 (continued)

Year	Bananas for internal consumption	Cacao	Cotton Fibre	Cotton Seed	Unhulled Rice	Sugar Cane	Sesame	Barley	Soy-beans	Sorghum
1950	92	98	106	104	92	61	88	101		
1951	87	93	113	105	111	65	80	111		
1952	86	90	120	110	81	78	79	123		
1953	91	89	110	104	90	78	75	111		
1954	85	108	99	87	95	74	67	98		
1955	88	94	95	85	96	74	79	103		
1956	82	86	89	81	91	69	89	101		
1957	81	99	98	92	98	100	120	97	116	
1958	102	97	106	108	106	117	106	104	105	
1959	112	137	110	116	102	122	101	107	123	
1960	109	122	102	104	109	113	106	98	86	
1961	107	107	97	98	108	113	104	92	85	
1962	113	103	105	97	98	122	137	87	84	122
1963	107	99	94	95	91	117	121	91	91	114
1964	125	91	88	94	100	152	121	85	105	100
1965	130	85	94	119	117	135	128	87	105	97
1966	117	81	91	103	111	126	123	96	103	86
1967	118	76	83	100	111	113	114	93	96	80

its goal may simply have been different.[1] Comparing targeted monetary support prices with actual prices tells us more directly how the support operation succeeded in the field. A comparison of Table V-14 with Table V-13 reveals, however, that the crops with the greater fluctuations in real price also had the greatest discrepancies between support prices and prices actually received by the farmers.

Though the above figures indicate that real price fluctuations were contrary to official preferences, it could still be argued that their effects may be exaggerated when one looks only at the price fluctuations. When price declines are a result of good crops (i.e. high yields) in a given year, they do not necessarily signal a decrease in farm incomes. Table V-15 presents series on the real income from the sale of the crops whose price series were presented in Table V-13. For several of the crops income does fluctuate less than prices.

In fact, these unimpressive results are not surprising. Witt and Wheeler argued[2] a few years ago that the variety of agencies involved in determining price support for individual commodities leads to poorly coordinated price programs in general with frequent distortions of relative prices among commodities. The particular level of support at a given time for a given commodity is based to a large extent on the economic power of the industry members and partly on unreliable cost data which is hastily gathered. The authors attributed the lag of wheat and bean support prices behind those of other agricultural commodities to the fact that INA has a responsibility to consumers as well as producers.

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[1] If the real value of the support price fluctuates this must represent either a desire to change it or a sort of inefficiency, an inability to predict general price movements.

[2] Witt and Wheeler, Op. Cit., p. 45.

Table V-14

Prices (Per Ton) Announced and Prices Paid by INA (IDEMA) and Average Producer Prices, By Crops

		1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Rice:	Announced		840	1006	1006	1260	1260	1280	1500	2050	2050	
	Paid		687	784	808	985	119	1230	1393	2073	1804	
	Average Market Price	770	883	954	919	1046	1347	1703	1884	1914		
	Real Price Received	726	770	767	695	642	711	831	787	785		
Beans:	Announced		1920	2000	2000	1900	2300	3600	3600	3600	4300	
	Paid			2373	2006	1620	3543	3421	3814	3538	5736	
	Average Market Price	1400	2000	2277	2006	2419	4151	3477	3662	4494		
	Real Price Paid	1319	1744	1822	1669	1486	2190	1696	1530	1582		
Corn:	Announced		383	560	560	750	850	925	972	1020	1250	
	Paid		401	470	523	858	933	903	975	1059	1243	
	Average Market Price	450	474	629	526	794	1040	903	1104	1203		
	Real Price Paid	424	413	506	398	488	548	440	461	440		
Wheat:	Announced		921	920	920	1000	1428	1428	1428	1917	2100	2100
	Paid		888	894	854	1052	1200	1380	1667	1838	2023	2020
	Average Market Price	940	880	975	957	1052	1394	1525	1755	1756		
	Real Price Paid	886	767	784	724	646	736	744	733	785		
Sesame:	Announced			1350	1550	2100	2100	2900	2900	3500	3700	3700
	Paid											
	Average Market Price	1323	1519	1617	2250	2450	2850	3283	3682	3934		

Sources: Prices announced and paid by INA (IDEMA) are from Octavio Barbosa C., "La Politica de Precios de Sustentacion", CID, Universidad Nacional de Colombia, mimeo., 1970. Average market prices are those used by the Banco de la Republica in the calculation of the Nacional Accounts and real prices are the nominal ones deflated by the gross domestic product deflator.

Urban Food Price Fluctuations

As well as measuring the marketing system's ability to prevent serious differences in price at different harvest periods or in different years, it is of interest to evaluate its ability to prevent serious seasonal fluctuations (i.e. fluctuations occurring between crop periods of consumer prices. This, of course, has been one of INA's main stated goals.

Analysis of prices of nine food products (rice, sugar, potatoes, eggs, milk, beef, corn, panela, and plantanos) in eight cities[1] between 1935 and 1965 indicated a definite diminution in the tendency to fluctuate over this time.[2]

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[1] The cities were Bogota, Medellin, Cali, Barranquilla, Cucuta, Pasto, Bucaramanga, and Popayan.

[2] Fluctuations were defined both for nominal and for deflated prices. Two alternative measures of fluctuation were used in the nominal price case. One was the absolute difference between observed values and a 12 month moving average for the same month summed for a one year period [i.e. $\Sigma(V_i - T_i)$]; the other was the square root of the sum of the squares of such deviations from the moving average over one year periods of time. In each case a calculation was made every six months for the 12 month period surrounding that point in time. And in each case the measure of fluctuation was normalized by dividing by the average price for the period in question. Thus the first index was $\frac{\sum_{i=1}^{12} P_{ai} - P_{ti}}{12Pm}$ where P_{ai} is the observed price in month i, P_{ti} is the estimated value of the trend line for that month and Pm is the mean price of the 12 month period for which the calculation is made. The second index is $\frac{\sum_{i=1}^{12} (P_{ai} - P_{ti})^2}{12P_m}$

The other definition of fluctuation involved the variation of deflated nominal prices around the moving average of these deflated prices. A major weakness in this case was that the same deflator had to be used for each city, introducing some error; another defect was that we did not use a deflator on a monthly basis but deflated the figures for each month of a year by the same figure, so that in years with rapid overall inflation, the deflator was considerably smaller than it should have been at the first of the year and larger than it should have been at the end of the year. This introduces an upward bias in the measure of deviations from the trend in the deflated series; since we were not concerned with the absolute values of such deviations in our deflated series analysis, a problem would arise only if this bias differed in size in the early part of the period under consideration and in the later part.
(continued on following page)

Sugar did not have substantial price fluctuations during any part of the 30-year period, and therefore showed no decline.[1] All of the other crops considered, with the exception of potatoes, registered substantial declines in the degree of fluctuation. A group consisting of rice, eggs, milk, and beef had substantial fluctuations at the start of the period but by 1965 these had been reduced in most of the cities to about the level of those for sugar

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(footnote continued from previous page)
Inasmuch as inflation has been somewhat more rapid in the recent period, this might suggest an upward drift to the upward bias, and therefore a tendency to underestimate the degree to which price fluctuations have decreased.

Neither of the two approaches is perfect; to the extent that one is trying to measure storage and transportation improvements and any other factors which might affect fluctuations, one does not want to allow long-run changes in the relative price of the good under consideration and other prices to affect the index; the deflation technique has a tendency to allow this. On the other hand, to the extent that a sudden increase in the price of a product simply reflects a general price rise, this is not a fluctuation in the sense relevant to an attempt to evaluate improvements in transportation storage, etc. but it does affect the index in our first method. The ideal method would involve eliminating general price changes, and also eliminating the long-run trend in the price of the good in question relative to general prices. Since this would entail a considerable amount of extra work, and it did not appear that it would change the general tenor of our results much, we did not pursue it. The deflated and undeflated approaches did give different results in some cases, with fluctuation decreases usually coming out lower with the index based on the deflated figures. As we tend to place more confidence in the method using undeflated figures, most of the comments in the text will refer primarily to it.

[2] In no city did it show a substantial change in the degree of fluctuation. The index of absolute fluctuations relative to the moving average was 0.5 (i.e. the representative observation was about 5 percent away from the trend line as defined by the 12 month moving average).

which we may think of as being close to a reasonable minimum.[1,2] For another group (panela, corn and platanos) the decline was considerable but did not bring the tendency to such a low level.[3] Potatoes was the crop for which, in more cities than for any other there was no noticeable decrease

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[1]The implication that sugar price fluctuations are low in some absolute sense could be questioned; in no case have they gotten as low as those of rice in recent years. This may be due to the fact that the administered or regulated sugar prices tend to remain fixed in money terms for substantial periods of time, and hence change abruptly and substantially when they do so with the result that total deviations in the trend line are greater than if the price followed other prices up more smoothly.

[2]The initial absolute fluctuation index for rice ranged from a low of 0.6 for Popayan to a high of 1.0 for Bogota and Pasto, typically being about 0.8 or 0.9; it descended in almost all cities to 0.35 or lower. (The exceptions were Cucuta and Bucaramanga, where the decrease was slight.) Virtually all the cities, therefore showed a marked decline, reaching a low level relative to most of the other products. In three or four cities a sharp decline was registered in the last six or seven years of the period.

For eggs the initial coefficients of fluctuation ranged between 0.9 and 1.5 while those at the end of the period ranged between 0.4 and 0.7 with 0.5 being about average; for milk, the initial coefficients lay between 0.8 and 2.8, and those at the end of the period between 0.3 and 0.5, indicating a really remarkable tendency for prices to stabilize; fluctuations of beef prices, like those of milk, tended to go down almost to what might appear to be a minimum regardless of how high the fluctuation coefficient was at the start in a given city (initial coefficients ranged between 0.4 in Popayan and 1.7 in Barranquilla with 1.0 probably being about the average, and the end of period coefficients ranged between 0.2 and 0.4). For both milk and beef, results did not vary much as among the various indices used. Milk price fluctuations were cut sharply in 4 of the large cities (Medellin, Cali, Barranquilla and Bucaramanga) by 1950 and did not fall much subsequently; for the others the fall was more gradual.

Eggs present a special case in that the index of fluctuations based on deflated prices rose in a number of cities; until this can be explained it is unsafe to conclude much about the egg market.

[3]All of these showed sizeable fluctuation decreases, but these differed by crop and the final level obtained also differed considerably by city. The smallest of the absolute fluctuation coefficients was that of panela, which at the end of the period ranged between 0.4 and 1.2 with 0.6 being about the median coefficient, after having started the period ranging between 1.4 in Bogota and about 2.5 in Baranquilla, with the median coefficient being in the neighborhood of 2.0. Both corn and platanos showed substantial progress in most cities, although not reaching low fluctuation levels even at the end of the period The corn fluctuation index ranged between 1.3 and 2.1 at the start and ended between 0.5 and 1.2. The coefficients for platanos were very high at the start of the period, reflecting the perishable nature of this product; they ranged from 1.7 to about 3.3 in Cucuta. By the end of the period the variations were down to a minimum of 0.5 and a maximum of 2.1.

in the severity of fluctuations.[1] One must conclude that there has been little if any improvement here.

As might be expected, fluctuation coefficients are generally somewhat lower in the larger cities; perhaps also where the climate is cooler, (See Table V-16). Overall it appears that substantial reductions in fluctuations have been made in all cities, so that none now has as serious fluctuations as Bogota had in 1935.

There appear also to have been considerable decreases in inter-city price differentials over this 30-year period. Rice prices, for example, were more uniform and also moved together more closely at the end of the period. This was also true for wheat flour, panela, yuca, and a few other items checked.

The Instituto Nacional de Abastecimiento

INA, recently designated by the new name of IDEMA, has had a very checkered career in the market and price aspects of government agricultural policy. As well as suffering from seriously dishonest management during at least part of its history, it appears also to have lacked clear goals, and certainly has lacked technical efficiency. Its stated goals include both raising prices to producers, lowering prices to consumers, and decreasing price fluctuations for both.

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[1] Their severity moved up and down over time, making it especially difficult to define trends; there seemed to be no clear downward trend in five of the eight cities. In a couple of these there would have been an apparent downward trend except for wild fluctuations in the last two or three years. In Popayan and Medellin there were fairly clear downward trends, and in Bogota a clear one until the recent upward surge. The mean coefficient of fluctuation at the start of the period was about 1.7, and at the end of the period about 1.4, indicating some improvement when the eight cities were taken on an unweighted basis.

TABLE V-16

Unweighted Average of Fluctuation Coefficients by Cities

	1935	1965
Bogota	1.2	0.53
Medellin	1.2	0.60
Cali	1.4*	0.60*
Barranquilla	1.7	0.76
Bucaramanga	1.5	0.78
Cucuta	1.45[1]	0.78[1]
Pasto	1.5	0.65
Popayan	1.35	0.72

Source : Calculations by the author.

*Figures for sugar were guessed and beef was not included in the calculation.

[1]Excludes beef.

Policy seems to have fluctuated between favoring the consumer and favoring the producer according to the pressures of the moment, (among other things), and consistent with unsatisfactory understanding of the relationship between the two goals. A considerable emphasis on stability of the level of production and the attempt to base its support prices on costs suggests that it has not been aiming so much at long run equilibrium prices as at some concept of constant output and profits. But the difference between these goals has probably not been clear in INA's thinking.

Perhaps the most disputed policy of INA was that of direct sales to consumers. At the end of 1963 it had 2,863 stores with which it tried to fight against speculators and intermediaries who were accused at that time of being responsible for the increases in cost of living. Barco, the Minister of Agriculture, declared that it was not possible to eliminate the intermediaries but that rather the problem had to be attacked through increases in output, storage facilities, and so on. INA then took some steps in this direction, such as conceding credit to producers cooperatives with the cooperatives selling their product to INA at prices fixed by that institution. And in 1964 it organized some free markets in the country, having particular success at the plaza publica de Manizales. INA trucks would go to the fincas and bring in goods for sale and those not sold for a certain time would be picked up by INA at support prices. Such policies created differences with the Federacion Nacional de Comerciantes and agreements were eventually reached.

INA handles a small share of the products in which it operates.[1] But this has probably been a less serious problem than "bad handling". It has

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1 The volume of its domestic purchases have been relatively small, averaging about 5% of the total production. (I think this is of the five crops in which it operates.)

often been subjected to consumer criticism (perhaps invalid) for waiting too long to resell and thus forcing a sizeable price rise.

Lack of technical efficiency has characterized both the planning and the execution of the storage program. Plans have been frequently very poorly thought through. And operation has had many flaws.

In its relationship to the private sector, INA is also subject to criticism. For example, in the face of substantial excess capacity in the rice milling industry in the early 60's, INA started to use its own mills, contracting private ones only when it could not handle the rice on its own.

It would be hard to make a strong case that INA had been a major factor in decreasing urban price fluctuations of agricultural products when among those whose fluctuations decreased the most were eggs, milk, and beef. While rice is a product purchased and stored by INA, which underwent a substantial decrease in fluctuations, the percent she handles seems unlikely to have accounted for the improvement. Corn is another of INA's crops; while its fluctuations were reduced substantially, they were not brought to a really low level; and as noted earlier, in the case of potatoes little improvement was shown.

This tends to corroborate the view of some observers that INA's overall efficiency has been low , partly because of a lack of ability to predict crops in advance and thus set a reasonable price, and partly because of lack of capacity.

The Superintendencia de Regulacion Economica

This agency seems to have had little positive effect (if any) towards its goal of price control. Like INA, it has lacked the basic understanding

of what economic reactions price control may generate, as well as the administrative capability to make its controls generally stick. To the extent that it has had effects, it could be argued that they have as likely been harmful as helpful.

By the nature of its activity, this agency is also particularly subject to bribery. Changes on this count have been frequent.

One negative effect is that the responsible retailer takes the loss implicit in price control (supermarkets seem usually to be either more responsible or more controlable in this sense) while the less responsible ones evade the law by passing higher purchase prices on in the form of lower quality, damaged products, etc.[1] Another is that supply can be curtailed.[2]

Policy on Imports and Exports of Agricultural Products

Government policy with respect to imports and exports is discussed in more detail in Chapter 7, where we discuss the contribution and performance of Colombia's agricultural sector in international trade. It is pointed out there that the import substitution policy with respect to agricultural products has, like the parallel one for industrial products, been founded on ambiguous and dubious bases, and its overall effects are by no means clear. It is even less likely that the policy with respect to exports has been optimal. The habitual presence of an overvalued exchange rate makes exporting less profitable unless it is at least offset by some form of government subsidy; the sophistication of Colombia's international trade policy is only now evolving

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[1] See IIMA, Op. Cit., p. 27.

[2] Thus, Littman notes that the intervention of the Superintendencia de Regulacion Economica has often kept the Bogota beef market from being supplied, something which has never occurred in the case of pork whose prices have not been officially regulated. And pork prices have not fluctuated much. He also notes that the gross margins of commercialization and the channels of commercialization in the hog market are similar to those for beef.

towards the stage of doing this virtually automatically. And a very controversial objective of agricultural policy at times is to limit exports when these would imply shortages for domestic consumers. The virtual embargo on the export of cattle, some . years ago, was a case in point, although contraband trade with Venezuela did continue. Export restrictions were applied in the 50's or early 60's to rice, cacao, beans, wheat, milk and milk products, beef, pork, cattle, horses, goats, sheep, vegetables, oil seeds and cake, barley, hides, and leather..[1]

An accidental circumstance which has probably implied that the government needed particularly to get involved in the field of agricultural exports is that one of the major potential exports is beef, at the same time that this industry is a particularly ill-organized and inefficient one, which could probably benefit from substantial government intervention of one sort or another.

INA has been charged with handling importation of agricultural products, once again presumably trying to balance the interests of consumers and producers. Criticisms have naturally been forthcoming, in view of the inevitable conflict of interest between the two groups, at least in the short run.

Summary and Comments on Government Agricultural Policy

Over the years the governments' stated and actual agricultural policy has undergone, naturally, a number of changes. It has seldom approached an articulate integrated policy based on analysis of the agricultural situation, partly because such analysis is only now getting under way, partly

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[1]Laurence Witt and Richard Wheeler, Op. Cit., p. .

management of most of the stabilization policies. The creation of INA in 1944 was the first move along these lines, occurring just as the real price of agricultural items started to rise. Since then the creation of the Superintendencia de Regulacion Economica has entered the picture, with generally dubious effects.

The last half dozen years have seen some Ministers of Agriculture with considerable ability and dedication pursuing for the most part reasonable goals.

Thus Virgilio Barco, the Minister of Agriculture, in 1963 described the principal elements of the government's agricultural policy as including a "technological revolution, better use of the natural resources, protection for the marginal farmer, adequate credit facilities, improvement in the systems of distribution and marketing, and development of agricultural exports. At the same time, the industrial sector would be developing in such a way as to create sufficient new jobs and increase the effective demand for agricultural products. The principal objective of this policy would be the full employment of labor and available land."[1]

And President Lleras has given considerable emphasis to the development of the sector. For all this, the present picture is gloomy; the solution to the real problem--income distribution--will remain well out of reach until very significant policy initiatives are taken by the government.

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[1] See "Palabras del Se. Ministro de Agricultura al Inaugurar en Cali las Sesiones del XXI Congreso Nacional Agrario", Agricultura Tropical, Volume XIX, No. 12, December of 1963, pages 710-11.

CHAPTER VI

Welfare of the Agricultural Population Through Time and its Determinants

A. Real Income Over Time

As we have seen earlier in this study, average output per person has risen steadily over the last forty years in agriculture (see Column 1 of Table VI-1). Between 1925 and 1950 the average growth of output per person was about 1.65 per cent per year, according to ECLA figures; for the post-1950 period, it appears to have been about 2 per cent, although this estimate is contingent on the accuracy of our guess that the rural labor force has been growing at about 1 per cent a year.

An increasing output per person does not imply increasing income per person (although when the rural population consumes mostly agricultural products it comes close to doing so), since relative prices could be moving against agriculture. But this was not the case in Colombia. There has been, in fact, a long-run trend of prices in favor of agriculture so that the real income in the agricultural sector has been rising by somewhat more than the 1 to 2 per cent per head indicated by the output increases (see Columns 4 and 5 of Table VI-1 for alternative estimates).[1]

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[1] Table VI-1 reproduces our output per person series, and the relative price of agricultural goods, derived first by comparing agricultural prices to the GDP deflator (Column 2) and then to the GNP deflator (Column 3). Column 4, the product of Columns 1 and 3, is based on the implicit assumption that the agricultural sector absorbs a bundle of goods representative of that absorbed by the economy as a whole. In fact the farmer consumes more food and less of other items than the average for the population as a whole, so Column 4 tends, for this reason, to overstate the improvement in his lot due to changes in relative prices. In Column 5 we assume that 75 per cent of rural income consumption is spent on food and 25 per cent on other goods.

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TABLE V-1

Income Per Person in Agriculture Over Time

	Annual Output Person (1950 pesos) (1)	Agricultural Prices GDP Deflator (2)	Agricultural Prices GNP Deflator (3)	Annual Income Per Person (1950 pesos) Estimate A (4)	Estimate B (5)
1925	750	71.5	65.5	491	560
1926	826	68.2	64.4	532	611
1927	805	67.7	63.6	512	588
1928	861	62.1	59.2	510	594
1929	862	71.0	68.7	592	663
1930	896	70.4	66.2	593	668
1931	840	79.7	69.0	580	648
1932	876	73.4	60.6	531	607
1933	911	74.7	63.4	578	652
1934	916	71.5	63.6	583	656
1935	884	74.2	69.1	611	674
1936	952	76.1	72.1	686	749
1937	935	75.1	71.1	665	736
1938	973	72.1	70.2	683	747
1939	979	76.5	74.5	729	787
1940	992	66.4	64.2	637	709
1941	997	69.1	65.6	654	723
1942	1,019	73.3	74.4	758	887
1943	987	77.2	78.6	776	824
1944	1,028	83.5	87.5	900	930
1945	1,055	77.9	83.0	876	917
1946	1,125	79.5	83.3	937	980
1947	1,166	85.9	90.9	1,060	1,097
1948	1,166	79.7	85.0	991	1,031
1949	1,241	84.4	89.3	1,108	1,139
1950	1,138	94.4	98.2	1,118	1,122
1951	1,142	96.9	97.6	1,115	1,121
1952	1,223	96.8	97.3	1,190	1,199
1953	1,226	99.5	104.8	1,285	1,262
1954	1,246	107.9	115.0	1,433	1,384
1955	1,263	103.0	106.1	1,340	1,321
1956	1,291	106.0	110.4	1,425	1,392
1957	1,356	104.7	108.3	1,468	1,544
1958	1,383	100.0	100.0	1,383	1,383
1959	1,440	98.1	97.4	1,403	1,411
1960	1,427	97.8	96.7	1,380	1,356
1961	1,468	95.9	94.5	1,387	1,405
1962	1,502	92.0	90.3	1,356	1,386
1963	1,488	91.7	87.3	1,299	1,336
1964	1,559	100.4	95.9	1,495	1,509

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TABLE V-1, continued

SOURCES AND METHODOLOGY: Column 1 comes from Table II-1. Column 2 is based on the agricultural price series of Table A-2, and the ECLA GDP deflator. Column 3 makes use of the same agricultural price series as Column 2; for the years before 1950 the GNP deflator was based on an adjustment of the GDP deflator allowing for changes in the terms of trade, and carried out by the author. Column 4 is the product of Columns 1 and 3. Column 5 is based on the assumption that the farmer spends 75 per cent of his income on agricultural products and the rest on other products (in the same proportion as these other products are consumed by the economy at large).

A major defect in the series on output and income in Table VII is the fact that only agricultural output has been measured, whereas in fact a substantial portion of the income of farm families may be derived from such non-agricultural pursuits as artisan industry, commerce, processing of some food products, etc. Sample surveys including farms of varying sizes have shown that the share of income from non-agricultural pursuits is larger the smaller the farm and the lower the family income from agriculture.[1] Whether increasing income over time within agriculture would similarly be reflected in a decreasing relative importance of non-agricultural pursuits is less clear on *a priori* grounds.[2] A more solidly based income per person series must await further research in this area.

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This assumption probably errs in the other direction from that underlying Column 4, so the two series would bound the true one, assuming that the output per man series (Column 1) is correct, and that the price elasticity of demand for agricultural and non-agricultural goods is zero. To the extent that the latter assumption is not met, there is at least one element tending to bias downward the gain in real income over time in both Column 4 and Column 5.

Further refinements in the deflator to make it closer to that of the bundle of goods actually consumed or absorbed by the agricultural sector would improve the series but the data which would be required are not available to me and the output and agricultural price series are in any case not so accurate as to warrant such an effort. The price series for agricultural products had to be constructed on a very dubious basis, especially before 1938. In the 1950 and on period it was, according to the central bank, a price paid to the producer. The same was true for 1938-1950, with the figures coming from the 1949 World Bank study, and being somewhat cruder. For the pre-1938 period, we used city prices as our base and to the extent that the rural to urban commercialization margin varied at all during this period an error was introduced.

[1]This was the case for example in the various regions studied directly or reviewed by CIDA (Chapter IV, Section B, *passim*).

[2]In the case of different farm sizes at a point of time, the family on the smaller farm has both a smaller income and a lower marginal productivity of labor in agriculture. As income increases over time for farm families this could coincide with either increasing or decreasing marginal productivity of

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Even if non-agricultural output has substantial importance it is unlikely that its inclusion would alter greatly the changes in income per person as indicated in Table VI-1. And since the improvement in terms of trade between agricultural products and all products occurred after 1940 (although there was a gain followed by a loss in the 1925 to 1940 period), when price statistics were fairly accurate, its existence is open to little doubt, although the extent may not be accurately measured.

Columns 4 and 5 show a clear pattern of gradual improvement during the forty-year period under consideration, interrupted only occasionally by fluctuations and almost never showing even a short downward trend. The exception is the period since the coffee boom of the mid-fifties, from which there was a gradual decline until 1963, reversed sharply in 1964. Whether 1964 represents the start of a new upward surge remains to be seen.

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labor in agriculture for a given number of hours worked, although an increase would perhaps be more likely. (Information on the relative importance of technological change, increasing capital/man ratios and increasing land/man ratios as sources of growth would be needed to answer this question.) And changes in the competitive position of the alternative non-agricultural occupations with larger-scale producers would affect the issue. There is some evidence that a variety of small-scale farm-based activities have become less and less competitive over time, so if anything one would probably guess that the share of income from these pursuits has fallen over time. One must, however, guard against the possible bias on the part of observers to see and comment on these declining industries but to fail to take note of new ones which may be starting up. One factor of unknown direction and magnitude would be improvements in transportation and commerce over time. This introduces new goods into the rural areas and these may squeeze out the traditional ones; if the traditional products are highly competitive it can increase their market in cities and elsewhere.

Changing Distribution of Income Over Time: Producers of Different Products

Despite the overall gradual increase in income per capita of the agricultural population, there is at any point of time a wide range of incomes among different types of farmers, and among different regions. Impressionistic evidence suggests that welfare has not increased uniformly for these various groups and some of the statistics we can bring to bear on this question concur.

We consider first the producers of coffee, non-coffee crops, and livestock. Increases in income to any producer can result from increased output on his own part or improved prices. In the period 1938 to 1962 real coffee prices rose a great deal (see Table VI-2) and even after a sharp decline between 1957 and 1962 were almost 100 per cent above the 1938 level. Livestock prices closed the period about 33 per cent higher than in 1938 while the real price series for crops other than coffee showed no trend.

Since coffee yields seem to have varied little over the period in question (see Table A-80), the coffee sector has gained largely from improved prices and from expanded area. If the estimates of population involved in coffee production shown in Table VI-3 are at all accurate, real income per person has risen very rapidly in this sector. Even with the sharp drop after 1957 the average producer is more than twice as well off as he was in 1930; his income has grown at an average rate (although the concept of an average is a little misplaced when such large fluctuations have occurred) of over 3 per cent per year.[1]

[1] The data on which these conclusions are based are weak but the conclusion that income per person rose less rapidly than indicated here would have to be based on a smaller estimate of active population engaged in coffee production in 1932 (the 1955-1956 study by ECLA-FAO is probably not too far from the truth) and this seems unlikely as it would imply a very low worker/coffee farm ratio at that time. Unless some severe irregularities characterized the coffee census of 1932 the number of farms should not have been overestimated.

TABLE V-2

Some Indicators of Welfare of the Rural Population Over Time

	Index of Physical Output per Person	Index of Real Price Received for:						Agricultural Real Wages		
									Deflated by Cost of Living Indices	
		Livestock	All Crops	Coffee	Other Crops	Livestock & Non-Coffee Crops	Total Livestock & Crops	Deflated by GNP Deflator	Clima Caliente	Clima Fria
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1925	54.2			44.6-58.3			66.9			
1926	59.7			37.0-48.5			66.3			
1927	58.2			36.0-47.3			64.5			
1928	62.2			31.2-41.0			60.0			
1929	62.3			33.2-43.6			69.6			
1930	64.8			38.5-50.7			66.2			
1931	60.7			64.6			68.5			
1932	63.3			73.7			60.5			
1933	65.9			71.1			63.2			
1934	66.2			53.3			69.7			
1935	63.9			57.0			69.1	88.4	104.6	
1936	68.8			56.1			72.3	83.2	93.5	
1937	67.6			44.1			70.8	86.6	101.5	
1938	70.3	68.2	69.9	40.3	91.5	79.5	69.9	79.3	89.1	93.5
1939	70.8	66.3	68.0	39.2	88.9	77.4	74.6	81.8	79.7	89.3
1940	71.7	64.9	63.8	29.7	89.2	77.3	64.3	81.8	94.9	100.2
1941	72.1	66.3	64.6	44.8	79.5	72.9	65.7	76.0	80.5	107.5
1942	73.7	61.6	80.0	45.4	104.9	83.2	74.6	75.4	77.4	76.0
1943	71.5	62.6	84.5	42.0	116.0	89.5	78.5	64.5	65.3	62.3
1944	74.3	80.3	89.7	45.4	122.1	101.2	87.7	74.6	68.3	68.8

(continued on following page)

TABLE VI-2, continued

	Index of Physical Output per Person	Index of Real Price Received for:						Agricultural Real Wages		
									Deflated by Cost of Living Indices	
		Livestock	All Crops	Coffee	Other Crops	Livestock & Non-Coffee Crops	Total Livestock & Crops	Deflated by GNP Deflator	Clima Caliente	Clima Fria
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1945	76.3	80.9	83.0	43.1	112.1	96.5	83.0	73.3	70.4	76.1
1946	81.3	78.3	84.6	53.8	107.2	92.8	83.3	76.2	72.7	79.6
1947	84.3	97.2	86.9	60.0	106.9	103.6	91.0	86.0	79.0	81.3
1948	84.3	85.7	83.3	54.5	104.3	95.1	85.0	94.8	85.9	85.9
1949	89.7	104.0	81.5	62.7	95.3	99.8	89.3	87.8	84.4	80.1
1950	82.3	94.6	98.3	81.5	111.0	102.9	98.5	94.4	79.3	82.2
1951	82.6	91.8	99.6	91.6	105.3	98.6	97.8	94.0	85.1	79.7
1952	88.4	101.2	93.6	96.3	91.6	96.5	97.7	91.7	87.8	87.7
1953	88.6	104.8	96.3	96.1	80.1	92.4	100.5	90.9	81.9	86.7
1954	90.1	114.1	115.4	124.3	109.1	111.7	115.2	97.3	83.4	85.3
1955	91.3	111.7	100.9	104.9	98.4	105.1	106.0	99.6	90.4	96.5
1956	93.3	103.9	112.3	129.0	100.8	102.3	110.3	94.8	84.1	88.6
1957	98.0	100.7	112.6	121.1	105.4	103.1	108.4	88.0	72.9	81.2
1958	100.0	100.0	100.0	100.0	100.0	100.0	100.0	88.2	79.1	83.9
1959	104.1	110.6	89.3	75.8	100.6	105.6	97.3	90.5	83.2	88.1
1960	103.2	111.4	86.9	76.0	93.9	102.7	95.4	91.5	87.9	94.9
1961	106.1	102.9	87.8	73.5	98.1	100.5	94.5	95.5	90.3	93.8
1962	108.6	98.3	82.3	66.8	91.7	95.1	90.4	97.7	100.6	104.4
1963	107.6									
1964	112.7									

SOURCES AND METHODOLOGY: Columns 1 and 7 are based on Table VI-1. The prices deflated to arrive at Columns 2 - 6 are from Table A-2; they are, like Column 7, deflated by the GNP price series. Column 8 is based on the author's estimate of a national money wage series (see Table A-135), and the GNP deflator. The money wage series come originally, on a department by department basis, from Table A-135.2. Columns 9 and 10 are from Table A-135.

TABLE V-3

Real Income Over Time in the Coffee Sector

	Output (thousands of tons) (1)	Average Price to Farmer (pesos per ton) (2)	Income (millions of current pesos) (3)	Income (millions of constant 1955 pesos) (4)	Hectares (5)	Output Hectare (kilograms) (6)	Active Population Producing Coffee (thousands of people) (7)	Income Per Active Person (1955 pesos) (8)
1932	207.2	284	58.8	420.8	356	582	241	1,745
1933	206	283	58.4	413.6				
1934	198	297	58.9	300.3				
1935	238	297	70.8	348.6				
1936	250	304	76.1	354.1				
1937	255	249	63.4	286.9				
1938	268.0	249	66.6	267.2				
1939	262.2	269	70.5	273.8				
1940	266.8	193	51.5	204.5				
1941	285.9	283	80.9	325.7				
1942	328.8	295	97.0	359.4				
1943	316.8	321	101.7	325.2				
1944	332.0	388	128.8	342.2				
1945	327.9	434	142.3	339.7				
1946	346.0	600	207.6	453.4				
1947	369.5	768	283.8	524.5				
1948	331.7	789	261.7	415.5				
1949								
1950	412.5	1,476	609.0	752.1				
1951	452.3	1,875	848.1	961.0	680	665		
1952	504.1	2,003	1,010.4	1,173	699	721		
1953	506.7	2,098	1,063.2	1,149	718	706		
1954	498.1	2,836	1,412.6	1,420	737	676		

(continued on following page)

TABLE V#3, continued

	Output (thousands of tons) (1)	Average Price to Farmer (pesos per ton) (2)	Income (millions of current pesos) (3)	Income (millions of constant 1955 pesos) (4)	Hectares (5)	Output Hectare (kilograms) (6)	Active Population Producing Coffee (thousands of people) (7)	Income Per Active Person (1955 pesos) (8)
1955	454.1	2,472	1,122.5	1,123	736	617 (532)	346.8	3,238
1956	493.1	3,270	1,612.3	1,527	776	635		4,403
1957	584.2	3,640	2,126.6	1,715	797	733		
1958	589.5	3,501	2,063.7	1,470	818	721		
1959	619.8	2,842	1,716.6	1,130	840	738		
1960	562.8	3,105	1,747.5	1,088	845	666	$\geq$ 404.1	$\leq$ 2,692
1961	619.0	3,281	2,031.0	1,166	840	737		
1962	587.0	3,209	1,883.9	1,037	840	700		

SOURCES AND METHODOLOGY: Column 1 is based on the National Accounts, 1950-1961 and 1962-1964 for the period 1950 and on; the statistical annex of the International Bank for Reconstruction and Development, The Basis of a Development Program for Colombia, 1950, for 1938-1948; the author's estimate based on export figures for 1932-1937. Columns 2 and 3 have the same sources for the same years. All of these figures are subject to considerable error; even for the post-1950 period I have been unable to reconcile the figures from the Coffee Growers bulletin and the national accounts for coffee output. Fortunately the possible discrepancies are not so wide as to possibly change the very clear trends in income per person engaged in coffee which emerge. Column 4 is based on the deflation of Column 3 by the national "obreros" cost of living index for 1954 and on and by the Bogota series before that back to 1937. Prior to 1937 the ECLA GDP price deflator was used.

The figures of hectares (Column 5) come from American Embassy reports (1951-1962) and the coffee census of 1932 (1932). Note that the 1955 and 1956 figures when taken with the national accounts output figures imply a yield considerably higher than that estimated in the ECLA-FAO study (presented in parentheses). The latter is probably the more accurate, so one could not conclude definitely that yields have risen between 1932 and the fifties. Nevertheless, we present yield estimates for 1951 and on since they may give an accurate picture of the directional movement of yields in that period.

The best estimate of active population in coffee growing (Column 7) is that for 1955-1956 based on the ECLA-FAO study of coffee (United Nations, Food and Agriculture Organization, Coffee in Latin America, New York, 1958). The 1932 figure assumes the same active population to farm ratio as prevailed in 1955-1956. The 1960 figure is from Lauchlin Currie's study of coffee (Banco Cafetero, La Industria Cafetera en la Agricultura Colombiana, 1962, Bogota, 1962); Currie considers it to be a minimum estimate.

The case of the livestock sector differs from that of coffee since the output is primarily for domestic consumption with the result that the price increase which has occurred has been at least in part a result of rather slow growth in output. Since the mid-fifties when output apparently began to rise faster, the relative price of livestock has not risen. Little is known about the amount of land and the number of people connected with livestock. A reasonable guess might be that the population involved has not risen rapidly and hence that somebody's income has been going up. The large-scale landlords (on whose property most of the cattle are raised--in 1959 close to 75 per cent of cattle were probably found on farms of 50 hectares or more) are the natural beneficiaries from the improved prices.

The producers of non-coffee crops have fared worst price wise. Yields have risen, especially in the post-1950 period, but the direction of any shifts in the land/man ratio are not known. It is quite possible that a large segment of this group has had little improvement in income and living standards over time.

Changes in the Distribution of Income by Size of Farm Operated (If Any)

Reference was made in Chapter I to the frequently proposed hypothesis that the poorest farmers, the landless workers and the owners of small plots, have been getting worse off over time. In this section we attempt to test this hypothesis. Subject to the weaknesses in the wage statistics, the appropriateness of the price deflator used,[1] and the impossibility of

[1] No cost of living series were available for rural areas and for most of the regions and periods only food price series in the departmental capitals were available. Whether these would move up faster or slower than food prices

(continued on following page)

measuring other sources of income, the real wage series give a meaningful picture of what is happening to the landless worker or the farmer who earns most of his income working for someone else. For the country as a whole real wages in agriculture seem not to have risen over the period 1935 to 1963 (see Table VI-4). They fell from 1935 until about 1943 and then rose fairly rapidly to the present.[1]

To the extent that large cattle farms continue to operate in a very extensive fashion and the modern commercial farms absorb relatively little

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(continued from preceding page)

in the rural areas is not clear. In general, if a typical farm family consumed only food products produced quite locally (so that high transport costs did not lead to high prices of the foods consumed) and if the margin of commercialization between the country and the city decreased over time, then food prices would rise faster in the rural than in the urban areas. We have no studies of changing commerce margins over time in Colombia, but the improved transport network would make it plausible to assume a decrease. This factor then would suggest that our real wage changes over time are biased upwards (since the rise in food prices in the rural areas is biased downwards).

On the other hand, to the extent that food and other products brought from some distance have some importance in the individual's market basket, the falling commerce margins mean that these prices are rising less rapidly than in the urban areas or in the rural areas where they are produced. Also, if food prices are rising more rapidly than other prices, the use of a food price series gives an upward bias to the deflator. (Given the large share of food in the consumption of the agricultural worker, and the fact that "food" prices in urban areas did not rise faster than non-agricultural goods since 1938, this may not be a serious problem.) These elements work in the opposite direction from that referred to in the previous paragraph and detailed empirical information would be necessary to determine the net bias.

[1] One qualification (among others) of the meaning of the real wage estimates made here is that, if the rural-urban migration is selective by education, ability and vigor (evidence is presented elsewhere that it is selective by educational level) then a constant real wage does not mean that a person with a constant skill level will continue to get the same wage--he will in fact get a higher one. So the people who stay in agriculture are getting better off. Unfortunately it is probably impossible to quantify this aspect of the situation. Some observers have remarked on the decreasing level of physical and mental vigor of the people left in the countryside around the larger cities, i.e., in areas from which out migration is particularly easy.

TABLE VI-4

Index of Real Agricultural Wages,
by Department and for Colombia as a Whole

(1963 = 100)

	1935-1937	1938-1939	1940-1941	1942-1944
Antioquia				
hot climate	78.3	59.1	67.7	50.7
cold climate		80.1	84.7	47.4
Atlantico				
hot climate	81.0	69.6	63.2	80.0
Bolivar				
hot climate	80.6	91.3	81.0	67.5
Boyaca				
hot climate	73.9	72.1	78.0	64.6
cold climate		80.6	87.2	68.2
Caldas				
hot climate	127.0	99.6	122.4	84.4
cold climate		105.4	122.2	79.4
Cauca				
hot climate	102.8	71.9	70.4	70.3
cold climate		87.6	99.3	69.1
Cundinamarca				
hot climate	73.0	72.3	86.2	64.8
cold climate		79.2	108.4	66.8
Huila				
hot climate	74.7	66.6	81.2	61.5
cold climate		66.2	79.9	60.5
Magdalena				
hot climate	86.0	87.7	75.1	63.4
cold climate		82.8	85.3	51.8
Nariño				
hot climate	95.9	83.8	85.0	62.9
cold climate		79.2	81.1	75.2
Norte de Santander				
hot climate	91.3	62.7	80.7	70.8
cold climate		82.6	99.4	72.8
Santander				
hot climate	80.9	84.0	87.8	77.8
cold climate		71.9	83.9	54.3
Tolima				
hot climate	71.5	84.9	75.7	63.5
cold climate		77.4	76.6	57.6
Valle del Cauca				
hot climate	116.2	112.2	117.7	92.1
cold climate		132.4	111.4	98.2

TABLE VI-4, continued

	1945-1949	1950-1954	1955-1959	1960-1963
Antioquia				
hot climate	60.1	69.9	83.2	92.7
cold climate	72.3	81.0	85.3	92.7
Atlantico				
hot climate	72.9	71.8	66.3	91.0
Bolivar				
hot climate	81.7	80.2	73.2	95.2
Boyaca				
hot climate	76.5	78.2	79.9	99.5
cold climate	72.3	78.9	79.2	97.7
Caldas				
hot climate	102.1	99.7	103.4	97.8
cold climate	86.8	87.3	91.6	93.0
Cauca				
hot climate	90.4	92.6	85.2	96.2
cold climate	85.6	90.9	87.8	97.0
Cundinamarca				
hot climate	81.7	86.0	92.4	95.9
cold climate	85.6	80.2	85.3	94.2
Huila				
hot climate	78.5	80.0	84.6	108.3
cold climate	75.0	77.6	80.3	101.8
Magdalena				
hot climate	85.2	86.9	78.5	96.2
cold climate	82.0	72.1	86.0	100.5
Nariño				
hot climate	89.0	84.6	76.4	98.6
cold climate	80.0	83.0	77.8	93.9
Norte de Santander				
hot climate	75.7	87.5	84.2	96.6
cold climate	79.6	93.5	85.8	102.4
Santander				
hot climate	84.6	89.7	88.7	97.8
cold climate	71.8	70.7	75.8	94.2
Tolima				
hot climate	59.4	91.7	94.3	102.3
cold climate	66.8	88.3	92.7	98.4
Valle del Cauca				
hot climate	96.7	97.0	96.9	102.5
cold climate	98.1	86.1	102.1	106.9
National				
hot climate	78.5	83.5	81.9	94.7
cold climate	73.6	84.3	87.7	98.3

[1] 1940-1944.

SOURCE: Based on Table A-135.

labor, it might be argued that increasing concentration of people on the smaller farms would prevent a real wage increase. The rural population has continued to grow and the breakup of small farms into even smaller ones must have occurred unless newly opened lands took up the additional workers or they found employment on larger farms. Although the former has occurred in some measure it seems unlikely that the two outlets together have prevented some decrease in land/man in the smaller farms. Add to this the fact that between 1938 and 1951 the increase in the agricultural population seemed to have been mainly in the form of non-owners (according to the two population censuses), and the fact that technological progress has probably not been rapid on the smaller farms, the result then seems easily understandable.

Before considering the path of the agricultural real wage in detail we digress to consider what, if anything, it tells us about the numerically much larger group of small farm operators. In a purely competitive economy the wage rate equals the marginal productivity of labor. If, in each region of Colombia, employers of wage labor (usually relatively large land holders) were profit maximizers and small farmers were willing to rent out their time whenever it paid more than their marginal productivity on their own farms, then the wage rate would be a measure of the marginal productivity of labor on farms of all sizes, and would be something less than (but probably moving closely with) the income of the small farm owner. The literature dealing with surplus labor economies[1] expands upon the conditions under which the supply price (equal to the wage) of labor is not equal to its marginal productivity. Whether labor surplus is serious in Colombian agriculture, and

[1] Defined as economies where the marginal product of labor is less than the wage rate in industry or the supply price to industry.

whether the institutional conditions are present which would imply no link between the marginal product of labor on small, owned farms and the wage rate, is a matter of great importance for the conclusions we can draw in the rest of this chapter.

Substantial labor surplus does appear to exist in some areas (such as Nariño, Boyaca, and Cundinamarca) according to the impressions of knowledgeable observers. Several possible breaks in the link between MP_L on small owned farms and wages of hired labor seem worth considering.

1. In some regions small farmers may be isolated from any potential employers, so that they could not divide their time between their own farms and those of others; at the same time they may be unwilling to migrate and leave their own farms to be full-time employees.

2. Some large farms may have a very inelastic demand curve for labor and be unwilling to hire more than a small number at any living wage. The inelasticity of their demand curve for labor may not be based on economic grounds; they may simply feel that it is dangerous to have too many employees. Under these circumstances there is some arbitrariness in the wage rate; if it is set above the physical minimum subsistence level then the income of the small farm owner or renter may be below it. And since the small farmer cannot get a job on the large farm even at a very low wage, the tie between his income and the wage rate is cut. A reasonable wage rate may coexist with the presence of surplus labor (with low or zero marginal productivity) on the small farms. If the wage rate is below the incomes of small farmers (by more than the return to factors other than labor), the landless worker would logically prefer to buy land. This may be very hard, however, in a situation

of very imperfect markets (for land and for the capital he might have to borrow to be able to buy the land). Price inelasticity of demand on the part of employers of labor could, thus, make the wage rate of little use as an indicator of what was happening to the incomes of small farmers.

3. In surplus labor conditions, the behavioral pattern of a farm family and its individual members may determine whether a link exists. The income of a farmer could be equal to the wage rate but his marginal productivity below it if the typical farm had several active persons with the total income divided up among them, even though the marginal productivity of the last one was low or zero. If the family were maximizing the total income it would still hire out any worker who added less to total family output than the wage he could earn elsewhere. As long as this rule were held to, the wage rate would be a measure of marginal productivity on small farms, and to the extent that MP_L moved in the same direction as average productivity, it would give some evidence on the movements of farm incomes. The link would be tighter, however, if the individual members hired themselves out only if the wage were above their personal income on the family farm; assuming income to be evenly distributed among the active members of the family, the wage would reflect average income.

As an indicator of small farmers' incomes, therefore, the wage rate is most precise when there are no geographical or other difficulties preventing the small farmer or members of his family from spending part or all of their time working for someone else, when larger farms have an elastic demand for hired labor, and when members of small farm families work for others when the wage is higher than their income (rather than their marginal

productivity) on the small farms. In Colombia the typical farm family is not a very extensive one, so it seems more likely that the members will work out when their marginal productivity (rather than their share of income) falls below the wage rate. But one cannot make a general presumption without empirical evidence. Geographical mobility is certainly a problem in some regions, and the demand curve for labor may well be inelastic in many areas. Case studies in some areas have shown a rough equivalence between the wage rate and income of small farm owners; in others this has not been true, so the sum total of empirical evidence to date casts little light on the relationship.

In summary, the link is sufficiently in doubt to make any independent evidence on small farm incomes relevant. But it probably exists in most regions even if it is not tight, so strong movements in the real wage can be expected to signal movements of the same direction for small farm incomes.

The Decline of the Agricultural Real Wage

Little data is available on the nature of any changes in the tenure picture which may have occurred during the period in question or during subperiods; one fact suggested by a comparison of the 1938 and 1951 population censuses is that the main increase in the active agricultural population between 1938 and 1951 was in landless farmers.[1] The alleged tendency of landowners to evict squatters and renters from their lands after Law 200 of 1936

[1] Unfortunately there is enough doubt as to the comparability of the definitions used in these two censuses to detract substantially from the confidence with which we make this assertion.

to prevent their acquiring rights to the land could be responsible. This trend would swell the army of potential laborers and push down their wages. There is dispute as to how often these evictions actually occurred, with Hirschman arguing that Law 200 was not really counterproductive as often alleged.

To the extent that a relative increase in the number of farmers with little or no land was a major cause of the fall in real wages, there would not necessarily be a similar fall in the income of the small farm owner. Income per person in the agricultural sector as a whole continued to rise in this period; since commercial farming was not yet important enough to have brought about such an increase, it seems probable that many small farmers must have been getting better off. This gives added support to the hypothesis that a swelled supply of farm labor was important in the fall.[1] On the other hand, as late as 1960, the CIDA study suggested that only about 10 per cent of farmers were essentially landless, so the increase in the relative size of this group in the thirties can hardly have been very great, unless a substantial decrease has occurred since the thirties. But this is possible. Out-migration flows (of farmers in general) were probably slower in the 1935-1945 period than later; from the mid-forties on the rural violence exerted a push factor of considerable proportions in support of this migration.[2]

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[1] If the incomes of landless workers and small farmers did move in opposite directions, it suggests the absence of the link discussed in the previous section.

[2] The population censuses do not give information enabling one to deduce a detailed time pattern of migratory flows, although it is possible to deduce roughly the intercensal average rates and the age composition of the migrants in the period immediately preceding the census. ECLA figures (United Nations, Analyses and Projections of Economic Development: The Economic Development of Colombia, United Nations, Geneva, 1957

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To the extent that the migration was concentrated disproportionately among landless workers,[1] its increase after 1945 would imply a high supply of hired labor in the 1935-1945 period and a decreasing supply thereafter, the latter being consistent with the rising wage rate after 1945.[2] Diagram VI-1 shows the four variables (output per person, income per person, real wages, and agricultural population) and their relation in the period 1935-1953.

Although the factors discussed above could plausibly have led to the wage decline, our evidence is not solid enough to prove it. An alternative hypothesis is based on the assumption of downward rigidity of nominal wage rates, and is consistent with the evidence from Japan, where the real agricultural wage fell in a period of general inflation after rising in a period of falling prices.[3] The phenomenon of falling real wages in Colombia might then suggest that an increase had occurred prior to 1935, perhaps coupled with falling prices, but that this (perhaps somehow artificial) increase was then eaten away by inflation. The rise after about 1950 might be distinguished

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statistical appendix, p. 5), based on sources not specifically cited, indicate that the active agricultural population was rising particularly rapidly in the period 1930-1938. Between 1945 and 1953, on the other hand, they suggest it almost came to a halt (due, presumably, to the violence). (Unfortunately, one cannot be sure whether their estimates were designed to match these reasonable patterns or were based on independent foundations.)

[1] Unfortunately I have no evidence bearing directly on this issue.

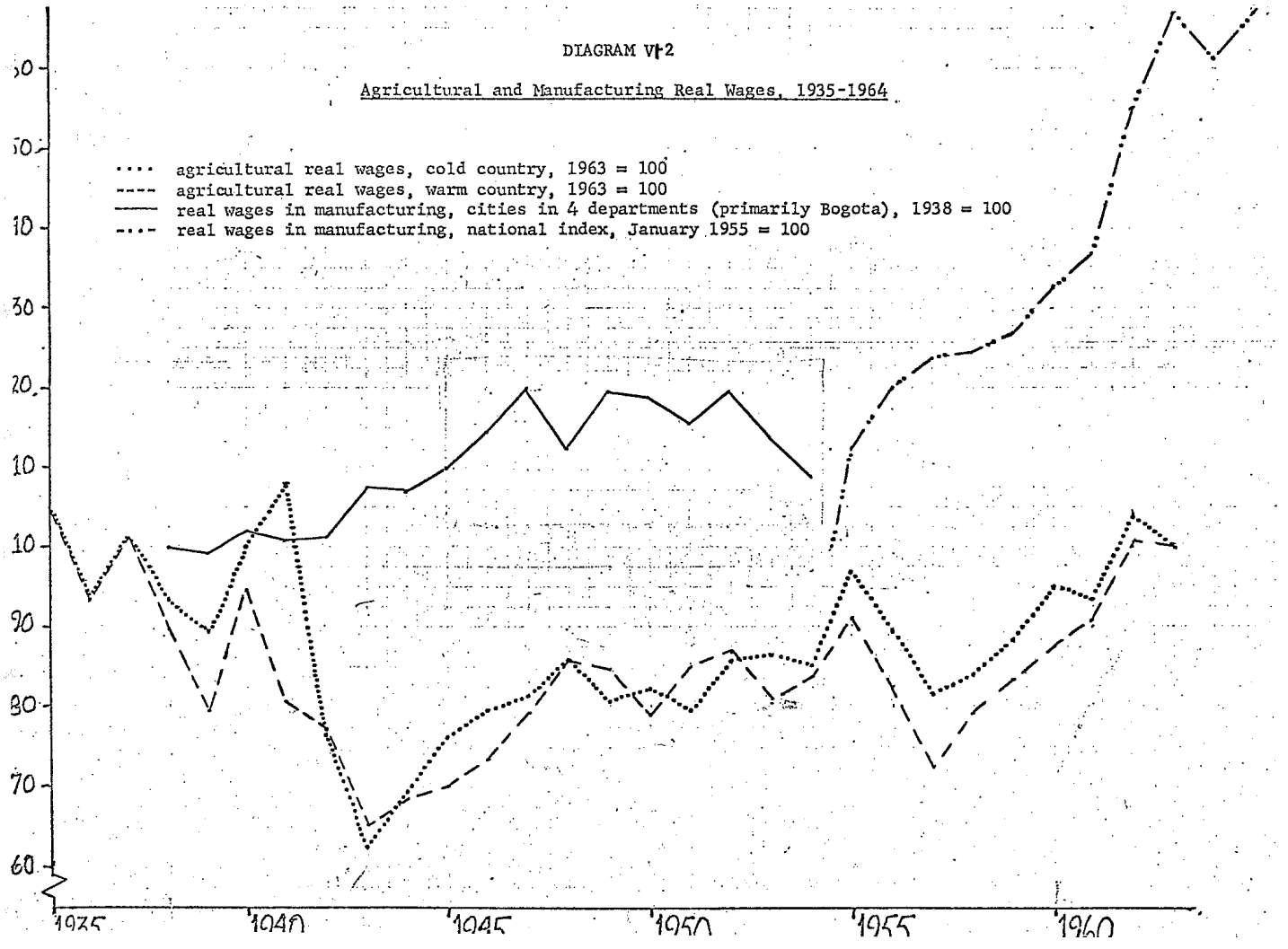
[2] Even if migration was not disproportionately rapid for landless workers it must have contributed substantially to the wage rise after 1945. As of about 1950 the coffee boom allowed industrialization to proceed relatively fast and to generate urban employment for a rising labor force. That migratory flows were responding to the urban-rural wage differentials is consistent with the way in which rural and urban wage patterns moved together. A group of series are plotted on Diagram VI-2.

[3] Ryoshin Minami, "The Turning Point in the Japanese Economy," Center Discussion Paper No. 19, February 15, 1967.

DIAGRAM VII
Indices of Output, Income and Wages in Agriculture, 1925-1964
INCOME AND OUTPUT PER PERSON, 1958 PESOS (000's)
INDEX OF REAL WAGES
output per person in the agricultural labor force
income per person in the agricultural labor force
agricultural population
warm climate, real agricultural wages
cold climate, real agricultural wages

DIAGRAM VI-2

Agricultural and Manufacturing Real Wages, 1935-1964



from the earlier one in that it followed the reaching of a turning point or "commercialization point" in Fei-Ranis terminology, and was based on a real scarcity of labor rather than a market imperfection.

The time pattern of prices is consistent with such an explanation. They had fallen sharply before 1935, especially from 1928 to 1933, and were rising again from 1935 on. The possibility that this mechanism played a role can be tested better by looking at the money wage rates in the individual departments than at averages for the nation as a whole. In Diagrams VI-3 - VI-5 we have plotted the money wage and real wage movements in the departments of Atlantico, Caldas and Tolima, including the period of falling real wages (usually about 1935-1945). The relative constancy of the money wage rate over periods of several years is somewhat suggestive of the hypothesis, but not convincing even for these (purposely chosen) departments, as there are some decreases. Some of the decreases may not be real in the sense of implying that someone's money wage must have fallen.[1]

But even if money wages were not perfectly rigid in these departments (and the hypothesis received even less support in the other departments) their behavior suggests some downward rigidity which may have been important

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[1] Published wage rates are "most frequent" rates; it is not clear whether they are modes or medians. Less statistical uncertainties would have plagued the test if it had been possible to use the figures from municipios; unfortunately these were apparently not published annually during this period. Even that test would not be perfect since a new random sample of workers wages could always be lower than the previous period average even if no worker's wage had changed. I am not aware whether the sample was changed each year or trimester in the collection of these figures. A further disadvantage of working at the municipio level is that the sample was, and still is (I believe) quite small.

DIAGRAM V-3

Real and Money Wages in Atlantico, 1935-1950

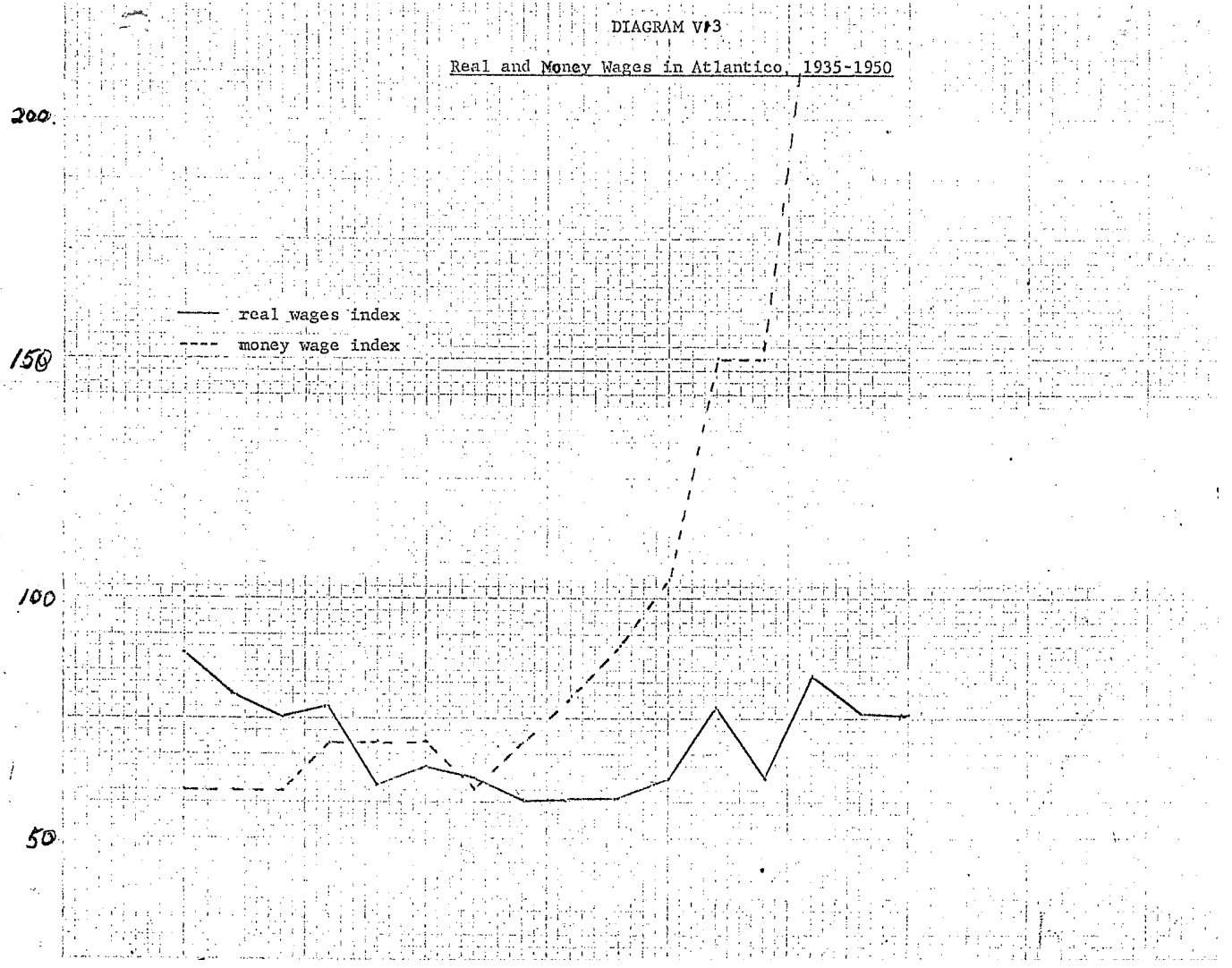
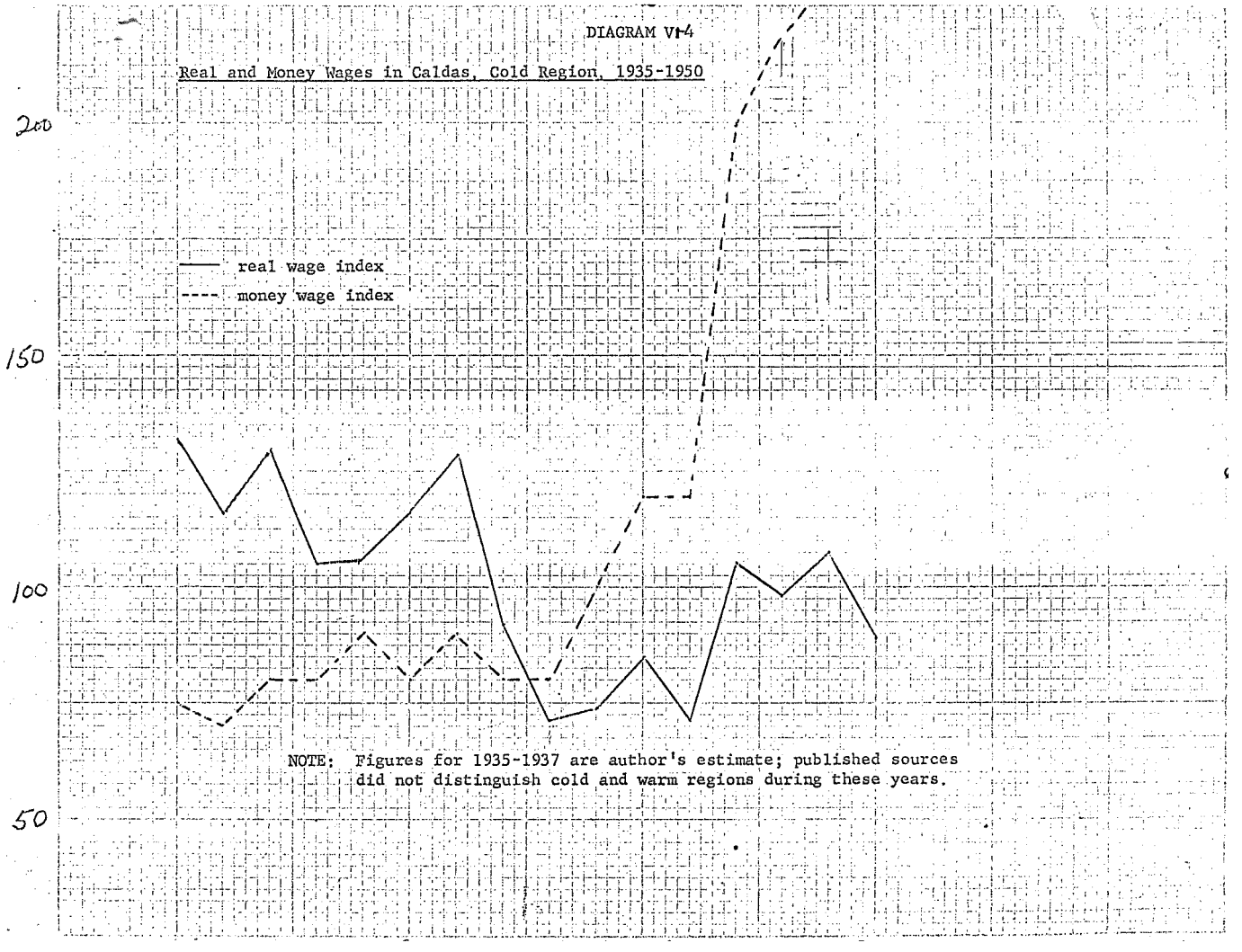


DIAGRAM VI-4

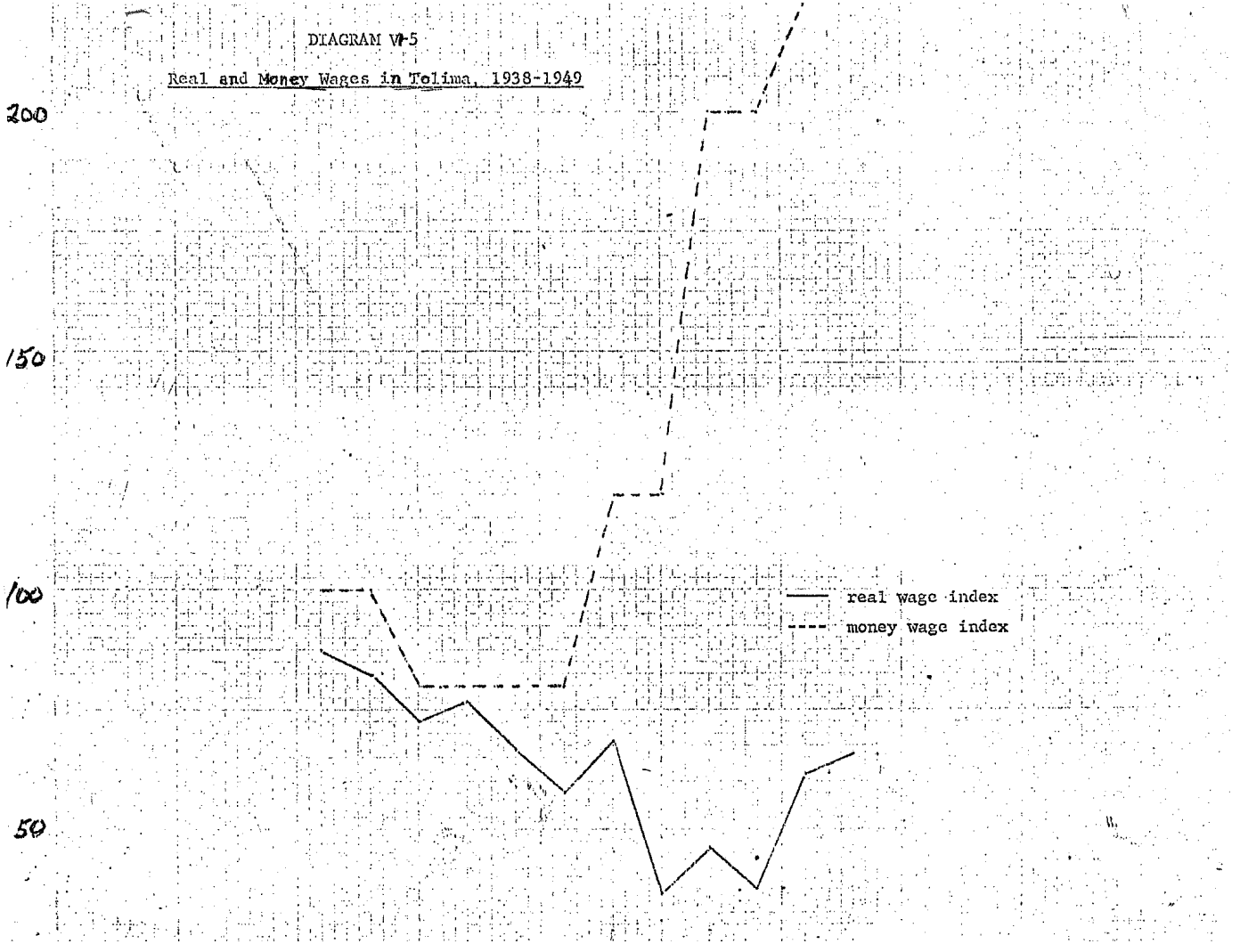
Real and Money Wages in Caldas, Cold Region, 1935-1950



NOTE: Figures for 1935-1937 are author's estimate; published sources did not distinguish cold and warm regions during these years.

DIAGRAM V-5

Real and Money Wages in Tolima, 1938-1949



enough to make inflation a necessary vehicle in the achievement of a rapid decrease in real wages. If real wages had risen above their equilibrium level in the previous period of falling prices, and were moving back toward equilibrium during the period in question, then the return of inflation after a period of declining prices explains the timing of the decline; the original increase in real wages (which we hypothesize despite the lack of empirical evidence) was brought on by the deflation.

If downward rigidity is an important factor, it probably suggests some stability in employer-employee relations in agriculture. Unless the rigidity is simply due to a careless failure to maximize profits on the part of the employer, it must imply an unwillingness on his part to decrease an employee's nominal wage. No figures are available on the job stability of landless farmers.

To the extent that the downward wage rigidity was an important factor in leading to the wage decline in question, the decline would be quite consistent with increasing average incomes in agriculture in general. And if there were no mobility between small farming and wage laboring, it would likewise imply nothing about the incomes of small farmers. To the extent that there is some mobility, some tie between the two income paths would exist, although not necessarily a tight one.

The Upturn of the Real Wage

The reality and nature of the definite upturn in wages which seems to date from the mid-1940's has important overtones when viewed in the framework of various theories of development. If it means that surplus labor no

longer exists in any general sense, then the ease of increasing agricultural or industrial output in the future might be smaller.[1] Some empirical observations confirm the idea of labor scarcity in some regions. Fals Borda noted an increasing scarcity in Saucio as of about 1950.[2] This was a special case, however, since the dam built there used a lot of labor. But a real increase in the marginal product of labor is perhaps the most likely explanation for the upturn. If in fact the out-migration to the urban areas was most rapid at this time (and especially if landless workers were prominent in this migration), the decreasing supply of labor would contribute to a higher marginal productivity. Real wages in factory manufacturing seem to have turned up in the early fifties after possible stagnation during the late thirties and forties[3] and this gives support to the alleged movement of the real wage in agriculture.

A variety of other factors could be adduced to explain the rise. Figures for the nation as a whole suggest an upturn occurring about 1944 in both cold and warm regions. There have been substantial fluctuations since then but the trend has definitely been upward.

Since the upturn the average annual increase in the real wage has been in the neighborhood of 2 per cent (more if the calculation is based on the low of 1944 and the high of 1963; a little less if less extreme years are used). But the irregularity of the movements of the wage series, and the

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[1] On the other hand, the existence of methods of cultivation which could easily replace many men with a reasonable amount of capital suggest that the less labor surplus the better.

[2] Fals Borda, Orlando, Peasant Society in the Colombian Andes (Gainesville: University of Florida Press), 1962, p. 81.

[3] The statistical evidence on which the series referring to the pre-1950 period are based seem quite weak, so not too much confidence can be placed in conclusions referring to that period.

differences in the different departments leave many things to be explained; one could not make a convincing case that a turning point had been reached sometime in the forties, or in the late fifties (this point could have been chosen on the grounds that wages were rising in every department during the early sixties), since movements have been too irregular and there have been similar increases before, which were not sustained.

Regional Differences in Movements of the Real Wage

The movements of the national real wage in agriculture indicate what is happening over time to the representative agricultural worker. The departmental series do the same for the representative worker in each department. To the extent that we are interested in changes in the distribution of income within this relatively poor group of the population, the narrowing among the average wages of the different departments is relevant. We saw in Chapter II that the migration which was a result of wage differentials (and presumably was partially responsible for closing those differentials), did not account for a substantial portion of the increases in agricultural output over time. That this migration and the subsequent narrowing of wage differentials was not important on the output side, however, does not imply that it could not have improved substantially the lot of a good number of the poorest workers. Considering the departmental wage series, one could argue that the events of the last thirty years are somewhat more positive than those indicated by the national real wage series, since the real wage of the people who were worst off at the start of the period increased faster than that of the people who were best off.

There remains, however, some doubt as to whether this narrowing of wage differentials was a really widespread phenomenon; such doubts are fostered by the impressionistic evidence and writings of some observers who suggest that in fact real incomes are probably getting lower in the poorest regions while they are improving in the better off regions, due to the fact that in the poorest regions education is neglected, outward mobility is thereby reduced, and the man to land ratio increases, while in better regions where farmers can afford to educate their children, and where communications with the outside world are likely to be better, out-migration occurs, thereby reducing the man to land ratio and leading to an increase in income per head. The fact that the differential among departmental wage rates has been decreasing is not inconsistent with a possible widening of the gap within departments (i.e., on a municipio by municipio basis). Those migrating between departments could be relatively better educated and their departure could lead to wider dispersion among municipios in the department from which they migrated but less between departments, since they would usually move to a generally more prosperous department.

The empirical evidence on this question is not consistent from department to department. In general it does not give much support to the hypothesis of widening dispersion within the departments.[1] The case of Cauca is portrayed

[1]Easily observable movements of labor in some parts of the country would in any case cast doubt on the hypothesis. The landless population is by and large the poorest within the agricultural sector, yet it is well known that rather large-scale movements of this population occur within the coffee region for harvest; there are also a variety of other indications of mobility on the part of this group. In the valley of Tolima, for example, they work at rice or cotton during part of the year, then move to the higher coffee growing regions during harvest there. It seems possible that this group might be more mobile than other farmers because they were not attached to a given piece of land.

in Diagram V-6; there is a marked decrease in dispersion of wages between 1937 and 1965. Not only is this true, but there are enough shifts in ranking by wage of different municipios to throw more doubt on a simple "widening gap" hypothesis. (The municipios are designated by numbers in Diagram V-6, so that these shifts can be seen.) Data are not available by municipio for all years, so only three were selected; this adds somewhat more uncertainty to the results.

Antioquia presented a different picture, at least as suggested in Diagram V-7. There seemed to have been a widening dispersion, especially in the warm regions, with the dispersion of the cool regions remaining about constant. Other departments had varied patterns. There was some narrowing of dispersion in the cold regions of Nariño, relative constancy in the warm areas. The cold areas of Caldas had a widening dispersion, the cool ones a constant one. Overall there was no general pattern.[1]

In most of the departments, there was not only a lack of widening dispersion for the municipios as a group but also a tendency for those municipios with the lowest wage rates in one year to move up into the middle of the distribution by the next observation several years later, and for others

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[1]The methodology has many flaws. Measurement of changes in wages is no doubt shakier at the municipal level than at the departmental level. The deflation of money wage series by a food price series for the capital of the department is a poor way to get a municipal real wage series. Yet, for the problem at hand it seems unlikely that such difficulties could have biased the results enough to change our general conclusion.

Another difficulty in the analysis is that the department is not necessarily the best unit to use. Somewhat more homogeneous regions might be superior. We have attempted the same sort of analysis using several of the geo-economic regions of the country (as classified by Ernesto Guhl--these are much smaller than departments) but have come to the same inconclusive results as when using whole departments.

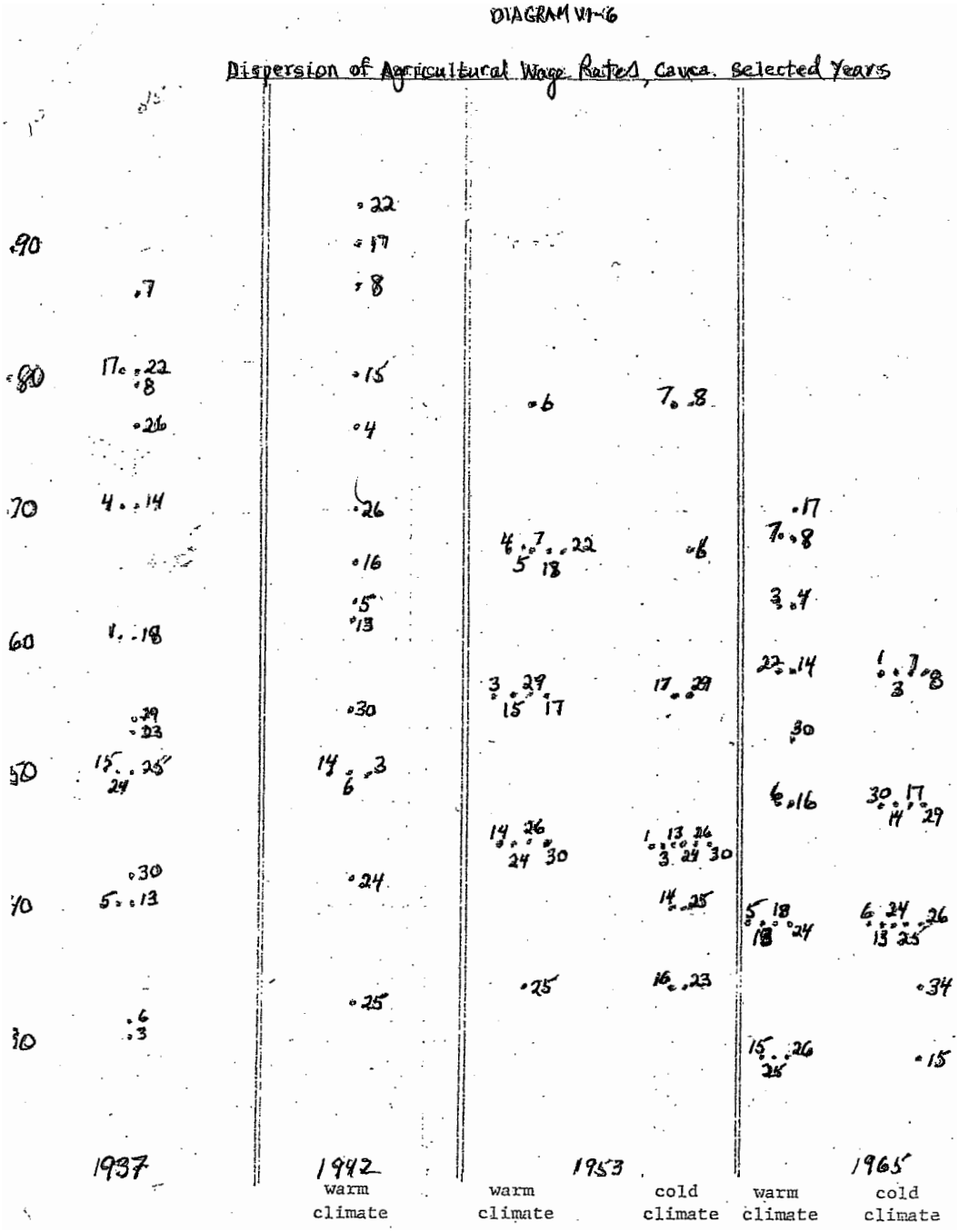
DIAGRAM VI-6
Dispersion of Agricultural Wage Rates, Cauca. Selected Years
90
80
70
60
50
40
30
1937
1942
warm climate
1953
warm climate
cold climate
1965
warm climate
cold climate

DIAGRAM V-6, continued

SOURCES AND METHODOLOGY: The money wage figures come from the Anuario General de Estadistica and the Boletin Mensual de Estadistica, both from DANE. The money wages for each municipio are deflated by food prices from the capital (Popayan); conceptually the deflation should be done by the prices prevailing in the municipio itself. If it were true that because of decreased margins for commerce or transportation over time, prices in outlying regions were coming closer to those of the capital, a bias could be present. Some prices would rise faster in the outlying area (goods produced) and some would rise slower (goods brought in to be consumed). The net effect is theoretically indeterminate. In general one does note a tendency for prices to rise at about the same rate in the different regions of the country, so over the fairly long time period considered here, the problem may not be too serious.

The wage data themselves are subject to much doubt and statistical error could account for some of the shifting in relative positions.

DIAGRAM V-7

Dispersion of Agricultural Wage Rates, Antioquia, Selected Years

a) cold climate

b) warm climate
1965
1953
1943

starting higher to become the low wage areas. This tendency cuts further into the theory of the predominance of the vicious circle of poverty in many areas.[1]

B. Structure of the Labor Market

It is well known that an industrial worker in Colombia with the good fortune to work in a large or fairly large factory receives a wage much higher than the employee in a small plant. One may speculate as to whether a similar variation of wage rates exists in agriculture, with larger farms paying higher wages (and possibly offering more security of employment, too). The only source I have found which distinguishes wage rates by farm size is the ECLA-FAO coffee study, from which the following table is taken.

Average Level of Day-Wages Per Worker by Plantation Size, 1955-1956

Size	Daily Wage (pesos)
less than 1 hectare	4.00
1.1 - 10.0 hectares	4.60
10.1 - 50.0 hectares	5.10
over 50 hectares	4.90
AVERAGE	4.45

SOURCE: Food and Agricultural Organization, Coffee in Latin America: Colombia and El Salvador, p. 77.

[1] Faulty data casts more doubt on this specific conclusion--the instability of the ranking of the municipios in terms of real wages--than on the general conclusion that there has not been widening dispersion within departments. Inappropriate deflation of the money wage series would produce just this sort of instability of rank ordering of the municipios, even if the ordering was in fact stable.

While it indicates somewhat higher wages on the larger farms, the differential is by no means of the order of that in industry.

A better understanding of the market for agricultural labor may be obtained by an analysis of the way the wage rate reflects various phenomena. The brusque movements of the coffee price over the last twenty years would seem to provide a good laboratory; it seems plausible that they would have affected substantially the wage rate in the coffee regions, and less so elsewhere. In fact this seems not to have been the case. The real price of coffee received by the farmer was high throughout the 1950's (until 1959) yet only Tolima out of the five most important coffee producing departments (Caldas, Antioquia, Cundinamarca, Valle and Tolima) showed a substantial increase in the real wage for the 1950-1954 period over the 1945-1949 period. And only Caldas had a lower real wage in 1960-1963 than in 1955-1959. These surprising results may be due to the disturbances created by the violence of the period or to the inappropriateness of the above test. A look at wage rates for coffee growing municipios would provide a better test.

C. Non-Wage Indicators of Welfare Over Time

Housing conditions in the rural areas of Colombia leave a good deal to be desired. Unfortunately, the results of the 1964 housing census (taken with the population census) are not yet available. So it is impossible to determine what changes may have occurred during the last fifteen years. It is possible to draw some comparisons between the 1938 figures and the 1951 figures. With respect to the availability of running water, electric lights, and sanitary facilities, there were increases between 1938 and 1951, but the levels were still extremely low. Only 7.4 per cent of the dwelling units had access to running water (of which only 5.1 per cent had running water indoors); 4.2 per cent had electric lighting and 11. 2 per cent had some form of sanitary facilities (of which only 4.7 per cent had indoor facilities other than latrines-- see Table VI-5).

Consumption Patterns

The per cent of income spent on food is an indicator of the level of income and welfare. No systematic survey has been made of rural consumer habits in Colombia; it is especially difficult when a portion of consumption is home produced. The rural social security department at the Colombian Ministry of Agriculture carried out a partial survey of income and expenditures of rural families in 1953.[1] The accuracy of this survey is not known, but it seems to be one of the very few sources which throw any light at all on patterns of rural consumption. While ECLA estimates that the per capita net income of the rural population was 497 pesos in 1953, the Ministry of Labor estimates that the consumption figure was at 337 pesos (i.e., 43 per cent of

[1] See ECLA, op. cit., p. 205. The study was carried out by the Departamento Tecnico de la Seguridad Social Campesina of the Ministry of Labor.

TABLE VI-5

Housing Conditions in Rural Areas, 1938 and 1951

	1938	1951
% of Dwelling Units with Running Water	1.1	7.4
Indoors		5.1
% of Dwelling Units with Electric Lights	1.9	4.2
% of Dwelling Units with Sanitary Facilities		
Toilet	1.2	3.3
Latrine		7.9
Total		11.2
% of Dwelling Units with Baths		2.18
Persons per Room:		
Per Cent With		
0-1 persons per room		.47
1-2 persons per room		18.40
2-3 persons per room		41.08
3-4 persons per room		11.60
4-5 persons per room		13.94
5-6 persons per room		13.44
6-7 persons per room		.92
7-8 persons per room		.09
8-9 persons per room		.05

SOURCES: Housing censuses of 1938 and 1951.

per capita urban consumption and 74 per cent of per capita consumption in the economy as a whole); the consumption was distributed in the form of 63 per cent for foodstuffs, 24 per cent for manufactured goods other than foodstuffs, and 13 per cent for services.[1]

CIDA's questionnaire about family expenditure (about 1962) indicated that almost all the workers spent more than half of the monetary incomes for food and often as high as 80 or 90 per cent. This would indicate that an even higher per cent was spent on food given that in some cases some was received free or produced on very small plots. (Of course, many of these workers did not have such plots.) Expenditures on alcoholic beverages were usually modest in the minifundio zones, higher in the llanos and at their maximum in Valledupar, where many of the workers spent more than 10 per cent of their incomes in this way.[2]

Nutritional levels, while not suggesting starvation in any region of Colombia, are quite insufficient. A series of surveys made over the period 1956-1962 suggested that about 46 per cent of the families showed too low a caloric consumption and about 48 per cent too low protein consumption. CIDA notes that the difference between a poor family and a well-off family in consumption per capita of almost all the essentials such as calories, proteins

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[1] It is interesting to compare this distribution of consumption with that of the blue collar workers in the various cities. By the time the 1953 consumer market basket surveys were taken, most of the cities had less than 55 per cent of expenditures for food. Nevertheless, the 63 per cent listed here is surprisingly low.

[2] Comité Interamericano de Desarrollo Agricola (CIDA), Tenencia de la Tierra y Desarrollo Socio-Economico del Sector Agricola: Colombia, Washington, D.C., 1966, p. 212.

and fats and calcium was about one to two.[1] In general the typical campesino diet is both sparce and very monotonous. It appears that in general poor rural families consumed less than poor urban families.

The poor quality of drinking water in most rural areas is in large part responsible for the high levels of infant mortality and the diseases of the digestive system. In a number of regions water is very hard to get and people carry it as far as two kilometers or farther. In some places they have to buy it from traveling vendors.

Education Levels in the Rural Areas

Education must be thought of both as a consumption item and an investment item. Although a significant proportion of rural children still do not attend elementary school at all, and an even greater proportion are through by the end of the second year, it remains true that the access of the rural student to education has been improved substantially over the recent decades with the building of new schools. The per cent of children who ever go to school has increased significantly over the period.[2] Only recently the department of Caldas became the first to claim that there was a school available to all elementary school age children in the department.

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[1] CIDA, op. cit., p. 219.

[2] Weaknesses in the statistics on students registered in school or in my estimates of school age children in the rural areas lead to the nonsensical result that over 100 per cent of rural children enter primary school at the present time. Thus no estimate of the ratio actually starting school can be made. If the biases in one or both of the series just mentioned do not vary widely over time, one can conclude that the per cent of rural children ever entering elementary school has risen a good deal over the last three decades.

Much less success has been achieved in decreasing the rate of attrition of children once they are in school. This might be attributed partly to the rapid growth of the system itself, and one might anticipate that, if and when the schools ever approach the point where all children enter, then more rapid progress will be made in solving the attrition problem. In any case, as seen in Table V†6, it has remained more or less stationary for the last twenty or thirty years. The calculations indicate that attrition was worse in the forties than in the late thirties (possibly due to the onset of the violence) and had, as of the late fifties, only just regained the level of the late thirties. More research will be required to determine whether these movements were in fact as Table V†6 indicates.

The fact that rural to urban migration occurs with greater prevalence among people with more education than among those with less has been noted by many people. This phenomenon presumably accounts for the fact that despite the gradual improvement in educational facilities available to the rural population, the rural illiteracy rate had not improved between the years 1938 and 1961, remaining, instead, around the 50 per cent level (see Table V†7). (Urban illiteracy has likewise shown little trend, with the overall decrease in illiteracy in the population being accounted for by the increasing proportion of the population in urban areas.)

CIDA notes that in the inferior strata of rural society the children do not receive more education than their parents, and in some cases even receive less.[1] If this is accurate, it is a very interesting commentary. As

[1] CIDA, op. cit., p. 236.

TABLE V-6

Attrition Rates in Rural Public Schools

	Boys					Girls				
	Passed First Year Entered	Passed Second Year Entered	Passed Third Year Entered	Passed Fourth Year Entered	Passed Fifth Year Entered	Passed First Year Entered	Passed Second Year Entered	Passed Third Year Entered	Passed Fourth Year Entered	Passed Fifth Year Entered
Entering in 1958	54.6	31.5	5.01	1.78	0.79	58.9	35.6	5.47	1.92	0.89
Entering in 1947	48.5	31.4	3.2	.71		50.4	23.5	3.03	.56	
Entering in 1941	42.9	26.5	3.26	.41		44.5	28.7	3.42	.37	
Entering in 1937	58:2	33.2	8.8	.72		59.7	35.5	9.4	.78	

NOTE: In each ratio "entered" refers to those who entered the first year.

SOURCES AND METHODOLOGY: Calculations based on figures from various issues of the Anuario General de Estadistica.

TABLE W-7

Illiteracy Rates, Rural and Urban

(people 15 years or more)

	Urban			Rural			Total		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
1938	20.7	29.0	25.4	49.2	57.6	53.4	40.1	47.1	42.4
1951	16.6	24.5	21.0	46.1	53.6	49.7	35.0	40.3	37.7
1961	17.1	25.1	21.6	46.9	54.3	50.5	35.7	41.0	38.4

SOURCES AND METHODOLOGY: The 1938 and 1951 figures come from the population censuses of those years. The 1961 figures, which come from DANE calculations, may possibly be in considerable error; the methodology is not known in detail to the author. The arrival of the figures in the 1964 census should help to clear up this ambiguity. The comparability of the figures for the three years is difficult to check and cannot by any means be assured.

might be expected there is a close relationship between the size of farm (or the lack of any land) of a farmer and the amount of education he has received. In the CIDA questionnaires forty landless farmers were interviewed and only one had received more than five years of education. Probably about a quarter had not attended school at all, and the median and mean number of years were probably between two and three. The statistics on education of their children were not sufficiently detailed to indicate whether it was on the average better or poorer. In Saldaña and Campoalegre the average for owners of farms up to fifty hectares and twenty-five hectares was only about two years of school. With rising size of farm this increased until the highest categories had respectively 8.6 and 7 years.[1]

CIDA notes[2] that in some cases the rural schools are not well-placed in terms of the populated areas, thus making more difficult than necessary the access to them. The variety of figures from the municipios studied by CIDA suggested that in some areas a very low proportion of students are currently attending.[3]

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[1] A notable fact from the statistics in Armero, Saldaña, Campoalegre, and Valledupar, is the relatively small number of children in the age group 7 to 9 attending school, and the higher, but still not very high per cent in the 10 to 13 age group. This reflects the very late start of most children in rural Colombia. In Valledupar in Magdalena even the children of very large-scale farmers had relatively little education; it is noteworthy, however, that they did tend to have more education than their parents, who had often immigrated from very poor zones such as Guajira and, beginning with nothing, had achieved success in the region. It may also have been due to a scarcity of schools in this very large area.

[2] CIDA, op. cit., p. 233.

[3] But performance apparently varies widely with region. For unknown reasons the minifundio region of Tenza in Boyaca has a relatively good record of formal education, apparently due to the fact that parents place much importance on this, and many families send their children to school in the cabacera. In Pupiales (Nariño) the teachers are so poorly paid that the parents of the students give a small contribution for each child.

Vocational education in agriculture was a very recent innovation (the 1940's) and only in 1952 was the Department of Rural Education formed within the Ministry of Education. In 1960 there were a total of 38 vocational schools for 2,200 students. Unfortunately the regional distribution of these schools did not maximize their usefulness; it was apparently the result of political motives rather than educational or agricultural ones. Other problems further decreased the potential productivity of the schools. In order to decrease the teaching problem in these schools the Ministry of Education created three rural normal schools located in Buga, Duitama and Lorica (Cordoba). The people emerging from these schools have had a fine record as extension workers according to CIDA although they have difficulty in furthering their practical studies within Colombia. The unfortunate case of a vocational school in Pupiales is referred to; 45 per cent of the students emerging in 1962 had emigrated from the region. While it is true that some of these may be practicing agriculture elsewhere, it is likely that not all are.

Social Conditions and Institutions in the Rural Areas

The lack of government interest in and the poverty of some rural regions can be indicated in part by the very low government spending per person in these areas. One gets a picture of how low spending by municipal governments can get by choosing very rural municipios, whose central pueblo is sufficiently small so that not too much is spent on it. As little as 5 or 10 pesos per person (i.e., nothing) may be spent by such governments. It is harder, of course, to guess at the federal and departmental expenditures which finally accrue to the people living in a given region. Municipal

expenditures are more a measure of the poverty of the people than a proof of the lack of governmental interest. Impressionistic evidence does, of course, confirm the fact that the national and departmental governments often spend virtually nothing which is of direct assistance to the populace in small municipios of a rural type. If schools are available, this is not so true, but many rural communities still lack this essential facility.

CIDA notes[1] that in general the social infrastructure seems to be most developed in the coffee zones which were settled a long time ago and which are, perhaps more than any other regions, characterized by the family farm. Social services tend to be lowest in the latifundio and minifundio regions.

The municipio, which is the basic entity of local government, is often founded on historical or social roots; still, a number of municipios have their origins essentially arbitrarily, perhaps for political reasons. In general the municipio has not been a very functional organization in terms of satisfying the needs of the community. To the extent that services are available they are usually limited to the town. One cause of the difficulty is that the municipal government is usually thought of as the arm of the central government and not as a representative institution for local interests. Inertia and lack of contact between the campesinos and the authorities is of course frequent. The municipal agencies usually proceed along their separate paths in a non-integrated fashion. The municipal councils often have little or no importance. The people in this are elected publically, although it seems highly unlikely that they would represent the interests of the typical citizen.

The close relationship between politics and justice, which prevails in general in Colombia, probably reaches its peak in the lower levels of government.

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[1] CIDA, op. cit., p. 222.

Thus the municipal judge is often under the orders of the local boss. Since payment for judgeship is poor, bribery becomes a natural result; in any case, the selection of individuals is not based on their efficiency but on political influence. A tremendous backlog of complaints and cases exists, and the anachronistic judicial system essentially assures the absence of justice.

Very limited efforts to apply minimum wages or working standards have been made in the rural areas. The highest salaries found in CIDA's various surveys were those in the Cauca valley in the coffee zone. Here workers unions have been established, and according to CIDA have improved working conditions.[1] Such unions, however, are still quite exceptional.

The minimum salaries established by law are rarely met in practice, and other payments such as paid holidays and vacations in many cases are passed by. In fact some of these laws probably introduced inefficiencies; an employer may refrain from hiring a seasonal worker for a week at a time in order to avoid the Sunday payment, or may avoid keeping a permanent worker long enough to have to pay the cesantia. Only in rare cases are written contracts used. Also the workers asked had no way to appeal to the authorities to make their rights received, and some did not know that these rights even existed.

The worst off workers seemed to be those without fixed employment or their own parcels of land, who therefore must rent a house in the village or construct a hut on "invaded" land.

Of the various rural associations which are present in Colombia only the Federación Agraria Nacional (FANAL) represents the small-scale farmer and the landless worker. In the second half of 1962 it was estimated that it had

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[1] CIDA, op. cit., p.

about 50,000 members, of which only about 5,000 represented the active group.[1] These correspond to about a hundred active local groups (of a total of 270). The group received official sanction in May 1946 and belongs to the UTC (Unión de Trabafadores Colombianos). About 75 to 80 per cent of its members are not owners of land, but the strongest support seems to be among small land owners and those who wish to get plots from the government through agrarian reform colonization. It has supported in the last two years some protest acts such as the so-called "organized invasions" in the departments of Bolivar and Magdalena. It claims to have taken possession of 80,000 hectares of non-producing lands and distributed it among members. Some of the lands were public property and others were private. It is severely hampered by a very small budget, which in 1962 was only 50,000 pesos, supplied by the UTC and contributions of friends and sympathizers. It had only seven full-time organizers and executives. Thus it still represents largely a potential source of action.

The cooperative movement in Colombia is weak. The majority of cooperatives which exist do not function for a variety of reasons. But, according to CIDA, when official support is strong enough and when cooperation comes as a response to a felt need, the rural community shows a good deal of understanding and enthusiasm for it. The Coffee Growers' Federation is the only organization to create cooperatives in more than a sporadic form. The Cauca Valley Corporation has a program to set up cooperatives but has had so far little success; a reflection, in CIDA's judgement, of the difficulty of the task.

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[1] CIDA, op. cit., p. 229.

The most interesting recent development in terms of rural organization are the Accion Communal groups. While they have not yet had a major impact on the rural areas, their potential as sources of rural investment and rural political power is substantial.[1]

D. Summary

Average income per person in the agricultural sector has grown at the very substantial rate of about 2 to 3 per cent per year during the last four decades. It is thus probably above the rate for the economy as a whole, (probably about 2 per cent), suggesting that the equilibrating mechanisms of changing relative prices of products and migration are at work. Migration out of agriculture has characterized the whole period under consideration, although the flows have varied. Relative prices of agricultural products have shown a definite secular rise, partly due to a very large increase in coffee prices but also due to an increase in the relative price of domestically consumed goods, at least up to the mid-fifties.

Special interest focuses on the hundreds of thousands of farmers at the bottom of the rural income scale. Those who were fortunate enough to be coffee farmers have benefited handsomely from the exogenously determined increase in the price of that crop. But for most of the other small farmers and landless workers, improvement has not been at all continuous during the thirty year period for which we have wage data; net change in real income may not have increased at all for some groups over the whole period. A real wage series for agricultural workers suggests that this group got worse

[1] For details, see the forthcoming Yale Ph.D. dissertation by Matthew Edel.

off from the mid-thirties to the mid-forties, since which time improvement has been fairly steady. But the net change over the whole period has been about zero. The wage series is statistically suspect but it seems unlikely that the changes it indicates are seriously biased in one direction or the other.

We conclude in this chapter that the real wage is not necessarily a good indicator of income movements for small farm operators; but other pieces of evidence do suggest that, if we exclude the coffee farmers, this group may not have fared well either. Relative prices have moved somewhat in favor of the crops grown on these farms but not strongly. During most of the period yields have probably not improved significantly if at all on the small farm and the amount of land per farmer has not in general risen; in some areas it has fallen.

The events of the last fifteen years are perhaps relatively encouraging, though. The real wage in agriculture has been rising. The argument that poor municipios are getting poorer is not borne out by the real wage figures we have (although these are admittedly weak). Relative labor scarcity has been noted in several areas by observers. And there is some suggestion that technological improvements such as better yields and use of fertilizers may be starting to reach some of the smaller farms. But these conclusions are still speculative and even if accurate, they do not preclude the possibility that an accelerated development of commercial agriculture coupled with no more than a moderate increase in urban jobs, will reverse any positive trend which has characterized these years.

Increasing percentages of rural children in schools and increasing communications channels make it possible that the rural problem will simply be converted into an urban unemployment problem as migration to the cities will increase, leaving labor fairly scarce in the country, but leaving masses of unassimilated people in the cities.

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CHAPTER VII

The Agricultural Sector as a Supplier of Foreign Exchange: The Development of the Coffee Industry: Present Export Prospects

Since most primary products involve less capital intensive production processes or less advanced technology than manufactured items, they usually constitute the bulk of the exports of underdeveloped countries.[1] This has been the case for Colombia, whose most important export product for the duration of this century and the latter part of the nineteenth century has been coffee; the other exports which have been in the past or are now of major importance are bananas, petroleum, and gold. A few other products have had limited importance from time to time. The supplies of these last three commodities (with the possible exception of bananas) are relatively inelastic, due to their being based on fairly fixed underlying resources. And coffee's comparative advantage over any other product seems to have been so large that it has continued to dominate the export scene, even though its relative price has fallen in the last decade. (It is not low viewed in a longer perspective, however.)

If a country's agricultural sector had a group of products whose relative comparative advantages in international terms were not very different, and some or most of which had fairly elastic supplies, one would expect the changing comparative advantage of the overall economy from agricultural or primary products to manufactured products to manifest itself in a decreasing share of exports and increasing share of imports made up by -

[1] Where a form of primary production is capital or technology intensive, it usually means that it is based on the exploitation of a country's natural resources, and this exploitation can usually be carried out conveniently with the use of foreign capital and technology. Colombian oil is in this category.

agricultural or primary products. (This assumes that government policy does not disturb too greatly the natural course of events.) The extent of coffee's comparative advantage relative to other possible exports is so great in Colombia that the share of exports which are agricultural goods or the ratio of exports to GNP over time (see Table VII-1) become not too adequate measures of the changing comparative advantage of agriculture as a whole. The size of agricultural imports is possibly more significant; Table VII-2 indicates a rise in the ratio of imports to domestically produced agricultural goods between the early 30's and the late 50's, with a fall again in the 60's. We turn later to a more detailed explanation of these figures.

The overwhelming fact with respect to agricultural exports is their predominance in all exports; they have usually ranged between 60 per cent and 85 per cent of the total in the period since 1920. The share of agricultural exports in all exports of goods and services is somewhat lower, ranging between 50 and 80 per cent. The share of all agricultural output exported has usually been 20 to 25 per cent, it has shown no secular trend over time (see Table VII-1), falling as low as 15 per cent and rising as high as 35. The quantum share of exports of all produce has been, no doubt, more stable than the value share, since the highest export ratio in value terms occurred in the 1950's when coffee prices were very high. The falling share of export quantum out of G.D.P. has not, therefore, resulted from a falling share of agricultural exports out of all exports but from a decreasing share of agricultural output in G.D.P.

The development and growth of agricultural exports does not tell a great deal about the development of the agricultural sector as a whole, since the coffee and banana sectors within agriculture are not either

TABLE VII-1

Agricultural and Total Exports

	Total Export Quantum (goods and services)		Share of Agricultural Products in All Exports of Goods and Services (by value)	Share of Registered Agricultural Exports in All Registered Exports of Goods (by value)	Coffee Terms of Trade	Share of Agricultural Output Which is Exported (value terms)		
	ECLA	National Accounts						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1920					34.0			
1921					35.4			
1922				78.7	42.4			
1923				80.4	41.7			
1924				84.6	58.7			
1925	40.9			86.8	64.0	22.9		
1926	51.3			80.3	69.1	22.8		
1927	61.8			73.9	66.5	21.7		
1928	65.7			77.1	70.8	24.1		
1929	68.1			75.3	57.0	20.8		
1930	74.0			77.8	49.1	20.8		
1931	65.5			63.2	55.7	20.1		
1932	66.6		64.7	71.7	49.4	19.8		
1933	67.2		65.4	77.4	45.4	20.1		
1934	67.6		61.9	60.8	49.1	21.9		
1935	76.2		60.9	61.8	37.4	21.5		
1936	82.0		62.3	67.9	38.9	21.9		
1937	85.2		60.0	59.0	35.9	23.2		
1938	89.7		55.8	65.4	38.1	18.7	19.1	
1939	83.4		56.1	60.5	41.1	16.5	16.8	

(continued on following page)

TABLE VII-1, continued

	Total Export Quantum (goods and services)		Share of Agricultural Products in All Exports of Goods and Services (by value)	Share of Registered Agricultural Exports in All Registered Exports of Goods (by value)	Coffee Terms of Trade	Share of Agricultural Output Which is Exported (value terms)		
	ECLA	National Accounts						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1940	95.3		47.3	50.7	28.0		14.9	
1941	72.5		48.1	52.0	45.9		15.9	
1942	79.0		68.8	73.4	45.7		22.3	
1943	97.6		69.7	74.0	42.0		22.7	
1944	101.7		63.2	68.0	37.6		16.4	
1945	101.9		67.4	71.3	37.0		15.4	
1946	109.8		72.4	77.3	51.3		19.9	
1947	104.9		73.6	78.4	57.6		19.3	
1948	107.2		73.6	79.6	57.3		21.0	
1949	109.9		71.4	77.2	69.4		20.3	
1950	100.0	100.0	73.2	79.2	100.0		21.8	
1951	111.9	111.9	71.2	75.9	89.8		27.0	28.0
1952	109.4	113.2	75.5	81.1	89.4		27.9	30.1
1953	136.8	138.9	77.0	82.4	98.8			28.8
1954	118.1	125.0	79.4	84.8	122.9			31.0
1955		127.3	79.5	86.1	101.2			25.7
1956		131.5	61.8	67.8	107.4			32.8
1957		132.4	61.5	69.6	97.8			35.0
1958		140.0	60.6	69.1	79.9			30.0
1959		162.1	62.1	71.8	73.2			29.8
1960		148.7	59.2	70.7	68.9			22.4
1961		146.6	57.6	69.9	65.4			22.0
1962		164.1	62.7	75.3	59.5			23.5
1963		158.8	56.4	68.6	43.3			21.1
1964		166.4						

(continued on following page)

TABLE VII-1, continued

SOURCES AND METHODOLOGY: Column 1, export quantum of goods and services for 1925-1950, is based on ECLA; Column 2 presents the comparable series for 1950 and on from the Bank of the Republic. In the five year overlap, 1950-1954, the two series diverged only mildly in a couple of years. For the calculations of both Columns 3 and 4, the estimates of agricultural exports and of total exports are based on a variety of sources. For 1951 and on, they come from the Yearbook of International Trade Statistics; for 1932 to 1950, they come from the Anuario de Comercio Exterior, a publication of the Statistical Office in Colombia; for the earlier years the direct source is Katherine Wylie, Agriculture in Colombia-her original source of statistics is the Anuario de Comercio Exterior.

The coffee terms of trade calculated in Column 5 are based on World coffee prices and a price series for imports into Colombia constructed by the author. (See a forthcoming study on the foreign trade of Colombia.) Column 6 makes use of the estimates of agricultural output made by ECLA for 1925 through 1950 and of the Bank of the Republic since then, and of the values of agricultural produce exported coming from the Anuario de Comercio Exterior. For the period 1951 and on basic statistics of the Banco de la Republica provided the material for a comparison of the value of agricultural exports (at the farm) and the value of agricultural output. For 1925-1950 the figures of exports f.o.b. were compared to estimated value added in agriculture; this method should have given a somewhat upward biased estimate of the share of exports, but as the figures for 1951 and 1952 were slightly below the 1951-1963 series figures, we made no downward adjustment to allow for this.

TABLE VI-2

Agricultural and Total Imports

	Share of Agricultural Imports in All Imports of Goods and Services (1)	Share of Agricultural Imports in All Imports of Goods (2)		Share of Food Imports in All Imports of Goods (3)	Relative Price of Agricultural Produce Apart From Coffee (4)		Food Prices Other Prices Entering the Urban Cost of Living Index (5)	Relation of Imports to Domestically Produced Supply of Agricultural Goods (6)
1922				7.3				
1923				8.0				
1924				10.3				
1925				8.7	60.9			
1926				11.5	57.3			
1927				9.7	61.0			
1928				13.3	50.3			
1929				14.4	62.9			
1930				20.6	93.1			
1931	11.8	16.3			72.7			2.40
1932	5.0	8.1			63.4			1.09
1933	4.7	6.5	9.5		64.7	69.0		1.29
1934	6.3	7.9			75.2			1.86
1935	7.6	8.8			69.0			2.55
1936	9.3	10.5			72.0			2.97
1937	9.3	10.8			72.3		70.6	3.81
1938	8.1	9.8	11.3		65.1	68.7	71.4	2.85
1939	10.3	12.4			72.3		77.2	3.72
1940	10.7	13.0		7.0	61.6		72.8	3.49
1941	10.6	12.7			60.8		68.5	3.85
1942	15.7	20.7			66.7		72.6	3.21
1943	11.6	15.7	17.8		74.0	72.8	75.0	2.81
1944	16.9	21.3			85.5		89.3	3.45
1945	17.2	18.8			77.0		91.4	4.18

(continued on following page)

TABLE VII-2, continued

	Share of Agricultural Imports in All Imports of Goods and Services (1)	Share of Agricultural Imports in All Imports of Goods (2)		Share of Food Imports in All Imports of Goods (3)	Relative Price of Agricultural Produce Apart From Coffee (4)		Food Prices Other Prices Entering the Urban Cost of Living Index (5)	Relation of Imports to Domestically Produced Supply of Agricultural Goods (6)
1946	13.1	14.6			76.8		87.5	4.00
1947	12.8	14.0			88.7		90.8	4.69
1948	12.2	13.4	14.3		77.8	84.8	87.8	3.96
1949	10.8	13.2			85.1		79.3	2.76
1950	13.8	16.1			95.7		90.4	3.96
1951	12.4	16.3			96.2		90.3	5.48
1952	12.8	16.5			94.2		82.1	5.02
1953	8.7	10.8	14.3		89.3	98.6	87.2	4.77
1954	11.9	14.5			109.6		94.9	5.32
1955	10.7	13.3			103.7		91.0	5.06
1956	11.0	13.7			101.5		94.0	4.32
1957	14.0	18.6			102.2		101.7	7.16
1958	13.0	18.8	16.3		100.0	102.2	100.0	7.03
1959	12.4	16.9			105.2		98.7	6.04
1960	9.8	13.3			101.9		97.2	5.67
1961	10.2	13.8			99.7		101.2	5.76
1962	9.2	12.0	11.5		93.0	96.3	94.9	5.26
1963	7.9	11.8					102.4	4.71
1964							102.3	

SOURCES AND METHODOLOGY: Column 1 is based for the post-1950 period on figures from the Yearbook of International Trade Statistics. The figures include imports of rubber, hides, and processed foodstuffs. For earlier years the data come from the Anuario de Comercio Exterior. Column 2, like Column 1, includes rubber, hides and processed foodstuffs, and relates agricultural imports to all imports of goods. Column 4 relates the price series for non-coffee agricultural products (from Table A-2) to a price series for non-agricultural products. Column 6 relates imports of agricultural products (c.i.f.) to the value of agricultural goods produced domestically, from 1951 on. For the earlier years imports are related to value added in agriculture. Since the figure for the early year series was lower in 1951 (5.26), than that for the 1951-1963 series (5.48), no attempt was made to adjust the earlier series downward.

typical of agriculture as a whole, or so closely tied to the rest of the agricultural sector by substitutabilities in production, etc., as to imply that increasing exports would tell anything about what was happening in the rest of agriculture.

A changing ratio of agricultural imports to all imports, or more precisely, of agricultural imports to total domestic availabilities of agricultural produce may indicate a changing degree of success of the agricultural sector in any country. Column 1 of Table VII-2 indicates that there has been no long-run trend in the share of agricultural imports in all imports of goods and services Column 2 indicates the same lack of trend in the share of agricultural imports in all imports of goods. While there is no monotonic change over time in this ratio, it has taken fairly long swings, which are in accord with our previous observations on the changing level of performance of agriculture within the country. During the period of rising relative prices of agricultural goods the share of all foreign exchange going to the purchase of agricultural imports had risen as had the share of imported goods in the domestic supply of agricultural products (Col. 6). Such a rise was occurring from the early thirties through the late fifties; since then, agricultural prices have fallen relative to other prices (even when coffee prices are excluded from the index) and the share of foreign exchange going to the purchase of agricultural imports has fallen. This is at least in part a result of the successful technification and mechanization of agriculture; a dramatic example of the success has been cotton, which has turned from an import of some proportions to a potentially important export.

Netting out agricultural exports and imports (see Table VII-3), we see that exports minus imports related to domestic agricultural output was rather

TABLE VII-3

Indicators of the Significance of the Contribution of Agriculture to the Foreign Sector

Year	Net Agricultural Exports[1] / Average of Total Exports and Total Imports	Net Agricultural Exports / Value of Agricultural Output	Five-Year Averages (or Four Years where Applicable)
1930			
1931		17.69	
1932	9.107	18.74	
1933	78.93	18.77	18.81
1934	71.43	20.04	
1935	63.82	18.96	
1936	64.23	18.96	
1937	57.92	19.43	17.26
1938	55.46	16.05	
1939	47.86	12.88	
1940	43.84	11.45	
1941	42.31	12.07	
1942	85.05	19.13	15.09
1943	83.57	19.87	
1944	67.22	12.95	
1945	54.94	11.25	
1946	62.81	15.88	
1947	53.15	14.59	15.24
1948	62.29	17.00	
1949	75.23	17.49	
1950	69.73	17.85	
1951	68.54	22.10	
1952	76.18	24.00	22.73
1953	79.65	24.0	
1954	74.00	25.7	
1955	70.52	20.6	
1956	58.49	28.5	
1957	63.64	27.8	24.74
1958	65.11	23.0	
1959	66.83	23.8	
1960	57.25	16.7	
1961	51.58	16.2	
1962	55.34	18.2	16.87
1963	55.79	16.4	

[1] Defined as agricultural exports minus agricultural imports.

Sources and Methodology.
The figures are from tables A-160 through A-166.

stable at between 15 and 20 per cent from 1930 to 1950, between 20 and 30 per cent in the 50's and back at its earlier level during the early 60's.

In drawing simple interpretations from changes in the ratio of agricultural exports and imports to all agricultural output or to all exports and imports as an indication of the performance of agriculture over time relative to other sectors, we assume implicitly that barriers to trade are not important. In fact, the Colombian government has for about 35 years been following an agricultural policy of self-sufficiency, in the implementation of which it has used a variety of measures such as tariff protection, exchange controls, import quotas and embargos, internal price supports, and technical and credit assistance.[1] Between 1931 and 1950 the main tools were the tariff and other international trade measures. More recently, the government has given more direct stimuli to domestic production through price guarantees, credit, technical assistance, etc. It extends, in the extreme, to virtually complete intervention in the production, marketing, and processing of a product.[2] In view of these attempts to curb agricultural imports, the gradual increase in their share of domestic agricultural supply up to the 1950's is all the stronger evidence that domestic agriculture was either through lack of suitability of resources or slow capitalization and technological progress, unable to satisfy the domestic demands.

The policy of autarky has taken relatively little account of the

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[1] See, for example, Lawrence W. Witt and Richard D. Wheeler, Effects of Public Law 480 Programs in Colombia: 1955-1962, Department of Agricultural Economics, Michigan State University and Departmento de Economia y Ciencias Sociales, Facultad de Agronomia y Instituto Forestal, Universidad Nacional de Colombia, Medellin, Colombia, October 1962, p. 36.

[2] Witt and Wheeler, op. cit., p. 36.

relation between domestic and world prices. (See Table VII-4.) At times even the export crops such as sugar and cotton have had support prices above the world prices. Cotton has been sold on the world market with an export payment like the one the United States uses. Under some circumstances such a neglect of world prices could be very costly but in this case one must allow for the fact that very often the Colombian peso is overvalued so that such an export payment might be interpreted simply as an adjustment for the overvaluation.

The policy of fostering cotton production does seem to have paid off well. It is now competitive on the world market in a real sense; sometimes it is sold there below the domestic price, but this differential would easily be made up for by the habitual overvaluation of the Colombian peso. The domestic barley price, when converted into dollars at the "free" exchange rate fluctuates a great deal, so that a trend is not apparent. But it is not implausible that this crop also is now competitive in a real sense. Table VII-4 indicates that much progress would be required before wheat production on a substantial scale could be competitive; the policy of autarky may have been bad here, if the land and other resources used to produce wheat could have been put to some other use, as indeed they probably could.

The composition agricultural imports has changed somewhat over time. During the gradual rise of the ratio of imports to domestically produced agricultural goods from just over 1 per cent in the early 30's to a peak of 7 per cent in 1957 and 1958, there was a gradual decline in the share of food products (implying a corresponding increase in raw materials, which comprise the bulk of the non-food category). This decline was reversed in the early 60's. Of considerable interest is the gradual increase in the

TABLE VII-4

Internal Colombian Prices and Export Prices Compared to Average World Import and Export Prices: Various Crops

	Colombian Peso Price to Farmer	Implied Dollar Price Using Free Exchange Rate	Average World Import Price	Average World Export Price
Wheat[d]				
1958	870	1,120		
1959	940	1,270	717	643
1960	880	1,270	703	636
1961	975	1,150	723	643
1962	957	1,020	744	665
1963	1,052	1,051	729	659
1964	1,394	1,302	756	662
1965	1,525	906	709	614
Corn				
1958	385	493		
1959	450	608	586	507
1960	474	682	587	516
1961	629	740	568	511
1962	526	559	572	507
1963	794	795	612	552
1964	1,040	938	640	563
1965	903	536	667	579
Rice				
1958	750	960		
1959	770	1,040	1,222	1,133
1960	883	1,272	1,202	1,094
1961	954	1,126	1,251	1,105
1962	919	9,741	1,395	1,245
1963	1,046	1,047	1,288	1,231
1964	1,347	1,258	1,297	1,245
1965	1,703	1,012	1,317	1,279

TABLE VII-4 (continued)

	Colombian Peso Price to Farmer	Implied Dollar Price Using Free Exchange Rate	Average World Import Price	Average World Export Price
Barley				
1958	580	742		
1959	630	850	614	536
1960	624	899	614	531
1961	637	752	534	475
1962	642	681	654	571
1963	828	829	632	564
1964	898	839	654	572
1965	999	593	709	626

	Colombian Peso Price to Farmer	Implied Dollar Price Using Free Exchange Rate	Price of Fiber Dollar/Metric Tons	Average World Import Price	Average World Export Price	Average Colombian Export Price
Cotton (in bulk)						
1958	1,150	1,984	5,144			
1959	1,770	2,390	6,197	642	581	
1960	1,726	2,485	6,443	676	627	533
1961	1,753	2,068	5,362	692	639	594
1962	1,844	1,955	5,069	682	607	593
1963	2,236	2,235	5,795	657	607	548
1964	2,567	2,398	6,218	665	610	539
1965	3,506	2,083	5,401	674	619	499

a Wheat and meslin

Sources and Methodology:

For wheat, rice, corn, barley and cotton the basic price to the farmer is from background material for the national accounts statistics. In the case of cotton this figure was onverted from price for raw cotton to that for fiber. The calculation is based on figures from Table 20 of Algodon y Oleaginosos, 1961-1962. We use the

TABLE VII-4 (continued)

Sources and Methodology (continued from page 13.

ratio of value of fiber to total value and the ratio of weight of fiber to total weight indicated in that study.

The dollar price here is Coli "common" -- it is biased up relative to world prices -- it is at retail level and per 16 — but Coli prices are lower than elsewhere. Domestic peso prices were converted to dollar prices using the free exchange rate. No attempt was made to allow for costs of transportation and commerce to the port so we are not necessarily talking about relatively as they would be in the important markets of the country.

The international prices are the average of export prices f.0.b. for exporters and that c.i.f. for importers both from the F.A.O. Trade Yearbook.

share of animal based imports in the total; this is consistent with the long run rise in the price of animal products relative to vegetable products within the country, and the slow progress of the livestock sector which has underlain it.

The Rise of Coffee

The story of Colombia's entry into the modern world is to a large extent the story of coffee's launching on the world market. Why did this occur when it did and what determined its subsequent course? And how did the exports impinge on the rest of the economy? The latter question is too broad in scope to be treated here; it is dealt with elsewhere.[1] The next few pages deal with the former.

Coffee's first home in Colombia was in the eastern departments of the Santanderes. With the population of the Quindio in the latter part of the nineteenth and the early twentieth century the focal point swung to that area. Coffee was probably already quite profitable for the regions growing it, despite the severe problems involved in its transportation.

In any case, judging from the export figures which are all we have for the early years, production was rising rapidly from the 1870's on, at least. There were fluctuations, some of which seem to have been related to price movements. For example, the big jump in production which seems to have occurred in the late 1880's or early 1890's did coincide with a very sharp upward swing in the coffee terms of trade as calculated by William McGreavy. (The export and terms of trade figures are plotted in Chart 2 and reproduced in Table VII-6.) The second sharp jump in output occurred in 1912 and again

[1] Book on the overall development process in Colombia, forthcoming.

TABLE VII-5

Domestic Supply of Agricultural Goods and Their Relative Price

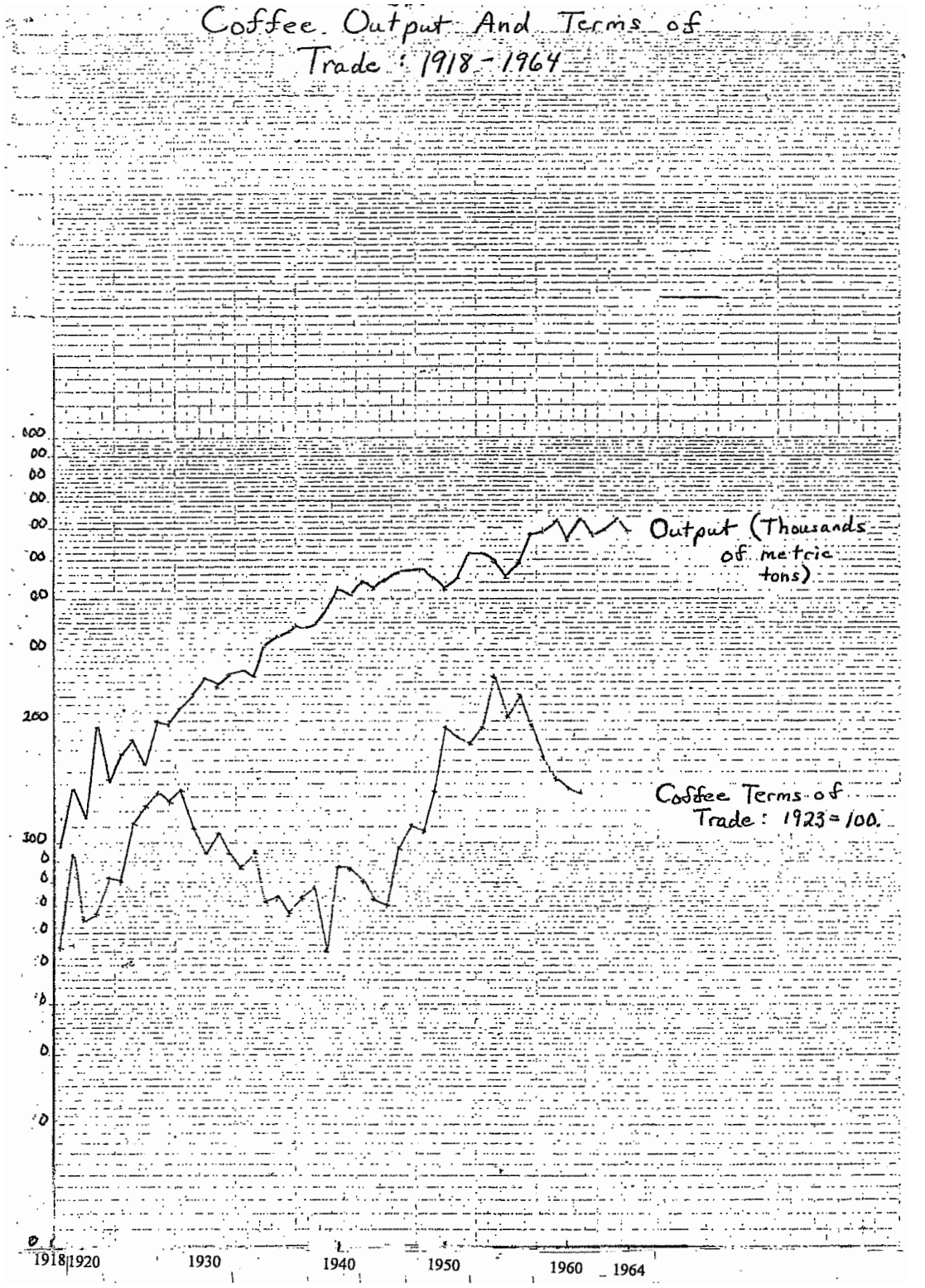
(Millions of pesos)

	Value of Agricultural Output (1)	Registered Exports of Agricultural Products (2)	Registered Imports of Agricultural Products (3)	Domestic Supply of Agricultural Products (4)	Domestic Supply of Agricultural Products (1958 pesos) (5)	Relative Price of Agricultural Products Supplied to the Domestic Market (6)
1950	3,076.1	620.7	160.0	2,615.4	4,911.5	103.0
1951	3,521.1	863.9	205.8	2,863.0	4,902.4	99.8
1952	3,769.4	1,001.1	189.5	2,872.9	4,927.8	98.1
1953	4,094.1	1,052.6	193.5	3,235.0	5,093.6	104.8
1954	5,051.8	1,380.7	272.8	3,943.9	5,424.8	111.5
1955	4,931.8	1,063.9	230.2	4,098.1	5,727.6	106.3
1956	5,670.8	1,607.5	222.9	4,286.2	5,746.9	103.0
1957	7,027.4	2,154.0	407.3	5,280.7	6,002.8	102.5
1958	7,866.6	2,139.3	438.4	6,165.7	6,165.7	100.0
1959	8,596.3	1,746.8	382.1	7,231.6	6,552.1	103.0
1960	9,330.2	1,836.9	385.0	7,878.3	6,771.8	99.7
1961	10,361.9	2,118.2	404.0	8,647.7	6,820.4	99.4
1962	11.012.7	2,000.7	396.1	9,408.1	7,210.4	95.1
1963	13,672.6	2,488.4	439.6	11,623.8	7,263.1	94.9
1964	18,290.0	3,657.8	552.6	15,784.8	7,458.2	106.0
1965	19,454.1	3,308.2	643.5	16,789.4	7,825.8	101.4
1966	23,038.4	3,573.7	753.5	20,268.2	8,230.0	101.2
1967	26,365.5	3,859.9	574.2	23,079.8	8,715.9	99.0

TABLE VII-5 (continued)

SOURCES AND METHODOLOGY: Column 1 comes from unpublished tables of the Banco de la Republica. It gives value of production at market prices (rather than value at factor cost). This series includes a category called "otros productores del sector agropecuario" including rural homes built, certain other improvements realized, etc. Technically, these should be excluded but as their share of all output is small and relatively constant, they are left in. A further problem is that these figures are not fully consistent with those from Atkinson used in most of the rest of this study, but the differences are not such as to much affect the coefficients of interest.

Col. (2) subtracts our estimate of goods not entering supply because they are either exported or stored in anticipation of being exported (coffee); a guess at contraband cattle exports is included. Col (3) is based on official import statistics (from the *Anuario de Comercio Exterior*); it includes beverages, cocoa and tobacco but excludes processed food stuffs (as do the export figures of Col (2). The dollar figures for imports are converted to pesos at the principal selling rate (usually above the official exchange rate). Col (6) is based on national accounts data as is the deflator to convert Col (4) to constant prices (Col 5).


Coffee Output And Terms of Trade: 1918-1964
Output (Thousands of metric tons)
Coffee Terms of Trade: 1923=100.
1918
1920
1930
1940
1950
1960
1964

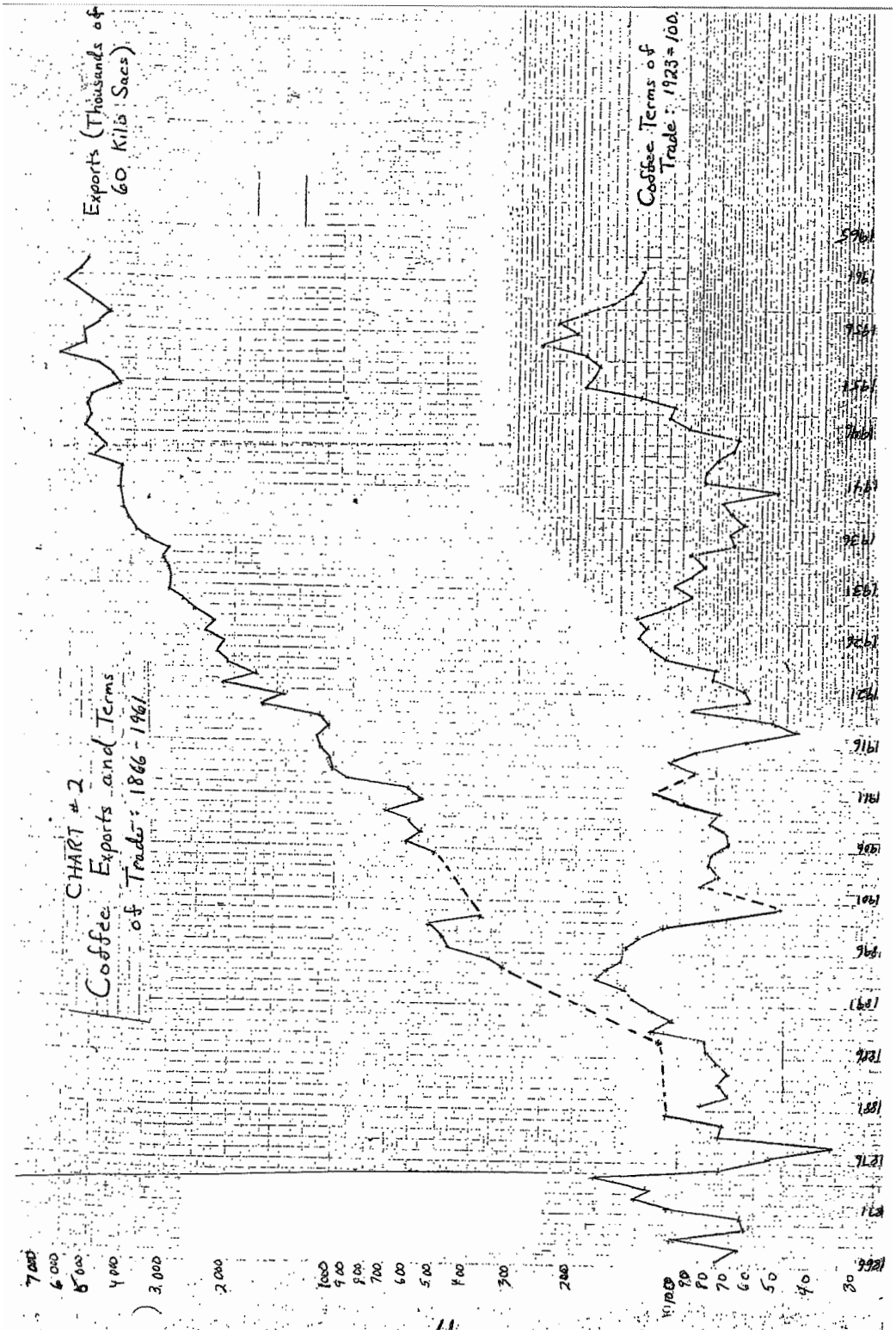


CHART # 2
Coffee Exports and Terms of Trade: 1866 - 1961
Exports (Thousands of 60 Kilo Sacs)
Coffee Terms of Trade: 1923 = 100

TABLE VII-6

Colombia: Coffee Exports and Coffee Terms of Trade

Year	Coffee Price Index (1920-29=100)	Imports Price Series (1923-25=100)	Coffee Terms of Trade	Exports (thousands of 60 kilo sacks)	Production (metric tons)
1881	53	64	83		
1882	46	64	72		
1883	48	62	77		
1884	44	61	72		
1885	46	58	79		
1886	45	55	82		
1887	46	55	84	111	
1888	70	58	120	n.a.	
1889	59	56	105	n.a.	
1890	67	56	120	n.a.	
1891	74	55	135	n.a.	
1892	73	51	143	n.a.	
1893	82	48	171	n.a.	
1894	72	44	164	338	
1895	70	47	149	358	
1896	68	48	142	475	
1897	59	45	131	459	
1898	50	44	113	531	
1899	37	51	73	387	
1900	30	57	52	n.a.	
1901	n.a.	54	n.a.	n.a.	
1902	47	53	89	n.a.	
1903	46	58	79	n.a.	
1904	49	58	84	n.a.	
1905	47	58	81	500	
1906	46	64	72	636	
1907	49	67	73	568	
1908	50	59	84	607	
1909	48	61	79	707	
1910	66	65	102	570	
1911	73	61	120	632	
1912	n.a.	67	n.a.	932	
1913	68	73	93	1,021	
1914	68	62	109	1,032	
1915	63	69	91	1,130	
1916	62	94	66	1,211	
1917	56	119	47	1,047	
1918	71	130	55	1,149	93.6
1919	120	129	93	1,684	137.8
1920	93	143	65	1,444	118.3
1921	67	99	68	2,345	191.1
1922	76	94	81	1,765	144.3

TABLE VII-6 (continued)

Year	Coffee Price Index (1920-29=100)	Imports Price Series (1923-25=100)	Coffee Terms of Trade	Exports (thousands of 60 kilo sachs)	Production (metric tons)
1923	82	103	80	2,061	169.0
1924	111	99	112		180.7
1925	121	99	122		158.6
1926	124	94	132		200.2
1927	109	86	127		192.4
1928	119	88	135		217.1
1929	99	91	109		231.4
1930	75	80	94		254.8
1931	67	63	106		247.0
1932	49	52	94		260.0
1933	46	53	87		267.8
1934	60	64	94		257.4
1935	45	63	71		309.4
1936	49	66	74		325.0
1937	50	73	68		331.5
1938	48	66	73		348.4
1939	51	65	78		344.5
1940	37	69	54		347.1
1941	64	73	88		371.8
1942	69	79	87		427.7
1943	69	86	80		412.1
1944	69	96	72		431.6
1945	70	99	70		429.0
1946	98	100	98		436.8
1947	132	120	110		465.4
1948	142	130	109		478.4
1949	163	123	133		453.7
1950	231	121	191		365.3
1951	254	140	181		392.6
1952	247	138	179		522.6
1953	260	136	191		499.2
1954	347	136	255		523.9
1955	280	137	204		490.1
1956	322	140	230		435.5
1957	278	141	197		474.5
1958	227	139	163		608.4
1959	197	139	142		600.4
1960	195	141	138		624.0
1961	190	143*	133*		599.3

*Author's estimate.

Sources and Methodology:

The coffee price series import price series and derived coffee terms of trade index come from the Ph.D. dissertation by William P. McGreavy,

His explanation of the derivation of the coffee price series is as follows: "Figures taken from Robert C. Beyer, 'The Colombian Coffee Industry: Origins and Major Trends, 1740-1940,' University of Minnesota Ph.D. thesis, 1947, Table IV of the Appendix. Prices used were for Manizales coffee at the New York market, in U.S. cents per pound. Beyer gives prices up to 1945; more recent prices are taken from the Revista del Banco de la Republica. A price of 23 cents per pound, which was more or less the average for the decade of the twenties, was taken as 100 for the index. For details on the derivation of the import price series see McGreavey, Table II-G.

The coffee export series comes from the "Boletin de la Federacion Nacional de Cafeteros." The output series is from Table A-150.

followed a sharp improvement in the terms of trade, which occurred in 1910. The causal relation is more doubtful here than in the previous case since the two rises are separated only by two years, less than the gestation period for coffee trees. Prices rose again in the latter half of the 1920's. Exports were expanding rapidly at the time, but did not continue to do so in the 30's; this, of course, was not surprising given the presence of the Great Depression. In general, however, looking at Chart 1 suggests that, except for the sharp rise around 1890 (which is in some doubt due to weaknesses of the figures and is in any case partly a rebounding from previous drops). The subsequent path of exports shows a rather smooth upward trend, with many fluctuations but no clearly definable cyclical ones and with a decline in the secular growth rate after the 1920's. This interpretation suggests that the price (or here the terms of trade) was not a crucial variable but that the coffee sector just grew. Possibly it was the most profitable crop for a long time and the gradual output increase was due to the need for time to overcome factor immobilities. I am not aware of any studies done to data on the mechanism of coffee expansion in Colombia.

While figures enabling a comparison of the relative productivity of coffee and other crops are not available, one can, given some idea of relative inputs, learn a little from figures on value of output per hectare, which was between 50 and 150 per cent higher for coffee than for non-coffee crops in the period 1951 and on. (See Table A-153). Even after coffee prices fell in the late 1950's a substantial differential existed.

Coffee output expanded relative to the rest of the agricultural sector during the period up to the early 1940's (see Table VII-7), and since then has grown more slowly with the exception of a short period in the fifties when it responded to the sharp price increases.

TABLE VII-7

Growth of the Coffee Sector Contrasted to Growth of Agriculture in General

Year	Agricultural Labor Force (1)	Labor Force Involved in Coffee Production (2)	Per Cent of Total Agricultural Labor Force Engaged in Coffee Production (3)	Value of Coffee Produced / Value of Total Output of Crops and Livestock (4)	Average Annual Growth Rates: Coffee (5)	Non-Coffee Crops (6)	Livestock (7)
1925	1,717			15.0			
1926				14.4			
1927				13.9			
1928				13.7			
1929				13.2			
1930	1,814			20.7	5.2	2.0	1.7
1931				23.3			
1932	1,869	241	12.9	29.8			
1933				27.8			
1934				18.6			
1935	1,956			22.8	5.2	2.8	2.3
1936				21.3			
1937				17.6			
1938				16.1			
1939				15.5			
1940	2,086			12.4	3.7	1.4	1.5
1941				19.2			
1942				19.3			
1943				16.6			
1944				16.1			
1945	2,186			15.4	2.6	3.8	3.6
1946				21.9			
1947				19.2			
1948				19.2			
1949				18.7			
1950	2,202			21.8	1.0	1.9	0.5
1951				26.3			
1952				26.1			

TABLE VII-7 (continued)

Year	Agricultural Labor Force (1)	Labor Force Involved in Coffee Production (2)	Per Cent of Total Agricultural Labor Force Engaged in Coffee Production (3)	Value of Coffee Produced / Value of Total Output of Crops and Livestock (4)	Average Annual Growth Rates: Coffee (5)	Non-Coffee Crops (6)	Livestock (7)
1953				25.9			
1954				27.2			
1955	2,260	347	15.4	24.6	2.9	.2	4.1
1956				30.3			
1957				32.4			
1958				28.3			
1959				21.5			
1960	2,375	404	17.0	20.2	1.7	3.9	4.0
1961				21.4			
1962	2,423			18.8			
1963				18.7			
1964				18.7			
1965							

Sources and Methodology:

The labor force involved in coffee production is, of course, difficult to estimate, since on many coffee farms other crops are grown. The ECLA-FAO study (13) indicated that the total labor on coffee farms was 1,156,000 people. Of these 55.7 per cent were apparently women and children. (Table 2 on page 13 of the study referred to is confusing and actually contradictory to page 12 with respect to this estimate of 55.7. But the interpretation we place on it here seems the most likely.) This figure of 1,156,000 people is of course an overestimate of the labor force in terms of man days, and the same study came up with a figure of 347,000 people, as presumably being a full-time equivalent labor force. The 1960 figure is from Lauchlin Currie's study of coffee (Banco Cafetero, Industria Cafetera en la Agricultura Colombiana, 1962, Bogota 1962) Currie considers it to be a minimum estimate. The 1932 figure is a crude estimate on the assumption of the same active population to farm ratio as prevailed in 1955-56. The relationship between the 1932 figures and the subsequent ones does not, therefore, tell us very much.

Column (4) is based on Table A-151. Column's (5), (6) and (7) are based on figures from Tables A-150, and II 1. The growth rates are calculated between five year averages. Thus the figure referring centered on 1930 refers to the average growth implied between the total output of the period 1930-4 over the total output of 1925-29.

It is, of course, tautological to say that a reasonably high price was necessary in the long run to stimulate coffee production. But it is of interest to distinguish between situations in which one believes that the path of coffee output would have been about the same with a price of 25 per cent or so lower than it was, and where it would not have been the same. We lack sufficient statistics to make such a judgment in the Colombian case. However, it does seem plausible that at most points of time, from the 1870's on, price of coffee was at such a height that the quantity produced was less than the long-run equilibrium. This would more or less explain the roughly constant secular rate of increase of output from the 1870's to the 1920's. A major determinant of the rate of output growth was the rate of removal of barriers to moving the crop and introducing new coffee lands to the economy. One would still expect some positive reaction to price fluctuations, since the rate at which barriers are removed is at least in part sensitive to the degree of effort put into their removal. But one would expect less sensitive reaction than if the long-run equilibrium output could be achieved quite quickly in response to price fluctuations. It is difficult to speculate on the elasticity of expectations of prices in those remote days.

Consistent with the above explanation is the fact that, according to McGreavey's figures, there has been no long-run trend in the coffee terms of trade. The significance of McGreavey's series is open to some question, of course.[1] Since the real price of coffee may not have paralleled the

[1]The relevant series would be the real price of coffee received by the producer. This might be different over time from the real export price of coffee, due to improvements in the transportation system, changes in the degree of coffee taxation, etc. Further, the coffee terms of trade might not parallel the real price of coffee, if the prices of imported goods did not move more or less in line with the prices of goods purchased by the coffee growers. Finally, of course, there is the possibility that the import price series used by

(continued on following page.)

coffee terms of trade too closely, the figures here do not lend themselves to a good test of the short-run price elasticity of supply. With the random element due to weather conditions further complicating the relationship, we cannot be sure that the elasticity was not substantial. We can say that there is no evidence to suggest that it was substantial, and that the rapid secular growth of output, coupled with our independent knowledge of the process of that secular increase, would not lead us to expect a particularly high short-run price elasticity.

An attempt to test the hypothesis that output responds positively to price changes for the period 1918 and on thr similar doubts on the relevance of price movements within their historical range. With the inclusion of credit availability and the real price of other agricultural crops, the results were still not convincing.

Production of coffee is a relatively specialized operation in Colombia, and the increase in its production especially in the early decades of this century resulted primarily not from a switching from production of other crops to coffee but from the settling of new areas whose land was very well suited for coffee but not so for other crops. In this context it would seem particularly unlikely to find a close relation between price changes and output changes; the lag would not be so closely related to the gestation period but would be affected also by difficulties in settling the

(Footnote continued from previous page.)

McGreavy has serious defects.

We have no solid reason to believe that the output series for coffee moved closely in line with the export series, or that the export series is very accurate. But all of these qualifications notwithstanding, the best guess is that the real price of coffee series at least fluctuated along the general lines of that given by McGreavy, and that output moved secularly along the same line as did exports.

newly opening territorities, etc.

It is interesting to note that real credit per unit of coffee produced was rising in the post World War II period, even as the rate of growth of output was falling off. Whatever may have been the response of output to price increases in the past, the whole issue of achieving increases in output is now entirely different in the case of coffee from those of almost all other crops in Colombia. The world supply of coffee is already well above world demand at current prices, and it is well known that many more lands than are now in production in the world at large could be quickly brought into use. Further, in Colombia and probably in most other coffee producing countries, much greater yields could be achieved through the wider application of already known technical improvements. We comment only briefly on the value of the international coffee agreement and its policies for Colombia and then, taking it for granted, consider the appropriate corrective adjustments in the Colombia coffee industry.

The international coffee agreement has in principle the purpose of stabilizing the coffee market, but in fact has also the goal of maintaining the price of coffee above equilibrium. The present price is above equilibrium and will be increasingly so unless it is allowed to fall. Since most studies of the price elasticity of demand for coffee have indicated that it is below unity, this represents a rational monopoly policy on the part of coffee producers, taken as a group. It would still pay many of the individual producers to gain larger shares in total exports, either by trying to increase their share of the total quota, which some have done, or by trying to circumvent the international agreement in a variety of ways, such as by officially fostered, or winked at counterband exports, or increasing trade with

the non-participants in the coffee agreements, at lower prices. Limited attempts to analyze the price elasticity of demand for Colombian coffee, or for mild coffees in general, have come to the conclusion that this elasticity is relatively high. This suggests that it would be to Colombia's benefit to foster contraband and to avoid the international agreement as much as possible, to the extent this could be done without fear of retaliation.

Assuming, as seems reasonable, that Colombia's exports of coffee will not increase very much in the future, and given the fact that domestic production could be increased very substantially and very easily, especially by increasing yields on existing coffee lands, there is a serious domestic production control problem at hand. One possible solution, of course, would be simply to decrease the price payed to the farmer and let the market place determine the most efficient producers who would continue in the industry. It seems unlikely, for political reasons, that this policy will be pursued. The coffee growers federation has a good deal of political power, and even a few economic or social arguments to back up its position. At the same time, according to J.W. Rowe,[1] "the technical officers of the federation are now absolutely certain that mainly by reducing shade, replacing old or low yielding trees with modern varieties and selected strains, and by the use of fertilizers, the present national average yield of 523 kilos of clean coffee per hectare could be increased three times within a few years: they claim that the necessary basic research work at the Chinchina Research Station and full scale trials all over the country have now been completed and that the improved technique is now standardized and ready for adoption." The new technique involves substantially higher usage of artificial fertilizers, but

[1] See Rowe, J.W., op. cit., p. 81.

the productivity of the fertilizers is apparently much above their price. Federation officers are also convinced that a campaign to achieve the adoption of the new technology, if backed up by loans and other financial measures, would meet with adequate farmer response.[1]

Continued expansion of coffee production is clearly wasteful in some social sense. It could be most easily defended if the productive resources engaged in coffee production had no other possible uses, and if allowing the farmers to continue to produce coffee facilitated the transfer of resources which would in any case have to flow to them to keep them alive. The answer to these questions depends on our overall conclusions as to the marginal productivity of labor in agriculture in general, and as to the potential alternative uses of coffee land. With respect to the latter, it has been estimated by the U.S. embassy that a substantial proportion of the coffee land is suitable for other uses, and this is consistent with other informed opinions. The marginal productivity of labor in Colombian agriculture, while it is probably very low in some areas, is certainly not low everywhere, which fact presumably implies that lack of mobility is at least partially responsible for holding down agricultural output, as well as the fact that complimentary factors are simply not available. It seems apparent, therefore, that if labor were moved from the coffee growing regions to certain other regions, its productivity would be positive. The question to be analyzed therefore is the relevant cost of inducing labor movements as compared to the increasing productivity which would result from it. Since we have no information about such costs of inducing mobility, we can make no comments on this issue.

Diversification is being pursued, although not vigorously, especially

[1] Rowe, op. cit., p. 82.

in the department of Callos. For a variety of reasons, including the fact that no system of real disincentives to coffee production seems to have been established, and due to lack of adequate loan supervision, technical assistants, etc., there has been no substantial increase in output in other crops. Concentration of the coffee diversification program in the department of Callos is dubious in itself, since this department seems to have very high productivity in coffee, on land whose best alternative use may have relatively lower productivity than the best alternative use of coffee lands in other parts of the country. The extent to which the diversification would succeed if more planning and resources were devoted to it is not known, and the payoff to such promoted diversification is also difficult to estimate.

The predominance of agricultural exports is clear historically. And the potential export for which most hope is held out at the moment is beef; the expectation is that the chief traditional exports -- coffee, petroleum, and bananas will not register great increases in the future (petroleum being a possible exception). The role of coiner of foreign exchange is no less crucial now than before, in the continued growth of the economy.[1] Whether or how soon Colombia will simply have to export manufactured products in quantity is a big question. On the one hand beef may not be the only agricultural product which could be a major export. On the other, Colombia's comparative advantage may indeed move more and more into the manufactured lines. Data needed to evaluate the relative merits or probabilities of these two directions would include the current price structure in Colombia compared to that abroad, past export experience, and the extent to which the foreign exchange system has biased past behaviour from what it would have been with

[1] A macro model of the Colombian economy constructed by the author showed an extremely high rate of return on increases in exports or other sources of foreign revenue.

a unified exchange rate. And of course the current internal prices of some products could be lowered by serious attempts to improve yields, etc.[1] Recent changes in the exchange rates applied to the so-called "minor exports" have made it possible to guess at their short run supply elasticities. Table VI-9 gives the composition of Colombian exports in the period from 1950. This shows that within agriculture, non-coffee exports have become more important, and that manufactured exports have become relatively more important in the total. The fluctuating importance of manufactures is largely due to the inclusion of refined sugar as a manufactured product. In Table VI-10 we present a separate category of semi-manufactures (basically sugar), the manufactured export series then shows a much smoother increase over time.

Exports of manufactured products have risen especially rapidly in the early 1960's (these were responsible for the rapid increase in all minor exports since 1959 - more than a doubling). The composition by industry is shown in Table VI-11. Their changing importance in the category of minor exports is shown in Table VI-12.

Studies attempting to determine the supply elasticity of minor exports or of manufactured exports have thus far been somewhat inconclusive due to

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[1] There are good reasons to believe that the rate of return on investment is very high both in the manufacturing sector and in livestock. It is widely believed that poor performance in the livestock sector in the past have been due to low levels of entrepreneurship, and in general to a lack of interest on the part of the large-scale landowners. This is certainly coincidental with, and no doubt to some extent with the cause of a lack of the complimentary infrastructure which would be required to improve the cattle industry in the country. Part of the reason for the high age of cattle at slaughter in Colombia is the difficulty in transporting them from the region of grazing to that of slaughter; such a problem could be handled either by having more slaughterhouses in appropriate areas, or by having better transport facilities.

But a recently carried out study on rates of return in manufacturing indicated that these were extremely high, so this suggests the possibility of more and more exports emanating from this sector, provided that producers can be induced to take a greater interest in this direction.

Table VII-9

Composition of Registered Exports of Goods and Services: 1950 and On
(Millions of current dollars)

Year	Coffee	Petroleum (crude)	Coffee and Petroleum	Bananas	Other Agricultural Mining and Forest Products (gold excluded)	All Agricultural Exports Except Coffee	Manufactured Exports*	All "Minor" Exports	Exports of Goods	Exports of Goods and Services
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1950	307.9	64.8	372.7	9.5	7.0		6.2	13.2	395.5	418.9
1951	359.7	73.5	433.3	8.7	8.8		12.3	21.1	463.2	494.8
1952	379.8	71.4	451.3	9.2	7.2	15.0	5.4	12.6	473.2	509.3
1953	492.2	76.2	568.5	11.5	9.0	20.5	6.9	16.0	596.1	639.9
1954	550.1	75.7	625.9	13.2	5.4	18.2	12.5	17.9	657.1	702.7
1955	487.3	61.4	548.8	16.8	4.8	22.6	13.2	18.1	583.8	633.2
1956	413.0	69.9	482.9	28.0	7.0	39.8	18.8	25.9	537.0	601.9
1957	388.7	76.2	465.0	21.9	11.3	29.8	12.7	24.1	511.1	590.2
1958	354.5	66.5	421.0	15.4	7.0	18.1	17.1	24.1	460.7	536.0
1959	361.2	73.2	434.5	13.8	7.5	17.8	17.0	24.5	473.0	555.5
1960	332.2	79.9	412.2	13.6	20.8	17.9	17.4	38.2	464.1	560.3
1961	307.8	68.1	376.0	14.0	20.7	25.3	23.6	44.3	434.4	536.0
1962	332.0	60.5	392.6	10.6	31.2	26.5	29.0	60.2	463.5	559.1
1963	303.0	77.1	380.2	13.2	24.0	29.7	29.1	53.1	446.6	550.9
1964	394.2	74.9	469.1	12.4	24.8	28.3	41.7	66.5	548.1	

*Based on Annuario de Comercio Exterior. The 1951 figure matched that of the 10-year Plan quite closely and the definitions.

SOURCES AND METHODOLOGY: Cols. (1), (2), (4), and (9) come from various issues of the Annuario de Comercio Exterior. Col. (7) is from the 10-year plan for the years 1950-1960 and the author's estimates for 1961-64. Col. (6) is the author's estimate based on the disaggregated figures in the Annario de Commercio Exterior Col. (10) is based on figures in Table A-164.

The other columns are derived from the above ones as indicated in the table.

TABLE VI-10

Minor Exports by Degree of Transformation

Year	Crude: Agriculture and Fishing	%	Crude: Mining	%	Crude: Total	%	Semi-Manufactured: Millions of Dollars	%	Manufactured: Millions of Dollars	%	Grand Total
1950											
1951	15.931	57.7	---		15.931	57.7	7.508	27.2	4.139	15.0	27.578
1952	15.947	74.9	---		15.947	74.9	.558	2.6	4.781	22.5	21.286
1953	20.205	75.1	---		20.205	75.1	---	---	6.686	24.8	26.891
1954	19.615	65.0	---		19.615	65.0	---	---	10.556	34.9	30.171
1955	---	---	---		---	---	---	---	---	---	---
1956	35.482	67.7	.897	1.7	36.379	69.4	4.982	9.5	11.041	21.1	52.402
1957	31.733	73.0	.552	1.3	32.285	74.3	.301	.7	10.844	24.9	43.430
1958	20.357	56.1	.218	.6	20.575	56.7	---	---	15.672	43.2	36.247
1959	19.875	55.7	.339	.9	20.214	56.7	.010	---	15.395	43.2	35.619
1960	33.408	69.8	.140	.3	33.548	70.1	.015	---	14.270	29.8	47.833
1961	33.521	60.9	.018	---	33.539	60.9	5.210	9.5	16.207	29.4	54.956
1962	38.067	56.4	.010	---	38.077	56.4	7.386	10.9	21.973	32.5	67.436
1963	37.571	59.5	.023	---	37.594	59.5	5.500	8.7	19.962	31.6	63.056
1964	45.162	53.5	.059	.1	45.221	53.6	3.276	3.9	35.827	42.5	84.324

Sources and Methodology:

The major source used was the Yearbook of International Trade Statistics, of the United Nations.

The lines drawn between the categories are naturally arbitrary. And some of the categories in the basic export figures are not sufficiently detailed to separate out individual items in accord with the arbitrary classification scheme chosen. A conceptually satisfying criterion for classification would be one which related the share of value of the good traded which came from the extractive sectors (in particular agriculture) and the manufacturing sector. (This omits any consideration of the trade and transport components of the value of the traded good such an omission might be defended on the ground that much economic theory deals with the relative efficiency of the agriculture and manufacturing sectors, or their relative resource endowments compared to other countries, and little consideration is usually given to the trade and transport sectors. Of course this could also be construed as a criticism of the typical analysis.)

Concretely, we have considered as crude materials here any mineral or agriculture product which has not entered the traditionally defined manufacturing sector. Still, in the case of a number of items, some sort of manufacturing process may have occurred on the farm or in the rural area, as in the case of fur skins, where one might argue that the skinning process was something which could be easily considered to be in the manufacturing sector. This, in the terminology of Hymer and Resnick, would be a Z service.[1]

[1] "The Responsiveness of Agrarian Economies and the Importance of Z Goods" (Stephen Hymer and Stephen Resnick) Center Discussion Paper No. 25 (Revised) October 1, 1967.

TABLE VII-10 (continued)

The only item of importance in the semi-manufactured category was refined sugar.

Note: The figures for 1951 56 were given in peso terms in the Yearbook of International Statistics, and were converted to dollars at a rate of 251 pesos per dollar on the assumption that minor exports were not receiving special treatment in that period or that if they were, the peso figures in the official statistics and in the Yearbook of International Trade Statistics had nevertheless converted from dollars to pesos at a fixed rate for all products.

Table VII-11

Minor Exports by Degree of Transformation

Year	Agriculture or Fishing	Mining
1950		
1951	39.987	--
1952	40.028	--
1953	50.716	--
1954	49.236	--
1955	--	--
1956	89.060	2.251
1957	31.733	552
1958	20.357	218
1959	19.875	339
1960	33.408	140
1961	33.521	18
1962	38.067	10
1963	37.571	23
1964	45.162	59

Note: The figures for 1951-56 were given in peso terms in the Yearbook of International Trade Statistics, and were converted to dollars at a rate of 2.51 pesos per dollar on the assumption that minor exports were not receiving special treatment in that period or that they were. The peso figures in the official statistics and in the Yearbook of International Trade Statistics had nevertheless converted from dollars to pesos at a fixed rate for all products.

TABLE VII-12

Breakdown of "Minor" Exports
(i.e., excluding coffee and petroleum)

Year	Primary Foods and Materials	Petroleum Products	Manufactured	Total
1958	20.7	10.1	5.7	39.6
1959	17.6	8.7	7.0	38.5
1960	32.7	7.7	7.0	52.3
1961	39.0	5.2	10.2	58.4
1962	44.8	7.2	14.4	70.8
1963	43.5	4.1	16.2	66.5
1964	41.3	7.9	17.7	84.8
1965	(59.8)	7.3	(39.1)	(105.0)
1966	(50.3)	9.7	(45.1)	(107.6)

Source: John Sheahan,

( ) Provisional.

the complexity of factors helping to determine these exports and to data weaknesses in key areas. A study by John Sheahan,[1] the most careful analysis to date, suggests a good, unlagged relation between the real exchange rate and minor exports. These are also characterized by a strong upward trend during 1958-66 (the period to which his study refers). The price elasticity of supply seemed to be about equal to unity.[2] This implied, that with the exchange rate existing in 1966, an increase in the rate by one peso would lead to about 10 million dollars more in exports. Sheahan's estimate of the effect of the exchange rate on exports was highly stable across a variety of equations, some including corrections for the seasonality of the minor exports, some lacking this correction, and some including a time trend and others not. According to his equation 3, the time trend was not an important factor, in fact it had a negative coefficient. But this seems unreasonable. Unfortunately, it has not been possible to break the minor exports into such categories as manufactured products, agriculture and other natural resource based products and others on a quarterly basis. At the same time the analysis of the effects of exchange rate variations is not too meaningful on an annual basis, since the fluctuations are often of short periodicity and occur within a given year. There is thus a sizeable dilemma in sorting out the separate effects of the exchange rate on the different types of minor exports. The

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[1] Sheahan, John, "The Response of Colombian Exports to Variations in Effective Exchange Rates" mimeo, 1967.

[2] A study by Vanek argues that exports are determined largely by external forces, as Sheahan mentions, while Aliber concluded that apart from coffee they were highly responsive to changes in incentives and felt that the supply elasticity might be 2 to 2 1/2. Neither of these studies involved the methodological sophistication of Sheahan's so his answer is the most revealing to date.

share of manufactured products in all minor exports has certainly risen in the period 1958 to 1966 as indicated in Table VI-12. Despite the relatively encouraging results of Sheahan's regression analyses, there remain many doubtful aspects of the relationship between the exchange rate and the exports in the long run.

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CHAPTER VIII

Comments on Some Current Policy Issues

This chapter discusses several policy issues of current interest bringing to bear the evidence produced in earlier chapters, as well as some additional information. There are any number of ways in which government policy can deal with the agricultural sector in an attempt to increase income per capita in that sector and in the economy as a whole and to improve its distribution. While most of the information which would be useful in choosing the best policy is not available in Colombia (and usually generalizations based on similar countries are likewise lacking) an informed guess can be made as to the value of certain possible courses.

Agriculture cannot, of course, be viewed in isolation from the rest of the economy. The decision as to how much capital and human resources should be dedicated to an attempt to increase agricultural output, employment, etc., depends on the potential productivity of these factors within other sectors. The wisdom of an agrarian reform program, for example, depends very much on the alternative employment which can be provided for small-scale or landless farmers in other sectors.

In an economy where all farmers had about the same amount of land and were in other ways similar, and where industrial enterprises were all located in urban areas, the problem of deciding how much resources to put into agricultural development would be at least conceptually a relatively simple one. If the rate of return on investment of resources in agriculture were greater than that in industrial and urban activities, agricultural development would be pushed.[1,2]

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[1]The costs of urbanization would have to be included as part of the total social cost of a program of industrialization. To the extent, of course, that

But starting from an initial equilibrium with the rate of return to investment the same in each sector, and given the relatively low income elasticity of demand for agricultural products, one would expect that only a limited amount of resources could be put into agriculture before falling relative prices would make further investments relatively unproductive. This would be especially true for those countries in the middle ranges of underdevelopment, like Colombia, where food needs are at least reasonably well satisfied now. Thus only if agricultural exports could be further promoted would there be really high scope for investment in the agricultural sector of such an economy.

When allowance is made for the fact that there is a very wide inequality of income in the rural sector, and a good deal of underemployment, the problems are complicated, since the goals of output and employment must be considered jointly, and may in certain situations be competitive.[3] Another source of

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some services become available in urban areas which are not available in rural areas, these would not be an additional cost of industrialization, but simply reflect the purchasing of a different bundle of goods by the urban dwellers. In practice it may often be difficult to distinguish between new expenditures in the urban areas which simply reflect paying for something which was free in the rural areas (a clear case of which would be transportation to place of work) and new expenditures in payment for goods which would improve welfare (a clear case of which would be doctors).

[2]Whether the wage differential which a person may require in order to get him to move to the city should be considered as part of the cost of industrialization and urbanization is a matter of value judgement, (or possibly of psychological speculation). Any part of a positive differential between the urban and rural wage rates required by an individual which is due to higher costs in the city would in any case not be included here, since it would have been allowed for in a calculation of the social costs of urbanization (see previous footnote). But to the extent that another part of this differential is due to the fact that people are unwilling to change their habitat without some payment for it, there is uncertainty as to how to treat this, especially if it can be predicted on sociological grounds that fairly soon the individual whose preference system now leads him to prefer the rural life will prefer the urban life, and at that point would require a differential in the opposite direction to induce him to move back to the country.

[3]In the Colombian context, it would appear that a strategy cannot be successful unless it leads both to increased output and to increased employment

complexity in real world decision making is that some industries may indeed be located in rural areas or at least in small towns, so that industrialization does not necessarily imply urbanization or at least it does not imply having people migrate into large cities; a whole spectrum in terms of the scale of urbanization going with industrialization may be conceived of. It is this latter, relatively complex, framework which is more or less applicable to the Colombian situation of the moment, and it is in this framework which we will discuss and analyze several alternative strategies for the agricultural sector.

It seems probable that agricultural output in Colombia can be increased at a smaller relative cost in terms of resources than can the outputs of most other sectors of the economy. This is suggested, for example, by the fact that the mechanization of such crops as rice, cotton and sugar has proceeded very satisfactorily in recent years and with quite high rates of private profit. Whether increased mechanization is the best strategy for the agricultural sector as a whole is not clear; but it does seem probable that such investment dominates most investments in the non-agricultural sector, thus suggesting, a fortiori, that some form of investment in agriculture is better than most forms of investment in

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opportunities, or, what is about the same, an improvement in income distribution. Part of a successful overall strategy could, indeed, include an investment in lines of production where the rate of return on the investment was extremely high, even though little labor was absorbed, but in this case, other investments would have to be made which were more labor intensive, or, despite satisfactory growth of output, the distribution of income would remain very unsatisfactory. We lack sufficient empirical evidence on the Colombian economy to guess whether these two goals are in fact competitive or not, i.e., whether the strategy which maximizes output will also maximize labor inputs, and therefore tend to improve the distribution of income. It is clear that the policy which maximizes output is very unlikely to lead to a highly equal income, but one might consider it satisfactory if it even gave everyone a fairly adequate income and employment.

non-agriculture.[4] As to whether some other agricultural strategy would increase output with an even lower input cost, our information is much less clear and no definitive answer can be given. And if it were found that mechanization of agriculture actually displaced labor (an issue to which we turn later in this chapter) and if there were no alternative satisfactory employment elsewhere in the economy for these laborers, then the goals of high output and high employment (i.e., relatively even distribution of income) would be in conflict and one could no longer say with assurance that agriculture should be given high priority at least in terms of certain inputs, in the near future.

If employment could be found elsewhere in the economy for the labor surplus in the rural areas (this is the position maintained by Lauchlin Currie)[5] then mechanization would almost certainly be the appropriate strategy to follow. But there are many empirical questions which must be fathomed before it can be demonstrated that a large number of productive jobs can be found outside the agricultural sector. The extent to which a relative emphasis on industry can be successful depends in good part on the extent to which the costs of urbanization which tend to accompany industrialization can be kept down; we know little about the relative costs of urban services in small and large cities, nor about the feasibility of locating a good deal of industry in rural areas or very small

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[4]Note however, that the private rate of profit in the manufacturing sector seems to be very high. One as yet unpublished study set the pre-tax rate at 35 to 40 per cent. It must be remembered, however, that there are reasons for believing the social rate of return may be less than this. For example, the capital goods and inputs imported come in at a below equilibrium exchange rate. This is true for the machinery used in agriculture too, so to further pin down the relative social ratio of return it would be necessary to compare the implicit subsidies in the two cases, among other things.

[5]See L. Currie, Accelerating Development: The Necessity and the Means, McGraw Hill, 1966.

towns or cities. To the extent that the typically high costs of urbanization may be in part avoided, a strategy concentrating on industrialization becomes more desirable.

The potential conflict between output maximization and decent income distribution within agriculture would also be avoided if it could be demonstrated that the spreading of technological progress to small-scale farmers would have as high a benefit-cost ratio as for large-scale farmers, or that credit extension could be as productive to the former as to the latter, this conflict would not arise. Or if that migration from the agricultural to the non-agricultural occupations which did occur involved the lowest income farmers, then this continual siphoning off of the most impoverished farmers might be large enough to prevent any widening of the distribution of income within agriculture, or even to allow some narrowing. There seems, however, to be substantial evidence that rural to urban migration often involves the better off and better educated people, and there is also substantial evidence to suggest that technological diffusion reaches many large-scale farmers more easily than the small-scale farmer. Whether these apparent results are due to unnecessary distortions in the extension services, or in the case of migration whether some government policy could induce the poorer farmer to migrate rather than the better off one remains to be seen.

Since any economy which develops successfully has eventually a small proportion of the total labor force in agriculture, the time element in governmental strategy is often very important. Thus, an agrarian reform which redistributes land with the prime goal of redistribution of income rather than increasing output

may be worthwhile if profitable urban employment could not be obtained for these people for another 30 or 40 years, and might be a poor investment if such employment were to become available within 5 or 10 years. Such a decision, therefore, involves a very careful prediction of the employment patterns of the economy over a substantial length of time.

No matter in what direction the government's effort to increase agricultural output goes, it involves an investment of human and/or physical resources; so one can think of the decision as involving the choice of the most profitable forms of investment. The individual farmer can increase output only through an increase in capital (or land) or an improvement of techniques (e.g., use of better varieties), with the two often being of a complementary nature so that the increase in information requires some capital to reap the benefits of it. Thus, as far as the government is concerned, progress must involve one or more of,

i) producing new technical information and making it available to the farmer, i.e., research on new varieties, new inputs and ways to use existing ones such as fertilizer, machinery, etc., disease control and farm management research;

ii) making existing information available to the farmer, i.e., extension work in its various possible forms;

iii) making additional capital available to the farmer, i.e.,
   (a) public capital, e.g., roads to open new lands currently of no commercial value, irrigation works, public storage facilities, etc., free public education,
   (b) private capital, whose accumulation may be fostered by subsidized prices of capital goods, increased availability of credit;

iv) improving the distribution of land among farmers, and the tenure arrangements under which it is held, which may be effected in a variety of ways, including various types of agrarian reform;

v) changing the farmers' incentives,[6] thus leading indirectly to a

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[6]Whether a change effected in an individual's behaviour resulting from a successful attempt to change his goals is good or bad is a philosophical question.

greater effort on their part to acquire more capital or more information;

vi) encouraging migration to other sectors.[7]

Research (at least by economists) in these realms remains quite limited. Determination of the optimal allocation in each of the above directions calls for figures on the stream of benefits related to a given stream of costs for each type and sub-type of expenditure. In reality only crude guesses can be made, but at least some pertinent information is available. A precise answer also calls for a preference function giving specific weights to increased output and to changed income distribution. We shall consider each possible type of expenditure with respect both to its production and income distribution aspects.

The external benefits to other individuals as a result of this changed behaviour may present no such problem, however.

[7]These six categories are not designed to give more than a crude sort of breakdown, and it may be that a number of policies primarily directed at one of these approaches will inherently involve another as well. The distribution of credit could, for example, affect the distribution of land if it made possible certain purchases which would not otherwise have been brought about.

It is also necessary to think of a package of policies, since the productivity of one approach may be low unless some other one is pursued at the same time, e.g., research on uses of machinery may not be useful unless credit is extended.

Evidence on the Optimal Relative Emphasis on Agriculture and Non-Agriculture

Before considering the allocation of funds and efforts among different governmental expenditures on agriculture, one would like to have a general idea as to how much should be invested in total.

One appraoch to the appropriate allocation of capital and human resources between agriculture and other sectors in the future would be to attempt a measurement of the marginal output to capital ratio in the different sectors in the past. This is of course not a perfect method, since the funds within each sector may not have been invested in the wisest fashion, since a certain amount of investment and other input helps to increase output in more than one sector, and since labor force changes have also contributed to output changes. For illustrative purposes we have, in any case, calculated a marginal output to capital ratio for the agricultural and non-agricultural sectors.

Agricultural investment in 1959 was estimated at 629 millions of 1958 pesos in the 10 year Plan. The average for 1961-1964 projected was 950 millions per year.[8] The average increase in output between 1956 and 1962 was 253.9, so if investment has averaged say 700 millions in this period, the marginal output/capital ratio would have been .364. The estimate of capital formation is very open to question; it could be too low by a substantial amount.

The marginal output to capital ratio in manufacturing for the period 1950-1959 was estimated in the 10 year Plan as .281.[9] For the non-agricultural sector as a whole over the period 1956-62, assuming gross investment in agriculture of 700 millions of 1958 pesos per year, the marginal output/capital ratio would have

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[8]See Plan General de Desarrollo Economico y Social, Parte I, p. 182.

[9]Op. cit., Parte II, p. 25.

been about .22 to .25.[10] These crude figures do give the advantage to agriculture.[11] When it is also considered that labor force was probably only growing at about 1 per cent per year in agriculture but at over 4 per cent in urban occupations[12] and that the labor in the urban sector was more skilled, a stronger presumption in favor of agriculture is present.

In summary, given that the most likely data weaknesses are an underestimation of the amount of investment in agriculture and of the output growth (which cancel out to some extent), the calculated marginal output to capital ratio of 50 per cent or so higher in agriculture than in non-agriculture gives fairly strong evidence that the true ratio is not lower in agriculture than in non-agriculture.

Research and Extension

It is usually impossible to get a reasonably accurate measure of the effects of research and extension by time series analysis (e.g., checking on changes in yield per hectare of a given crop over time when the variety is changed), since too many things vary. But when a change occurs very quickly it may be possible. The measurement of costs is not so difficult, although an attempt to assign them by discovery may be.

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[10]Based on output and gross investment figures from the Banco de la Republica, Cuentas Nacionales.

[11]The figures used here are all of dubious validity, especially those on agriculture. Agricultural output increases may be underestimated but so may gross investment. The subtraction of agricultural investment as roughly estimated above from total investment as presented in the national accounts in order to obtain non-agricultural investment may be inappropriate. Gross to net investment ratios may differ between sectors, and the length of life of capital may also.

[12]ECLA estimated an employed urban population of 2.905 millions in 1963 as opposed to 1.714 millions in 1950, a growth rate of 4.2 per cent per year. See ECLA,

The Case of Barley

Between about 1956 and 1960 the Funza variety came from zero importance to almost complete predominance (over 90 per cent of all area sown to it). Probably the amount of capital used did not increase substantially, although improvements there, and in methods of cultivation, may have occurred due to a vigorous effort at extension by Bavaria (the major beer company) and Procebada (an institution set up mainly by Bavaria for the advancement of the cultivation of barley). In any case, if no inputs besides the seed were changed at this time, then the contribution was running at a conservative[13] estimate of 16 million 1958 pesos per year. If even half of this gain were the result of the change in variety, then a doubly conservative estimate of the resulting stream of gains would be 8 million 1958 pesos per year. The total government expenditure on research and extension in 1958 was only 18.2 million pesos and all expenditure on agricultural development was 41 million. (This comparison is used only for rough illustrative purposes, since the research on barley was not, I think, funded by the federal or departmental governments.) A very high rate of return is indicated.

Funza has now been partially superseded by new higher yielding varieties. One of two varieties released about 1964 was capable of 40 per cent higher yields than Funza, according to reports. This suggests that Funza was not a "never to be repeated" accident, and that the research input in Colombia can be expected to produce a rather steady stream of better varieties.

The Cases of Corn and Wheat

As of 1960 the Rockefeller Foundation estimated that Colombian farmers had benefitted by about 175 million pesos from the development of improved corn

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13. A yield series for barley is presented in Chapter II, Table II-16. One showed a more rapid increase in yield over this period than the one used here.

varieties.[14] This would, as noted in Chapter III, have paid for the whole federal and departmental expenditures on research, extension, and related activities from 1956 through 1959. Substantial varietal improvements have been made since then and it seems clear that this investment in research has, like that in barley, paid off well. And, considering that only a small portion of all corn planted is now in improved varieties, it seems likely that if reasonable improvements in the extension services occurred, the rate of return would be substantially higher.

By 1964-1965 about 80 per cent of the country's wheat crop was from improved varieties released by the wheat breeding program.[15] The Caja Agraria was producing 20 per cent of the seed needed annually to produce the crop. Colombian wheat varieties have yielded very well in a number of other countries now.

The Rockefeller Foundation[16] notes that when the cooperative wheat program was begun in Colombia, the varieties were late, weak-strawed, and susceptible to rust, with average yields around 450 kilograms per hectare.[17] The Foundation report notes "with the introduction of 14 hybrid derived varieties over the past 15 years, the situation has radically changed. The new varieties are short and strong-strawed, adapted to mechanization and higher fertilizations, early, allowing two crops per year; and resistant to rust and other diseases. Average yields

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[14]Rockefeller Foundation, Program in the Agricultural Sciences: Annual Report 1959-1960, p. 123.

[15]Rockefeller Foundation, op. cit., 1964-1965, p. 59.

[16]Rockefeller Foundation, op. cit., p. 70.

[17]This estimate of an average yield of 450 kilograms per hectare is well below alternative estimates, made for example by the American Embassy, and the Ministry of Agriculture. But these latter estimates are rather crude guesses, both on the production side and on the acreage side. So the Rockefeller Foundation estimate may not be too far out.

have almost quadrupled, and several farmers have harvested over 6 tons per hectare. Some of the best farmers, using good management and high fertilizer levels, have harvested up to 9.5 tons per hectare, or about 140 bushels per acre.

The history of new varieties in wheat indicates that a flow of new varieties is necessary to keep yields going up satisfactorily. The initial gain in yield which a particular variety can lead to, will not be maintained over time as new diseases and pests arrive to afflict it. (This is reminiscent of the history of the development of cotton, where the areas of production have fluctuated a great deal as old areas become high cost with the increasing seriousness of pests.)

Menkemen was the first of a series of good new varieties released by the Colombian program. It was widely grown until 1955, when it was removed from the recommended list for Cundinamarca and Boyaca because of the appearance of new rust races. Bonza 55 is the second variety released and is still resistant to rust at elevations below 27,000 meters and remains on the recommended list. The rust conditions of Colombia are very difficult so its ten years duration is outstanding. Expectations were great for the variety Nariño first released around 1960, but a new race of stripe rust appeared early in 1962 and heavily damaged the variety. In 1964 six new varieties were released--a very timely event. These provide at least one adapted wheat for a greater part of the country than had ever been true before. In 1963, Miramar 63 was released for use in the northern savannah of Bogota. This is the first commercial multi-lineal variety in the world.[18]

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[18]Multi-lineal varieties like this one have interesting implications for the risk-averse small farmer; the likelihood of a serious crop failure due to rust is almost eliminated. The strain is composed of 10 phenotypically similar component lines each of which carries different sources of resistance to disease.

The aggregate figures on Colombian wheat output and acerage do not indicate the very rapid increase in yields suggested by the Rockefeller Foundation's report. Still, it is not at all improbable that at least one-quarter of current value of wheat output can be attributed to new varieties. Given the value of output in 1965 that would constitute almost 40 million pesos. Even without further refinement, this figure suggests a very high rate of return on the investment in research in wheat.

It has been mentioned occasionally that there is much evidence to indicate that the rate of return on investment is very high in many parts of the Colombian economy. Thus it requires a very high rate of return on the investment in any given line to make a convincing case that it is a good investment. In the absence of a careful and detailed study of investment in research, and the way in which its payoff is related to investment in complementary services such as extension work, one can only make the general, but highly plausible guess that research has been a very productive line of work in Colombia, and it would probably pay to invest more in it. But many people do believe that this might not be true unless more were invested in extension work, and this may indeed be an expensive process.

Increasing the Capital Stock

Large Scale Public Investment

Few case studies of large scale investment projects have been undertaken in

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'This gives maximum protection against new rust race changes, since the likelihood of a new rust race rising in nature that could destroy all 10 lines is infinitesimal. What has actually happened is that a new ste$_m$ rust race attacked two of the 10 lines of Miramar 63. Maximum losses, however, were always less than the possible 20 per cent because of the isolation effect of the 80 per cent resistant population which prevented innoculum from reaching epiphytotic proportions."

Colombia and, since there is probably good reason to suspect that the rate of return varies widely from one project to another, the analyses which have been done do not add up to any significant conclusions as to the overall profitability of investing in this way if projects were well chosen. We nevertheless mention two of the studies, since weak generalizations may be derived from them.

Klaus Bethke[19] has carried out a benefit cost analysis of the Saldaña irrigation works.[20] He arrived at a benefit-cost ratio of 1.8/1 considering only the primary benefits and 4/1 considering all benefits.[21] These high rates occurred even in the presence of very serious management problems and a lag in the adoption of irrigation by many farmers.[22] The author concludes that the use of water offers

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[19]Klaus Bethke, "Irrigation, A Means for Colonization: A Colombian Case Study," mimeo., July, 1966.

[20]Some interesting sidelights to Bethke's main focus of analysis throw further light on issues of general interest in Colombia's agriculture. He noted an abundance of labor during all the year, coupled with a low demand for it during most of the year. Despite this, "land preparation, cultural practices such as fumigation, fertilization, harvesting are all highly mechanized and require low amounts of labor inputs. Even on the smallest farms rice cropping is done on a mechanized basis and if farmers do not own the machinery they rent or make a contract with the large land owner, generally under quite unfavorable conditions." It is perhaps noteworthy that the per cent of total area irrigated does not vary a great deal with size of farm. It is slightly higher for farms 50 hectares and up. This had not been the case as recently as 1962-63 when the CIDA study was performed in the area; at that time the smallest farms (less than 5 hectares) irrigated an average of less than 15 per cent of total area, medium sized farms (5 to 100 hectares) irrigated between 35 and 50 per cent of their area, and large farms irrigated about 60 per cent. The change in cropping patterns which occurred along with increased productivity are attributable according to the author to the introduction of a new chemical herbicide in 1963, which markedly reduced production costs and increased yields. The author's calculation of per cent of farm irrigated was for 1965. Note that the introduction of the herbicide inevitably creates difficulties in the calculation of the benefit-cost ratio of the irrigation project itself.

The author notes that various secondary activities have been stimulated; rice mills have been built at several points and there have been increases in sales of agricultural machinery and other types of commercial activities.

[21]This result cannot be interpreted accurately without knowing the discount rate used.

[22]As rice production grew in the region, disease and pest problems became

very high returns in Colombia, and this seems indeed to be a reasonable conclusion.

A benefit-cost study of a projected irrigation program in the La Victoria area of the Cauca valley was carried out by Don Bostwick. It was an ex-ante analysis of the benefit-cost ratio under certain assumptions with respect to changes in yields, and changes in crop patterns resulting from irrigation.[23] Bostwick estimated a benefit-cost ratio varying from less than one (under the assumption that the cropping pattern stayed the same as between crops and pasture and among types of crops, with the increase in income resulting only from increases in yields) to a ratio substantially greater than one (somewhere between one and two), on the assumption that land use changed so that for a given land quality classification the crop appropriate to that land quality was grown. This still did not represent particularly intensive or effective land use.[24] But since his calculations assumed a rate of interest of only 8 per cent, certainly far below the rate achieved on various lines of capital investment in Colombia, it could not be considered to have demonstrated the desirability of the project in question.

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serious. A period of decline for rice ensued but then, when the problems became better controlled again, it rose.

The gains were, as one might expect, very unevenly distributed, going mainly to large landholders. But it does appear that employment opportunities were markedly increased, though a severe seasonality remained. Peasants who previously eked out an existence on their own plots were able to get work on the large farms.

[23]Don Bostwick, Analysis de Beneficio-Costo del Projecto Cartago-La Victoria, Centro de Formacion Profesional e Investigacion Agricola, Universidad del Valle, Monograph No. 10, 1965.

[24]The benefit-cost ratio seemed to be rather sensitive to slight modifications in cropping patterns. This was apparently because the gross income and the costs were both fairly high, and a small per cent change in one or the other could change the net income substantially. Bostwick noted that one could make more favorable assumptions than any he made, assuming, for example, that the appearance of the irrigation system would constitute a general stimulus to more effective farming and more intensive use of factors and more crops per year, etc.. Under such circumstances the project presumably could pay off even using a much higher rate of discount. His study indicated among other things the difficulty of predicting the payoff on such a study, without very intensive research.

Economists emit frequent warnings that some highly expensive projects such as dams and highways can be economic folly, and this seems very probably to be the case. Unfortunately too few careful attempts at benefit-cost calculations have been made for these to "add up" to useful evidence on the overall payoff to agricultural investment in general or to specific types of it. The results of each study have improved the information on the project in question, and often come up with interesting related information; but a good impressionistic observer with long experience in Colombian agriculture would still be the best consultant on government investment in agriculture.

Rural Education

There can be little doubt of the fact that improved primary education in rural areas increases the "consumption" of the population even when that education is of a very inferior quality, as it inevitably is in a country like Colombia. Its contribution on the investment side is more problematic, and has not been analyzed in a profound or comprehensive way in many or perhaps any countries. But some of its effects have been analyzed in Colombia, as elsewhere. The major possible benefits from improved education would be greater efficiency of farm entrepreneurs or workers, and increased out-mobility. (Greater out-mobility is desirable in situations where one can assume that the marginal productivity of labor is lower in agricultural areas than in the city, or that it is lower in some agricultural areas than in others, and that the lack of movement from the low productivity areas to the high ones can be partly overcome by improved education.) This latter supposition has been borne out in a number of studies in different countries, and most of the evidence to date in Colombia is at least consistent with it. We return to this issue in a later section.

The actual level of rural education is very low. Yet it is highly valued by the rural population, as indeed other studies have shown it to be by the urban

population. But it seems that no one is willing to put a special emphasis on rural education. The church, for example, has long preached about the need for education and purports to support rural education in isolated areas. But, according to Havens,[25] of the 3,626 sisters and priests engaged in teaching, only 7 per cent are located in rural areas, these being primarily in the Capuchino Mission in the Guajira and Putamayo.

Evidence accumulated by Mathew Edel indicates that there does seem to be a positive relationship between the educational level of farmers and the degree to which they adopt new technology.[26] But the overall effects of improved rural education are unclear until this relationship is better understood, along with the way in which different degrees and types of education affect the tendency to migrate and the way in which migration itself may affect the overall productivity of the economy.

Mechanization

The period of rapid mechanization of some aspects of Colombian agriculture, extending from the late 1940's through the mid '50's, undoubtedly was important in the rapid increases in output of some products such as cotton, barley, rice, and several others. The pace of mechanization slowed since the mid to late 1950's as the relative price of machines compared to labor rose again, resulting at least in part from the tighter balance of payments situation due to falling coffee prices. Neither the decision making process leading farmers to turn from more labor intensive technologies to mechanization, nor the results of the changeover have been documented in Colombia. In some of the newly opened warm lowlands

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[25]A. Eugene Havens, Education in Rural Colombia: and Investment in Human Resources, research paper No. 8, Land Tenure Center, University of Wisconsin, Madison, Wisconsin, February, 1965.

[26]See Mathew Edel, forthcoming Yale dissertation.

which have been turned to the production of cotton and other crops, mechanization seems a natural response to the scarcity of labor in these regions, and would presumably be socially as well as privately desirable, at least in the short run. But in terms of long run policy, we have very little evidence to go on in trying to determine the net effects of mechanization either on output or on labor absorption. One would anticipate the existence of distorting biases both for mechanization and against it; the former would be present when a farmer preferred to be "modern" even at the expense of somewhat lower profits, when he felt that the insecurity attendant upon the use of less predictable laborers warranted the switchover, or when the price of machinery is subsidized by importation at a below equilibrium exchange rate. The latter bias would occur when farmers were unaware of the advantages of the new technology in particular cases, and as a result stuck with the old.[27]

To the extent that important sectors of the Colombian economy have a genuine labor surplus, one might expect the labor to machinery ratio to be below the socially optimal ratio. It is clear that some machines are substitutes for labor and may therefore be counter-productive in a labor surplus economy. But labor surplus in Colombia, and probably in many other countries, is a complicated concept. In general the use of machinery is more extensive in areas of low labor intensity in Colombia. Knowing this does not prove that the machines are necessary, since the labor intensity differences between different regions result from rigidities in the tenure structure etc., as well as different qualities of

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[27]Impressionistic evidence is present on both sides of the fence. There are documented cases in which large farmers fired many workers and replaced them with machines, only to discover later that the switch had not been a profit-increasing one, due to unanticipated difficulties in the use of the machines, and due to the rise in the price of machines with the passage of time and the tightening up of the balance of payments situation. On the other hand there is no doubt that machines are cheaper in many instances.

land, etc.. While the existence of labor surplus on a seasonal basis cannot be questioned, there would be doubt as to its size and significance on a year round basis in many regions of Colombia.

Thus we can only conclude that in terms of its effects on output, the use of machinery is a big question mark. A separate issue is its income redistributing effects, and in an agricultural sector with the tenure structure and inequalities of Colombia's this becomes a key question.

Examples of labor displacing mechanization and of labor using mechanization are not difficult to find in Colombia. The latter often involves a change from extensive livestock raising to crop growing, which even if partially mechanized, is the more labor intensive of the two. Some forms of mechanization speed up a particular process (e.g., harvesting) sufficiently so that two crops can be grown in a year rather than one. In such a case, although less labor may be used than before, per crop, more may be used per unit of land over the course of a year. Such a change may further decrease the seriousness of the seasonality of the demand for labor. Which of these types (labor saving and labor using) of mechanization has predominated in Colombia is an important question in the evaluation of past policy and the formulation of future policy.

Since most of the mechanization has been a post World War II phenomenon, a region which is now more mechanized than a neighbouring one can be assumed to have opened this gap since the war. If labor were homogeneous and wages flexible, one would be able to test the effect of the mechanization on the demand for labor by observing the relative movements of wages in the two regions. Even if these assumptions are not met (as they obviously are not in Colombia) the experiment has some interest. But preliminary investigation reveals no relationship, either positive or negative, on a municipio by municipio basis.

Given that mechanization might imply high wages for a skilled labor elite and unemployment for the rest, relatively high wages would not in any case be convincing evidence of the benefits of mechanization. Another test is to see what has happened to total agricultural population in mechanizing regions.

A positive correlation between the degree of mechanization at the time of the agricultural census in 1960 and the rate of growth of the population in agriculture since the 1951 census would seem at least to indicate that mechanization was not leading to high displacement of people previously employed[28] in a given municipio to the extent that they were required to move right out of the municipio. Admittedly that would be a very serious result in any case since the mobility of landless workers to places outside their own municipio is likely to be very small. Such a positive correlation does not however prove that mechanization is not labor saving. Mechanization is not usually a necessary condition for the opening up of the new regions and even less for their continued cultivation. Other factors playing a role are the facts that the ability to control health problems in these regions has improved, and that the violencia has uprooted many people in different parts of the county and forced them into these newly settled areas.

Credit

The historical pattern of agricultural credit was traced in Chapter III. As noted there, it is extremely difficult to use aggregate figures to determine the effectiveness or productivity of credit. But since the amount which goes to the agricultural sector is clearly an important policy issue, it is relevant

[28]It is far from being a really solid test, although it does seem implausible that there would be large scale migration into the rural sector of a municipio where labor displacement was substantial. So when agricultural population is growing near or above 3 per cent per year (implying immigration) the case is strong.

to make some attempt at evaluating its usefulness there as opposed to other sectors. And to the extent that income redistribution is a goal along with maximization of output and income in the sector, it becomes relevant to know how productivity of credit differs by types of farmers, and how the amount of complementary inputs needed to make it productive varies by types of farmers. A recent and possibly significant development in terms of credit giving in a number of countries is "supervised credit." The theory underlying it is that small and relatively poorly educated farmers are likely to be able to do much more with credit which is given to them if they are also given technical advice as well.[29] (Or viewed in another way, the credit may be thought of as a bribe to induce them to undertake certain technical improvements.) Given the fact that there are various obstacles to the spreading of technological improvements, especially among the small-scale farmers in Colombia, this would seem to be a plausible assumption.

A number of "supervised credit" programs have been developed in Colombia, with the major one now being that of INCORA.[30,31] With respect to the INCORA

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[29]Of course any credit program will tend to have some directing effects, inasmuch as no credit is given without some consideration as to its use. What differentiates the programs to be discussed here from ordinary bank credit is the detail of direction and the technical assistance which is given along with the credit.

[30]By late 1965 about 8,000 families were being directly contacted through this program.

[31]Among the early ones was that carried out by STACA (Servicio Tecnico Agricolo Colombiano Americano) through which the Ministry of Agriculture began a pilot supervised credit program in the department of Tolima in 1960. (See Dale W. Adams, Antonio Giles, and Rodrigo Pena, Supervised Credit in Colombia's Agrarian Reform: An Evaluative Study, Mimeograph No. 40, Centro Interamericano de Reforma Agraria.) Before this, the Caja de Credito Agrario had initiated a program of supervised credit and directed credit in late 1959. The program was reduced in 1962, with excessive overheads of from 30 to 40 per cent being the reason given. (This was hardly a sufficient reason for a public entity to decide against the program but the

program, Adams et al note that since a substantial proportion of the credit has gone into "slow maturing" investments, such as cattle, fences, machinery, wells, buildings, cooperatives, and permanent crops, it is difficult to make accurate measurements of the rate of return. These investments amount to about one-half of the total amount loaned. Other changes such as those in attitudes, skills, etc., are also essentially immeasurable. But the author's general feeling is that the program is a productive one-a feeling based mainly on observations of how the credit is used. One more direct piece of evidence was that the net farm income of a supervised credit borrower taken as a (presumably fairly typical) representative of the group was about double that of previous years; not enough data was given to indicate what sort of rate of return this might indicate. But it was presumably high.

In terms of changes in operating patterns, there was, as mentioned above, substantial "long term" investment. And in a few cases the amount of land operated by the borrower was increased as a direct result of the credit; in a number of cases the farm opertaion had become more diversified, and in a few cases farmers had specialized their production increasingly. In all cases supervised credit had helped orient the borrower's operation more toward the money market.[32]

Interestingly enough, only a small group (15 per cent) of the borrowers stated that their families total labor input to the farm had increased as a result of

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Caja has usually acted very much in the profit maximizing manner of a private bank.) Other organizations which have had such programs are the Tobacco Development Institute, the Rice Federation in Tolima, and the Banco Cafetera, whose program was linked to the Interamerican Development Bank project for diversification of crops in Caldas.

[32]Adams et. al., op. cit., p. 137. The borrowers considered that their major need was more land, with more credit a very close second. Non-borrowers tended to indicate more land as their prior need about twice as often as more credit, with these two still being the major problems, by far.

the borrowing. The authors suggest that this low percentage may be partially explained by the difficulties which the interviewers had in getting farm operators to differentiate between productive and non-productive time spent on the farm before the loans. Also, many of the uses, such as increased fertilizer application, more heads of cattle or pigs, etc., do not tend to require much additional labor. The same goes for investments in permanent crops, etc..

It was not clear whether there was a shift in relative importance of livestock and crops.[32] A small proportion of the borrowers, most of whom had a significant part of their land in natural pastures, decreased this amount in favor of crops; some of the farmers who had more natural pasture than before were now renting land on which to pasture the cattle acquired with the loans. A few borrowers had planted improved pastures but hardly any had switched improved pasture lands into more intensive cultivation. But about 60 per cent of the farmers reported having more annual crops than before. The data was not detailed enough to indicate where this land came from. Some may have switched unimproved pasture lands to crops (at the same time acquiring more pasture land), the proportion of land left in stubble may well have decreased and some unproductive lands been drawn into use. In all areas studied, the supervised credit farmers were carrying out more intensive cultivation of the crops which they had been accustomed to growing, as well as introducing new ones. In general they were using better seed, more insecticides, more weed killers, and better cultivation practices.[33] Yields in

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[32]Overemphasis on livestock is a major problem in the agricultural sector as a whole. But it is not due to a shortage of capital; livestock farming is relatively capital intensive. It is, rather, due to a shortage of entrepreneurship and/or interest. So we would not necessarily expect the crop to livestock ratio to rise here.

[33]Adams et. al., op. cit., p. 63.

many areas had therefore risen.[34]

There was a substantial increase in the number of animal units owned by supervised credit operators. Poultry, which had been a successful operation in Caldas, where the quality of technical assistance available was higher, tended not to do so well in Tolima, where diseases, lack of knowhow and costly feeds were the main causes of the problems. A number of people who had started out in poultry exploits had given them up. Cattle, on the other hand, usually require little supervision, and it seems to be true that many small farmers have access to some unutilized pasture, and it is the lack of medium term credit which makes it difficult to purchase the livestock they need. Cattle may therefore be a good first step in many regions, where the rate of return on credit can be very high even if the technical supervision is still not too good.

A program like INCORA's could have a variety of indirect effects through increased communication of ideas to farmers and through spreading of new techniques from one borrowing farmer to neighbors. There are a number of indications that new techniques, ideas and knowledge have been introduced by the program to participating farmers, and although some information is filtering out to the neighbors, much more could be done in this regard. Radios appeared to be the major source of communication with the outside world but only one-quarter of radio owners reported that they listened to programs about agriculture, although most of the radio stations transmitting in their areas did have such programs. Probably word of mouth and direct personal contacts were more important means of communication than the mass media. Nevertheless, the authors were struck by

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[34]Adams et. al., note on page 64. The dilemma posed by the fact that the risk involved in crop failure due to climate is further magnified when large yields with high inputs of things like fertilizer, etc., are the rule. A crop loss is even more disastrous than when yields are lower, since the inputs have been higher. In such a case, they suggest that increasing diversification may be required.

the lack of information about the supervised credit program, about INCORA itself, and so on.

It is relevant, in trying to generalize from their conclusions, to keep in mind that there were various ways in which the borrowers were a selective group as compared to non-borrowers. They tended to have more education, be younger, be closer to being full-time farmers, and have generally fewer sources of off farm income. Their farm units tended to be somewhat larger in size than those of their neighbors, with about two-thirds being larger than four hectares, while only about one-third of the neighbors had as much land. There was little or no difference with respect to tenure arrangements. Considerably more of the borrowers tended to have farm animals which they owned. (About 67 per cent as opposed to about 40 per cent on the part of their neighbors.) While there was no difference with respect to the use of tractors or their ownership, the supervised credit operators had a clear edge over their neighbors in the use of light machinery, such as small water pumps, hand crop sprayers, etc.. The borrowers also had considerably more previous experience with credit.

The Banco Cafetero program, like that of INCORA, tends to select the better, more progressive farmers as borrowers.

The credit allocated is probably more productive as a result of this selection process which occurs. It tends, however, to reconfirm the argument that there are few attempts to aid the man who is really at the bottom of the income ladder, possibly because the real cost is extremely high.

While the authors judged the program favorably overall, they pointed to several possible weaknesses. They doubted the wisdom of putting much effort into the fostering of cooperatives when few farmers considered marketing to be a serious problem. INCORA has helped to form a number of cooperatives as companions

for the supervised credit program in Colombia. Only about 4 per cent of all the farmers interviewed in Antioquia, Boyaca, Tolima, and Valle listed middlemen as their main marketing problem, only a small proportion thought that marketing of any sort was a major problem; lack of credit was considered to be much more important. Most of the marketing complaints were centered in Valle. Transportation and price were also much more often mentioned, suggesting that even if the middlemen do constitute a serious problem, their role is not understood as a causal factor in making the price low. The answers also suggest that the social strife between middlemen and farmers must not be too high in these regions. The authors concluded that possibly the magnitude of the marketing problem for most of the small to medium sized farmers has previously been overstated. They consider this to be borne out by the responses of the supervised credit supervisors as to what they thought their borrowers most serious problems were. In the cooperatives which INCORA was fostering, it was noted that the members did not have a clear idea of their relationship to the new organization, and some may have been unduly encouraged to join. There was an almost total lack of "cooperative spirit" in all areas. In some areas the co-op may have no function at all, i.e., it may not be able to do anything better than existing institutions.

One problem at the supervisory level of the credit program is the relative inexperience of the supervisors, who, although very eager, are usually urban born and raised and not too familiar with the agricultural scene.[35] This makes

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[35]It was amazing and very revealing that about one-quarter of the supervisors could think of no major agricultural problem in the areas with which they were concerned, and one-third could think of no major social problem. About 40 per cent did list the lack of rural schooling. With respect to economic problems almost one-half felt that lack of capital was the most pressing need. Many less felt that lack of land was a major problem; this is in distinction to the opinion of the farmers themselves. The supervisors did feel that they had had good success in the introduction of new practices.

them somewhat hesitant about suggesting technological improvements, since the farmer may know more than they do. Experience will reduce this problem. There tended also to be a lack of communication between the supervisors and zone chiefs and the major agricultural research centers in Colombia.

Agrarian Reform - Land Redistribution

Agrarian reform in the sense of land redistribution is a matter of topical interest in Colombia as in much of the rest of Latin America. The program was begun in 1961 in Colombia and has continued at a somewhat erratic pace since then.[36] To date no one has, to the author's knowledge, attempted a serious evaluation of it.

Land tenure changes may be desirable for any of a variety of reasons. It may increase agricultural output, in a situation where land is taken away from latifundios which are extensively farmed and given to people who will crop more intensively; it should improve the distribution of income by giving greater productive resources to the poorer part of the population.[37] Since an increase in

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[36]In his study "Journeys Toward Progress," Hirschman discussed the history of the agrarian reform movement in Colombia, culminating in the Act of 1961. This gives much interesting detail as to the background of the problems and the movements involved, but does not evaluate the program in economic terms. Another interesting study from a political and sociological point of view is a senior thesis done at Yale University by Dennis Mack on the socio-political underpinnings of the agrarian reform movement, its critics, etc.. Finally, Pat M. Holt (Colombia Today and Tomorrow, Frederick A. Praeger, New York, 1964, Chapter V.) presents an interesting account of some of the economic and administrative problems and the successes of the program up to about 1962, along with scattered pieces of evidence which can be of assistance in an evaluation of the program.

[37]Most of the discussion of land reform usually focuses on these two issues. Many links between land tenure and these variables have been suggested, e.g., a) large owners tend to have a more capital intensive technology than samll ones, in a situation where the labor intensitivity is economically optimal (although this question would have to be analyzed in itself), b) ownership of land leads to a greater feeling of prestige and greater effort expended, c) there is little point in saving unless the investment is securely in the hands of the individual;

production is presumably not the major goal of Colombian agrarian reform, we may concentrate primarily on the second question, i.e., by how much can the reform improve the lot of the lower income segment of the agricultural population, and is it the best way to bring about this desired result?

Given the fact that agrarian reform may conceivably be the best way to handle the problem of overpopulation of very poor people in the countryside, the next question is whether the current program is sufficiently large to make a real dent in the problem?[38] This in itself is a complicated issue since the amount of change in the land tenure system which is required cannot be deduced for example by counting the number of landless farmers, or those with farms below a particular size. It is not at all inconceivable for landless farm workers to achieve a satisfactory level of income, as they do in the developed countries. Ownership of land can be considered a goal in itself only when the preference pattern of the farmers is such that the holding of land adds to satisfaction even when it

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given the fact that a small farmer is unlikely to have many channels for investing outside the agricultural sector, this may be rather important. Also other relevant effects of land reform are often discussed, e.g., a) income redistribution away from the large land owner cuts luxury import consumption, b) it is sometimes suggested that landlords are opposed to schools because they can lead to discontent or the teacher may be strong minded; agrarian reform presumably cuts into this, c) it may be more easy to tax canpesinos than landlords.

The above suggestions are taken from Dennis Mack's honors thesis, Yale political science department. He also suggests that Bolivian reform did have important sociological implications, although the monied class is now buying the land back again.

[38]It seems unlikely (as the figures presented later will suggest) that the agrarian reform in Colombia has to date had any major influence on economic variables; its scope has been too small for such to have occurred. Thus the only way in which it could have been really important would be through the additional gains from its presence in zones where the potential social unrest was so great as possibly to have caused violence and economic loss or other difficulties, and where its very existence quelled potential social protest by holding out a hope for the landless farmers, even though they have not as yet received any land through the program. The author is not sufficiently familiar with the situation to comment on these last two possibilities.

does not lead to a higher level of income.[39] A thorough evaluation of the seriousness of the current situation and the extent to which agrarian reform would be required, and the likelihood that the situation will worsen in the future without any such step is beyond the scope of this study. We attempt only to put forward some data which constitutes circumstantial evidence in one direction or another.

One approach to the analysis of the need for agrarian reform, relates the rate of growth of current agricultural population to the need for moving families to new land. A comparison of the number of farm families who get land due to the program to the increase in total rural or agricultural farm families would be relevant if the situation were one in which large farms were not subdivided at all nor did they increase the number of adequately paid workers with the passage of time, so that the whole increase in population would settle on substandard sized plots or in poorly paid laboring jobs in the absence of a reform scheme.

If the policy objective were to prevent the farmers at the bottom of the economic totem pole from having less and less land as time passed, and if none of the addition to the population in substandard conditions migrated spontaneously to new lands or to the city, this goal could be satisfied by moving each year, through agrarian reform, a number of families sufficient to keep this population constant. To the extent that yields were increasing on these farms, the incomes of the population remaining could rise under these circumstances.

The rate of growth of the rural population between 1938 and 1951, seems to have been about 1 per cent per year. The agricultural labor force, according

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[39]This is not an unreasonable desire on the part of farmers, as the ownership of land certainly gives them greater security.

to ECLA figures, grew at only about 0.65 per cent per year. If the latter figure was accurate, the difference was presumably a result of the fact that out-migration from agriculture tended largely to be in the working age groups. A reasonable estimate for the rate of growth of rural population between 1951 and 1964 seems to be between about 1.2 per cent and 1.4 per cent per year. In this calculation rural population is defined as those people living in the countryside or in towns of less than 1,500 people. Hence the rate of growth of the active population in agriculture could be below this, both because the rate of growth of agricultural families might be less than this, due to the fact that population of the small towns was growing faster than the population of the countryside, and also due to the fact that emigration probably continued to be sufficiently concentrated in the productive age groups as to further skew the population distribution in the rural areas away from the national average. These facts suggest that the rate of growth of the active population in agriculture has been about one per cent since 1951.[40] It is not unreasonable that this should be faster than the rate of growth between 1938 and 1951, since that period was plagued by the onset of violencia, while the latter period was blessed with a decrease in this rural disturbance.[41]

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[40]This, parenthetically, is the rate assumed by the Central Bank in its national accounts calculations.

[41]Using the ECLA estimate of the active population in agriculture in 1951, along with the customary assumption (for example, as in the ten year plan) of 1.8 active workers per family, one would deduce that there were about 1.231 million farm families in 1951. (Another customary assumption is about 6 persons per farm family.) If the number of farm families had grown at 1.18 per cent between 1951 and 1959, the number in 1959 would have been 1.351 million families, while a growth rate of 1.38 per cent per year would have implied 1.374 million farm families. The number of separate plots estimated by the Agricultural Census of 1959 was 1,209,672. These two figures (farm families and separate farm units) are probably about consistent with the CIDA figures, since both imply about the same per cent of farm families would be landless. Estimating a conservatively

This seems to imply, according to our calculations, that perhaps 8,000 farm families would have to be moved each year if the goal were to prevent those families living on less than 3 hectares from becoming worse off.

As of the close of 1965, about 33,000 plots (with a total area of 1.3 million hectares) had been adjudicated in the INCORA program. (See Table VII-1) This is an average of about 8,000 per year. The majority of these titles given were on government lands where the family in question was already squatting. So, without underestimating the contributions of clarifying the title situation, we do conclude that a relatively small number of families were actually getting access to new land, relative to the 8,000 estimated as needed. And one would need more detailed information to determine how many of the people helped by INCORA

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wide range of possible agricultural populations and rates of growth thereof, one could assume that the number of farm families in 1964 should lie between 1.271 (if the growth rate from 1951 had been at 0.8 per cent) and 1.462 (if the growth rate from 1951 had been 1.4 per cent). The latter growth rate seems to be definitely toward the upper range of possibilities. The lower population would imply an annual growth of a little over 10,000 families and the upper one of a little over 20,000. If families have been growing at 1 per cent a year since 1951, the growth around 1964 would be 12.7 thousand families per year. It seems, therefore, unlikely that the growth is at more than 15,000 families per year, and 12,000 is perhaps a more precise estimate.

Now if we consider that a growth of farm families is not a particularly serious matter as long as the growth is occurring in areas where farm size is not below a certain level, the number of farm families which would have to be moved in order to prevent a deterioration in the level of living of the poorest families is somewhat smaller than the 12,000 or 15,000 per year just cited. As of 1960, there were about 565,000 farmers on farms of more than 3 hectares and operating their own land. If we use this cutoff line it implies that as many as 800,000 families were not in a very satisfactory condition. (CIDA's estimate of families in unsatisfactory condition was .) This base of 800,000 families, with a growth of 1 per cent per year, would generate 8,000 new unhappy families each year. This estimate would have to be revised upward if farmers with larger plots were being displaced for some reason (e.g., if they rented their plots and these were then mechanized) and if we tried to include people whose farms (originally above the cutoff point) were divided into units of less than 3 hectares (through bequest, for example).

were originally in the bottom income group to which our calculations referred. The nature of the program suggests that the great majority were.

Spontaneous colonization has been by far the biggest form of relocation within agriculture. INCORA estimates 80 to 100 thousand families have been involved. The flow has probably been uneven over time but if as many as 5,000 or 6,000 of the poorer farmers moved this way each year, this along with parcelization projects might together imply no serious increases in man/land ratios in the already densely populated areas. But it is possible that the colonization rate has slowed down with the decrease in violence in the populated areas, and also that some of the migrants are not the badly off farmers anyway.[42] Finally, of course, the objective of agricultural policy is certainly not just to hold average income levels constant, and if land redistribution is a relatively effective way to pull up the incomes of the poorer farmers there is no reason to limit its size in the fashion indicated above.

Given the desirability of some form of redistribution of land, the issue of whose land should be distributed becomes an important one. In Colombia the controversy has focused on the two approaches just referred to, i.e., colonization of new (usually public) lands on the one hand,[43] and redistribution of (usually

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[42]When a prosperous farmer migrates (due to violence, for example) this would help small farmers remaining in the area if his land went to some of them, i.e., in such a case it would not matter so much who migrated. But such an event is hardly likely to be the typical one.

[43]The eastern lowlands of Colombia, like other lowlands in the country have been made at least theoretically habitable by the advance of technology particularly the development of DDT and other insecticides, fungicides and pesticides. In the lowlands closer to the heart of the country, this advance, coupled with penetration roads which gradually made the lowlands accessible and the development of chemical fertilizers were the key features. These developments explain the great growth of cotton production in the late 1950's. The eastern lowlands which theoretically could be colonized have not been made readily accessible, and the use of such inputs as fertilizers is very rare.

Table VII-1

ADJUDICATION OF PLOTS[1]

Departments	1962		1963		1964		1965		Total 1962-65	
	No.	Has.	No.	Has.	No.	Has.	No.	Has.	No.	Has.
Antioquia	39	4525	79	3892	1028	64289	1014	35643	2193	109239
Bolivar	11	1720	14	2996	30	6977	240	5109	397	17639
Boyaca	31	4925	178	5479	786	32716	708	12220	1721	50813
Caldas	11	423	35	816			103	628	149	1869
Cauca			62	1240	425	6927	467	5068	954	13236
Cordoba	32	1662	191	5564	158	6039	317	9617	846	23583
Cundinamarca	33	5054	31	3650	232	10409	107	6374	452	26201
Choco	12	1139	1	50	4	618	631	11031	648	12838
Huila	238	7564	492	11716	545	8688	780	7692	2055	35611
Magdalena	113	25197	242	15024	365	14936	362	17768	1464	73355
Meta	30	6787	238	18746	587	16210	1508	45186	2363	86930
Narino	3	1890	490	5401	936	10543	58	731	1550	21226
Norte de Santander	1	323	15	487	100	1511	171	2880	303	5281
Santander	18	3698	37	3649	238	13599	361	12407	654	33354
Tolima	83	398	634	8534	481	7261	294	5144	1456	20580
Valle	3	100	6	873	56	121	421	6018	480	7218
Intendencias and Comisarias										
Amazonas	7	180			1	26	2	3	10	209
Arauca	2	1	11	3	106	7798	334	8942	453	16743
Caqueta	533	31812	744	39975	807	44376	899	40637	2983	156801
Guajira	143	16100	128	12520	135	14764	649	29515	1055	72911
Putumayo	362	8313	230	2200	532	8371	229	5200	1353	24084
Titles Distributed by Governments	2697	89461	2714	180975	2546	150573	1451	70098	9408	495108
Totals	4402	211272	6572	323790	10098	426762	10606	337911	32947	1304829

[1]The figures include adjudications on land acquired by INCORA through voluntary negotiations, expropriations, extinction of private domain (through failure to use the land, usually), voluntary cession and on public lands.

Source: Instituto Colombiano de la Reforma Agraria (INCORA), Informe de Actividades en 1964 and Informe de Actividades en 1965.

private) lands located in the already settled parts of the country on the other. Factors which must be weighed in making such a choice are

1) public and private investment of real resources in alternative approaches.

2) total public spending (including transfers arising out of the purchase of land). Since the budget is usually very tightly constrained this may be important. Similarly the rate of payoff by new farmers (if such payoff is required) is important.

3) the positive and/or negative "scare effects" on farmers who do not lose their land in appropriation schemes. Some forms of investment may be discouraged if expropriation is fairly likely, depending in part on the way the agrarian reform law is set up. It is also possible that investment, improvements, and greater intensity of cultivation will be stimulated by a well devised law which makes expropriation more likely the more poorly the land is utilized. The Colombian law tries to do this. Both positive and negative effects appear to have been present in Colombia --the net effect is not clear (at least to the author).

   All of these elements involve the effects of the reform on output and the income of larger scale farmers.

The basic measure of success in moving toward the combined goals of higher output and better income distribution would be the ratio of real resources used up in achieving given degrees of improvements in those variables. It is important not to forget the implications on output of the side effects referred to in (3) above. It is quite possible that the relative ease of achieving the output goal as opposed to the income redistribution goal varies considerably with the different approaches.

Spontaneous colonization has been occurring for many years, much of it spurred by the violence of the 1940's and 1950's. Directed colonization dates from the late 1950's.

By late 1961 the Caja Agraria had resettled 2,000 families in its five colonization projects, and there were perhaps somewhat more than that number of spontaneous settlers related to these same projects. Since INCORA took over land programs in general, directed colonization has been abandoned although the government continues to help the growing number of spontaneous colonos. In the

country as a whole, INCORA has estimated that there are 80,000 to 100,000 families carrying out works of spontaneous colonization, many of them without ties to any form of government projects.[44]

Parcelization began only in 1962, after the passage of the Agrarian Reform Law and the creation of INCORA. As of the end of 1965, as noted earlier, about 33,000 plots had been adjudicated.

The weight of informed opinion in Colombia (including the National Agrarian committee, the Ad Hoc committee of the OAS set up to study Colombia's general development program, and other individual observers) has for the most part concluded that parcelization in the central part of the country is superior to the colonization of the Eastern llanos, (the emptiest region of the country at the moment).[45]

But little data is available to allow a valid comparison of average cost per family settled by parcelization as opposed to colonization or of the relative benefits. Duff[46] cites an estimate of 60,000 pesos per family as an average cost for settling in INCORA's first two parcelization efforts, (which were "show" projects so perhaps too much money was being invested in social assistance and

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[44]Holt, op. cit., p. 82.

[45]Ernest A. Duff, "Agurian Reform in Colombia: Colonization or Parcelization," Inter-American Economic Affairs, Winter, 1964. Duff gives specific examples of some of the problems encountered in colonization on the eastern Llanos. The group cited grew almost no crops (at least one of them didn't) since they had neither seeds, fertilizers, nor implements with which to plant and cultivate. "Roads" through the area were impassable during the rainy season, even by jeep. Communism was developing. By contrast, large cattle farms operating in the Cucuta region were well run and productive enterprises, since they had sufficient capital, and could overcome the lack of roads by constructing landing strips and flying the cattle to Bogota or Cali. This suggests that it may be better to open up new areas in large chunks and in the hands of people with lots of capital.

[46]Duff, op. cit.

ancilary services).[47] Estimates for colonization ventures are harder to find, but a proposed export import bank loan to be used for a land settlement venture implied an expenditure of between 80,000 and 100,000 pesos per family settled, with very likely the same low chance of success as the other colonization programs.[48,49]

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[47]Holt cites a figure of 50,000 pesos as being "typical" of INCORA's early experience. But this figure, like that of Duff, presumably includes the transfer payment involved in purchasing the land. This is not a real resource cost. Such transfers are probably small or zero in the colonization projects.

[48]El Tiempo, May 26, 1960.

[49]Pat M. Holt (Colombia Today and Tomorrow, Frederick Praeger, New York, 1964), writing in about 1963, presents a much more favorable picture of one of the Caja's colonization projects than is typical. He refers to the first project of the Caja Agraria, which began in 1959 and was located on the bank of the Ariari River in Meta; it included 195,000 acres of public land. Despite a number of factors working against its success, most of the farmers were at least getting by and some (especially the spontaneous settlers who had preceded the directed colonists into the area) were thriving, while the cost of the project did not appear at all high. This was the more true since, according to Holt, the left bank of the Ariari River was enjoying a brisk economic development sparked by the Caja's activities on the right bank. This suggests the need for great care in doing benefit cost calculations for particular projects.

The area was originally all in jungle with an annual rainfall of 120 to 160 inches. (See Holt, op. cit., p. 76.) The migrants brought with them little wealth and sometimes little experience either. People with a net worth of less than 30,000 pesos (then not quite $3,500) and without any lands capable of being farmed as an economic family unit were chosen. Preference was given to those who had lost lands in the civil violence. The settlers had to be married or have dependents and they were supposed to have had practical agricultural experience or knowledge, or special aptitudes, but the selection process was in fact not very rigid. Even barbers and carpenters would turn up as settlers and usually failed. Still, at the end of the first two years only about one in ten was said to have left, though Caja officials thought possibly as many as three in ten might have. By 1961, according to Holt, the settlers in the Ariari project were characterized by quiet and determined confidence. At that time this was the highest failure rate of the Caja's colonization projects according to Holt, but Tinnermeier, writing a year or so later about what he considered to be one of the best of the direct projects, observed that about one-half of the parcels had been abandoned at least once, and most desertions had occurred by 1960. These two positions seem contradictory.

In the first two years the Caja extended about 1.8 million pesos in credit to 471 families (averaging almost 10 persons per family) and invested about 3 million pesos in the infrastructure of the project. This implies an average

Ronald L. Tinnermeier has carried out what is probably the most intensive study of problems of colonization in the eastern Llanos.[50] Tinnermeier chose Caqueta as the region for his analysis; it is one of the more advanced of the five directed projects of colonization in Colombia, all of which were established by the Agrarian Credit Bank in the late 1950's and early 1960's. Also in Caqueta a substantial amount of spontaneous colonization is occurring, thus offering a good basis for comparison between the two forms.

Tinnermeier concludes in general that the spontaneous settlements have been the more successful ones in Caqueta (defined in terms of the amount of livestock they had and amount of wealth in general, the amount of produce sold in the market, and their degree of satisfaction in Caqueta).[51] Tinnermeier concludes that this was basically due to the fact that their previous experience in agriculture had been greater.[52] In Caqueta they had less access

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public investment per family of about 10,000 pesos assuming zero opportunity cost for the land. And something less than 5,000 pesos of this, in the form of credit would eventually be repaid. If these figures correspond even distantly to reality the project was a low cost one. Admittedly it was closer to the "settled world" than later projects could be if the total size of the colonization programs were greatly expanded.

[50]Ronald Tinnermeier, New Land Settlement in the Eastern Lowlands of Colombia, Research Paper No. 13, Land Tenure Center, University of Wisconsin, December 1964.

[51]A majority of the directed colonists were living in homes inferior to their previous conditions (47 per cent against 30 per cent who were better off, with the rest equal) while more of the spontaneous settlers had improved (41 per cent) than had got worse (30 per cent). (The absolute level of living conditions was, of course, low. Average number of persons per room was 3.7, and only 2 per cent of the homes had covered outdoor latrines--there were no toilets.) Comparable results were found for changes in earnings with the directed settlers being worse off (65 per cent worse versus 22 per cent better) and the spontaneous settlers better off (25 per cent worse, 45 per cent better). Each group spent about the same amount of money for food and clothing; the spontaneous settlers had apparently had lower average income levels than the directed ones before migration.

[52]Forty-two per cent of the directed colonists had not owned or rented land during the ten years before they arrived in Caqueta; the corresponding figure for the spontaneous settlers was 23 per cent.

to credit and extension services. But the governmental assistance program for the directed colonists has not been effective. Land was not the real limiting factor of production[53] as almost all the settlers had enough but their living standards remained low. The problem was one of the technologies used--the methods which predominate contribute strongly to the low labor productivity; not even advanced hand methods such as scythes are used. Many settlers own horses or mules but they are never used in the field; the author feels that this would allow more effective land use and increase incomes. (He apparently did not investigate the reason for failure to use these animals.)

Tinnermeier feels that more credit is likely to be ineffective unless means can be found to provide more technical assistance.[54] He concludes that few benefits have been derived from the assistance given to the colonists in Caqueta. INCORA has now taken the position of working with all of the settlers in the region and has made no new plans for opening up other directed colonization projects.[55] He does feel that the credit program can be useful for assisting farmers in developing cattle programs since substantial experience has been gained in the region by large cattle raising operations. But when it is granted for new

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[53]Size holdings varied a lot for the spontaneous settlers (average 75 hectares and standard deviation 60.6); the average for directed colonists was 60.4 hectares (standard deviation 16.6).

[54]This conclusion seems perhaps to warrant some more research. Many analysts in the past have underestimated the peasant's willingness to switch to technologies which can be shown to be superior in the appropriate senses, and it has been subsequently determined that a credit shortage was present or that the technology was not really superior. In the present case part of the problem could be the relative lack of experience of the directed colonists. Tinnermeier does not comment on the extent to which difficulties in obtaining tools may underlie the problems.

[55]Tinnermeier, op. cit., p. 51.

crops or for increasing crop production, its chances of success are small.[56]

The relative failure of the directed colonization projects attempted to date does not mean that no such efforts could succeed, especially when allowance is made for the lack of seriousness with which the Caja Agraria is often alleged to have approached this particular task, and, for the apparently considerable success of some of the spontaneous colonization settlements. Some further details on the programs may therefore be relevant. One of the problems seems clearly to have been that the directed colonists had been "pushed" into Caqueta (often by the violencia).[57] Although few of those in the area at the time of the interviews wanted to leave, many who came before them had done so.[58] The combination of lack of agricultural background and unfortunate frame of mind certainly augured against the success of this group. The government's failures to live up to its promises compounded the attitudinal problem.[59]

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[56]Tinnermeier does not rule out the possibility that the lowlands might be an effective place to settle sometime in the future when the input ratios in agriculture have shifted more towards capital. But that time has not yet arrived.

[57]It was a basic premise of the government's policy that those most in need of land were those displaced by the violence. Both groups of settlers were found to have moved about substantially before they finally reached Caqueta. Fifty-six per cent of the directed colonists had previously migrated between other departments, as had 37 per cent of the spontaneous settlers before they came to Caqueta.

[58]Seventy-six per cent of the heads of households indicated that they were more satisfied in Caqueta than in the area where they lived previously. Ninety-five per cent of the directed colonists wanted to stay in Caqueta while 82 per cent of the spontaneous settlers did. But 50 per cent of the parcels in the direct colonization projects had been abandoned since the beginning of the project in the late 1950's. Thus about one-half of the 500 parcels have turned over. Twenty per cent of the abandoning colonists gave sickness as the reason, and most of those who left did so in 1960 shortly after the establishment of the project.

[59]Neither group has much respect for the government or for other people. Any government program, such as extension or credit would have to overcome these negative attitudes. Tinnermeier notes that the farmers feel any stranger has a

Tinnermeier's overall results suggest that a program of aiding people who take most of the initiative to migrate into their own hands might be more successful.[60] Further the government's restrictions on the rights of the directed colonists may have been counterproductive, by decreasing the farmer's security.

In the directed colonies the government requirements of the colonist include one saying that he may not sell, rent or transfer his rights to a third party without the permission of INCORA until he has fee simple title. These policies are designed to protect the government's investment but do lead to some insecurity in tenure on the part of the colonist. The net effect of this is not clear. "Originally the colonists were required to pay for the land through extended credit. This resulted in a heavy financial burden and there is evidence that many left because they felt that they could not pay off the debt. Payment for land has now been dropped or at least has not been in force."[61]

While the directed colonists have some degree of ownership, it is a limited extent. But the spontaneous settlers often have no legal title or other legal

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hidden reason for asking questions or getting a rapport and that this will be used against them later. There was a high degree of despair on the part of both groups. Their negative attitude toward the government, with which they started, has been reinforced as that institution has failed to live up to its promise. Many farmers were rather miffed for example by the fact that after they had established pastures for cattle production, as required by the Caja Agraria, the Caja's promise of assisting with the purchase of cattle was not carried out. Some well established artificial pastures were reverted back to brush because the colonists saw little prospect of obtaining cattle.

[60]In most other respects besides extent of background in agriculture and desire to migrate the spontaneous settlers were at a disadvantage. Educational level was 2.2 years for directed colonists and 1.1 for spontaneous settlers. But education tended not to be related with such other variables as land area cultivation, adoption of new techniques, level of living, etc., perhaps because everyone's level was so low.

[61]Tinnermeier, op. cit., p. 25.

guarantee at all, and this situation discourages development of the land and can lead to violence or extreme conflict. Further, a farmer cannot obtain credit from the Caja Agraria or the commercial banks unless he has a registered title.[62]

A description of the characteristics of the llanos economy bears out the extent to which social infrastructure would have to be added to allow full exploitation of its resources. Distance from the nearest road was a severe problem for almost all of the settlers interviewed.[63] Lack of attractive financial institutions make land and livestock the only available forms of savings for the settlers.[64] These are sold when any financial crisis arises.

Along almost every line, government services were deficient in quantity or quality. No extension service was originally available to the spontaneous

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[62]Twenty-two per cent did have a registered fee simple title, and 43 per cent had a bill of sale but not a registered title. Thirty-five per cent had neither. The bill of sale does record the purchase and is respected by the farmers of the region.

In the areas of spontaneous settlement various middlemen have developed to provide the services of measurement and titling of land. Three such lawyers were found in Florencia. Some people have argued that the campesinos are not particularly interested in getting title to land, but this study indicated that they were, but were unfamiliar with the procedures, and that it was very expensive for them (the cost ranging from one to two dollars per hectare). In cases of title conflict, there are a variety of ways in which a campesino with a legitimate claim can be (and often is) done in by the more powerful and by unscrupulous lawyers.

[63]"On the average directed colonists took nearly two hours to reach the nearest road and another hour to reach the market place. The spontaneous settlers interviewed were an hour away from the road on the average and another one-half hour away from the local market." (Tinnermeier, p. 19.) Tinnermeier notes that these distances are somewhat biased in that many spontaneous settlers lived farther from the road than the ones he questioned. Average time to school for the directed projects was three-fourths of an hour, although some are two or three hours away. The spontaneous settlers live an average of one hour with some as far as four and six. All the schools offer only the first few grades.

[64]It should, however, be noted that this is characteristic of much of the Colombian rural economy, not just of the llanos.

settlers though INCORA has now extended its operation to most of Caqueta. Still, although seventy-three per cent of the directed colonists had had an average of one visit per year by an extension agent, ninety per cent said they would like more technical assistance. Those extension agents in the area have limited training and their views are not respected by the settlers. There was somewhat more adoption of new practices in the directed colonies, but most of these had to do with health conditions rather than agricultural production. Few settlers used improved seed, fertilizer, or weed killers, suggesting that they are getting (or at least accepting) little technical information from the county agents or from other sources. The greater the wealth of a family the more likely it was that they had a source of agricultural information.[65] The typical settler feels that belief in God is the most influential factor on his farm operation and that having previous experience, large family, a good location, or high ambitions are less important. Tinnermeier feels that his study is consistent with the description of the Colombian farmer as fatalistic. The difficulties of ever staffing the llanos with an effective extension service, given the shortages of the same personnel elsewhere in the country, are not difficult to envision.

A substantial proportion of both types of settlers had received credit during the last two years, the main source was the Caja Agraria.[66] The main criticism of present credit services was the short term. And, previously, loans had been promised and not made, as noted earlier. Even with long term loans from the Caja, the farmer must begin repaying within a year. The Caja normal interest

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[65]Tinnermeier, op. cit., p. 46.

[66]Seventy-two per cent of the directed colonists and 63 per cent of the spontaneous settlers. Fifteen per cent of the directed colonists did not request credit and this was true of 27 per cent of the spontaneous settlers. The spontaneous settlers relied more on non-official sources with friends being the most important outside source to whom 20 per cent turned.

rates are 8 to 12 per cent, but as discounting is used the actual rate is higher and when other costs are taken into account it may be much higher.

The form of agriculture in the region studied is not a stable one (although in other parts of the llanos it is probably more stable). Land is usually cleared, planted in rice, planted in some other crop for a couple of years and then placed into pasture. Yields drop very quickly and new lands are cleared. Little thought has been placed on the question of what happens when no more virgin forest land is there to use. Rice is the major marketed product; about 65 to 70 per cent of the farmers received proceeds from this in the last year. INA paid 20 or 25 per cent higher than the price in the open market, but few farmers sold directly to it since it takes about a month to receive the money. Lack of credit for purchases and lack of information on breeding have kept the animal, and in particular the cattle population below what would seem to be a desirable and feasible level.

It is difficult to guess at a rate of return on public and private investment if an "optimal" colonization program could be devised. It might not be much higher than that in the current projects, since it may simply be true that the provision of credit and extension services and social infrastructure will be simply too expensive in many parts of the llanos for some time to come. But a more detailed analysis would be required to prove or disprove this.

Alternatives to Colonization of Public Lands

The evidence on the payoff to colonization projects is far from promising, and suggests that agrarian reform may have to concentrate on the interior of the country and on lands now privately owned.

In dealing with private lands, alternative approaches would be expropriation

and distribution of land, commercial purchase and distribution, etc.. Adams and Montero[67] note that in many countries the leaders of agrarian reform have felt that the division of commercially purchased lands could not be justified, and have as a result turned their attention to colonization projects, irrigation works, and special credit programs, etc., as methods of effecting an agrarian reform. They present data on the results of parcelization of one farm in the municipio of Cabrera (Santander) to suggest that these reservations are not necessarily justified. Other land in the same region offers even better possibilities according to the author, and could easily be purchased as evidenced by the fact that the owner of that land has traded very much in land in his own life. Results are likely to be best, in the sort of parcelization project referred to, when preference is given to areas where large numbers of share croppers have already developed some managerial skills. Careful selection of the tenants also improves considerably the possibility of success. In general, comparisons to alternative forms of "agrarian reform" make this sort of project look very favorable.[68] Though they tend to favor expropriation as a better long-run solution, they note the many political and other difficulties of effecting such a program quickly, and suggest that commercial purchase and distribution of land can still have a very high payoff.[69]

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[67]Dale W. Adams and L. Eduardo Montero, Land Parcelization in Agrarian Reform: A Colombian Example, Mimeograph No. 4, Centro Interamericano de Reforma Agraria.

[68]The authors point to the Saldaña irrigation project begun in 1948, which had only a little over half the potential land under irrigation by 1964. Still, as we saw earlier, Bethke argued that the overall benefit-cost ratio was high. But the financial arrangements were apparently bad, with repayments by land owners not as great as maintainence costs. Adams and Montero note that this financial problem is not unique to the Saldaña project; a similar situation exists in Venezuela on a 250,000 acre irrigation project.

[69]The project in question was a farm in the tobacco producing region, where the typical pattern was for many small-scale sharecroppers to operate on one

Changing Attitudes and Incentives

While availability of factors and techniques go a long way in determining a farmer's level of productivity, his own attitudes and goals are far from unimportant. Many examples of increases in agricultural output occurring in response to the new availability of desirable consumer goods have been cited in the literature. By a minor extension of the argument, one would expect a farmer who saw the advantages and possibility of educating his child to be willing to sacrifice toward that end. The social productivity of a rural school therefore may be partly in that it increases private savings. Wisely placed credit may have a similar effect in generating "matching" private funds.

The Colombian farmer is often characterized as fatalistic. While this aspect of his character may be overstated, its existence is hard to deny. And effecting a change toward a more questioning, problem solving attitude would have very positive implications for productivity. But this is a slow matter, and one in which others should be more competent than economists.

Rural-Urban Migration (And Related Issues Dealing with Rural-Rural Migration)

If labor can be more productive outside agriculture, policy should help to

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owner's land. The farm studied was made up of 1500 acres and was divided into 98 parcels. Before the parcelization the land pastured 400 cattle and 10 families lived on it as sharecroppers producing tobacco. The annual net cash income was about 16,000 dollars, but after a carefully selected group of 98 families was placed on the land (by the Tobacco Growers Institute) the total net cash income was about 130,000 dollars. Adding to this the increase in home-produced consumed goods suggests to the author the rate of return of about 20 per cent on the 573,000 dollar cost of the project. (It is hard to imagine that 573,000 dollars of real expenditures went into the project, so this must include the purchase of the land. If this is indeed the case, the real productivity of the investment is much greater. The authors do assume that the marginal cost of labor is zero, a very realistic assumption in such a region.) After four years the parceleros have been able to pay almost one-half of their total debts to Intabaco. Hence the payoff period is going to be around 8 years, a very creditable performance.

stimulate its movement in that direction. But, as might be expected, there is no agreement as to whether productivity is higher in other sectors of the economy.

In a competitive and flexible economy, and assuming it were possible to allow for cost of living differentials between rural and urban areas, a simple comparison of wage rates would indicate in which sector the marginal productivity of labor was higher. Most people who make such a comparison do so between blue collar manufacturing wages and agricultural wages concluding that the former are higher by more than enough to make up for whatever cost of living differences exist. But such a comparison is not very meaningful. The really marginal workers in the city are usually in service industries or outright unemployed. And the economic meaning of this unemployment is little understood. Further, it is held with respect to some agricultural sectors that there is a surplus of labor and the wage rate is not an accurate indicator of marginal productivity.

In a competitive economy, again, the flow of people would itself indicate where productivity was higher. And, if some risk-averseness or immobility in general were present, one could deduce that the actual flow was slower than optimal. But there is the possibility that some people overestimate the gains to be reaped in the city and take an irreversible step. Empirical evidence does not give this much support, however, and it is probably safe to conclude that productivity is, in some sense, higher in the city. But only if it can be shown that the current flow is not optimal should policy be directed towards changing it.

Comparisons are often made between the investment required to "make a job" for a man in the urban economy, and the amount required in the agricultural sector. Often these are so crude as to not even specify that the productivity of the two jobs be the same (giving the man the same real income in either case).

In other cases the comparisons are inappropriate for other reasons.[70] But in any case the issue is a different one in a sense. It deals with the optimal allocation of current investment. It might pay to put most current investment in agriculture but still try to stimulate the rural-urban migratory flows, since much labor would have to flow to the city before marginal productivity would be equalled in the two sectors, even with the added investment in Agriculture.

The inability to reach any conclusions on the basis of the very general type of analysis described so far suggests the need to look more carefully at the detailed causes of migration, where the migrants come from, what jobs they obtain after reaching the city, etc..

Further, even if the social welfare implications of rural-urban migration cannot be deciphered, rural to rural migration (e.g., the spontaneous colonization

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[70] See, for example, Holt's comments on the relative merits of the Currie plan to push industrialization and urbanization (Operacion Colombia) as opposed to INCORA's plans for further resettlement in rural areas. Holt notes that the Colombian government economists estimate that an investment of 35,000 pesos in fixed capital is required for each new job in industry, and that INCORA's early experience is that an investment of about 50,000 pesos is required per family in its parcelization projects. (Holt, op. cit., p. 98.) Holt argues that this does not necessarily support Currie's argument, since the 35,000 pesos cost per new industrial job includes only the industrial investment and excludes the social overhead. And when one deals with non-cultivated and idle lands, the costs (excluding the labor of the settler) are very much lower.

At least three probable errors are involved here. First, the average income of a worker in industry is above that of the farmers in INCORA projects. Secondly, the appropriate investment figure per man in the city should refer to all types of jobs, not just those in industry, which are the most capital intensive. (Social infrastructure costs should, as Holt notes, be included.) Finally, the use of currently idle lands in future land parcelization should not lower the cost of providing a new agricultural job at a certain income level, unless INCORA did not choose the best projects first, i.e., unless INCORA made a mistake. (One must admit, on the other hand, that costs may go down in future as experience is accumulated, etc..

referred to in previous sections) can certainly be beneficial, so its determinants are of interest.

Of primary interest is the relative incomes of migrants before and after the move. Earlier in the present chapter the changes characterizing some rural to rural migrants were referred to; these were usually positive, especially in the case of spontaneous migrants.

Effects of Migration Out of Agriculture on the Welfare of the Migrants

There remains much to be learned about the process and welfare implications of migrations out of agriculture. Unfortunately very little research has focussed directly on this group of people. A number of studies in poor squatter settlements of major Latin American cities throws some light, at least tangentially, on the issue but it is tangential since most of the people moving into such squatter settlements have not come directly from agriculture or even from agriculture at all. Still, such studies provide a general test of the extent to which immigrants feel their decision to move was correct, sometimes the studies show time profiles of incomes. Hopefully some of the results hold also for the people leaving agriculture.

Naturally, conditions and attitudes of migrants vary from study to study.[71]

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[71]This would be expected to be more true the greater the extent to which migration was independent of economic and other conditions in the city, e.g., the more it depended directly or indirectly on push factors out of agriculture or small towns. This issue is still hotly debated. Examples of proponents of "push" factors would be Germani, Wolfe and Bazzanella.

Germani (Gino Germani, "Emigracion del campo a la Ciudad y Sus Causas" in Horacio Giberti et al. Sociedad, Economia y Reforma Agraria (Buenos Aires, 1965.) minimizes the forces of urban attraction but finds no necessary correlation between degree of rural poverty and tendency to migrate either. Wolfe (Marshall Wolfe, "Some Implications of Recent Changes in Urban and Rural Settlement Patterns in Latin America," paper for U.N. World Population Conference, 1965 (A.8/I/E66) feels that push factors are important, including the uprooting of resident workers on

As we shall see later, results from Colombia do not follow all of the "usual" ones. But some conclusions have been so general as to warrant summary. They would be the natural hypotheses to test in any new case being analysed.

Immigrants (and dwellers in squatter settlements in general--some of them come from other types of urban slums[72]) are usually more satisfied with their situation than they were in the place from which they came. Mangin, in his useful summary of studies done to date on squatter settlements in Latin America notes that at least one source from every country surveyed stated that the squatters

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large estates by the mechanization of agriculture and land owners fears of future land tenure claims. These people typically moved to roadside clusters or shacks or to periferies of smaller towns. "Nuclei of small owner cultivators are being squeezed by the population increase, land exhaustion, and declining demand for seasonal labor on large estates." They may move into petty commerce, organize invasions of large estates, migrate to tropical pioneer zones, become temporary wage laborers, or migrate permanently to towns and cities. "Despite population pressures, rural settlement patterns are moving toward dispersal and impermanence. Roadside "line settlements" are increasing in number....Hence the difficulties of extending public services, school systems and housing programs to the country ....Small towns in Latin America have always been less than effective as administrative, marketing and service centers."

Bazzanella concludes that industrialization is an efficient but not a sufficient cause of urbanization. Dividing Brazil into three zones which he called "retarded," "intermediate," and "advanced" with respect to socio-economic development, he finds that the urban population growth is almost the same in 1940-1950 for each of these (around 50 per cent) but the percentage of the ten year population increment absorbed by industry differs sharply (from 5.6 per cent in the retarded area, 12.4 in the intermediate to 19.5 in the advanced). (See the reference to Bazzanella's work in Richard M. Morse, "Recent Research on Latin American Urbanization: A Selective Survey with Commentary," Latin American Research Review, Vol. 1, No. 1, Fall 1965, p. 35.)

The extent to which people move to the city without having a job there might be related to the extent of push factors. Germani found for immigrants to Buenos Aires that the migration decision was usually not preceded by lengthy discussions. It seems that 60 per cent had given some consideration to the way in which they would find a place to live, but relatively fewer had any ideas about how to find work - they were simply generally optimistic. Most of them received subsistence from relations or their friends in one form or another, with housing the most often mentioned. Assistance was received by a relatively smaller number of the recent migrants than of the earlier migrants.

[72]Most new migrants into Colombian cities seem to go to squatter settlements, so the literature on these is more relevant than if, as is apparently the case in some countries, some go first into central city slums.

were more satisfied with their present housing and economic situation than with what they had had in the rural areas, small towns, and in the central city.[73] And although a very wide range of attitudes to life, the future, etc., is found in the settlements and in the world at large, this feeling of improvement seems clearly to be the norm. A fairly typical reaction would be that met in Germani's study,[74] "...migrants state that work in the provinces was much more difficult to obtain, less well paid, less steady, and more difficult; they also state that they had fewer trade union rights, workerd harder and longer hours and had less opportunity for advancement (the last factor being cited particularly by the early migrants).[75]

Typically, a small percentage of the migrants feel that, overall, they made a bad decision in moving. Germani, for example found that about one-fifth or fewer say they have sometimes regretted their decision to migrate, but two-thirds are satisfied with the decision.

It must be borne in mind that statements of migrants as to whether they would like to return to their previous locations may be misleading in that they depend very much on expectations, which may or may not be accurate.

No studies of which I am aware have tried to compare monetary incomes of migrants before and after moving. Such a comparison would involve so many difficulties (different prices, different services available) that it might not be

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[73]William Mangin, "Latin American Squatter's Settlement: A Problem and a Solution," Latin American Research Review, Vol. 2, No. 3, Summer 1967.

[74]Gino Germani, "Inquiry into the Social Effects of Urbanization in a Working Class Sector of Greater Buenos Aires," in Urbanization in Latin America, edited by Philip M. Hauser, pp. 206-233.

[75]Germani, op. cit., p. 222.

worth while at the present time.

In general recent immigrants to these settlements have lower incomes than earlier immigrants, whose incomes in turn are lower than those of city-born people living in the same settlements. This suggests that income rises over time for the typical incoming family,[76] presumably at least partly due to increased skill, acculturation, etc.. Germani found that average family income of the recent migrant groups was lower than that of the earlier migrants and the city born families. This was partly because the individual worker made less and partly because the dependency ratio was higher for the recent immigrants. Among one-third of the most recently arrived migrant families the financial contribution by the husband or other adult responsible for the support of the family unit gave rise to serious difficulties and in some cases was nil.[77]

Germani also found that the number of persons employed in industry increased with the length of residence, and the number in commercial, transport and service occupations decreased. Shipbuilding and meat packing were the big employers, followed by metallurgical, printing and electrical. This is consistent with (though it does not prove) the argument that increased incomes with longer residence in the city are due to increased skill levels.

Also "the city born residents of the children of foreign born immigrants (principally Italian) who at the beginning of the century took part in the first

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[76]This would not follow if the equilibrium wage of new migrants in the typical city had a downward trend. This could be true in some cities but it is unlikely to hold generally.

[77]This was related to the degree of family disintegration and so may not necessarily have indicated no income for the man in question. Germani notes also that the family atmosphere was in general better for the people of longer standing residence with a greater degree of friendliness and lack of constraint as well as democratic behaviour.

industrial activity in the area."[78] They have a higher level of skills. Most of the recent migrants are peones (day laborers) with no special skills; perhaps a quarter of them have some qualification, and the level varies.

Although there was little unemployment among any group at the time of the survey, "less than 50 per cent of the recent migrants had worked throughout the year; a third of them were able to work only six months or less. This was true of only 18 per cent of the earlier migrants. It is clear that a large proportion of the recent migrants included in the survey cannot in any sense be regarded as fully employed. The level of earnings reflects the employment situations..."[79]

Germani also found that between 14 and 19 the proportion of adolescents, especially boys, in regular work is much higher in the city born group, than among the more recent migrants. Among women work outside the home was much less, and in the city born group almost non-existent. The young people of the city born residents are usually trainees or apprentices while all those of the recent migrants are day laborers or apprentices. Among the women of the recent migrant groups almost all are employed in domestic service.

Out and out unemployment, while not negligible is usually low. (Though the fluctuations in employment may be severe; many squatters work in construction, a sector very subject to cycles.) One might argue that this is almost a necessary result since a family in the precarious economic status of the squatter dweller simply cannot survive long out of work. But the continued growth of the settlements does show that there is something for the immigrants to do. Mar found that in the Lima settlements studied a high proportion of the male workers were artisans

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[78]Germani, op. cit., p. 221.

[79]Germani, op. cit., p. 222.

or laborers, and a relatively small per cent were street peddlers and other people in commerce. Seventy-one per cent of the economically active population has stable employment and 27 per cent casual employment.

Mangin observes that many people work full and part time within the settlements, especially construction workers who get a lot of part time work. Often owner occupiers do the unskilled work in their houses and get construction men to do the more difficult parts. The squatter settlements become great hives of activity of all sorts.

Some have noted that the instability of the construction industry or of the economy at large creates problems since workers are pulled into the city when the demand for labor is high, and tend to stay when it falls off. (See, for example, Hauser, op. cit., Chapter IV, "Creation of Employment Opportunities in Relation to Labor Supply," by the ECLA Secretariat.) If, even in the latter circumstances, they would have preferred the city, there is no "social inefficiency." But if after arriving in the city they are unable to return to their previous position, a real inefficiency may be present.

Even though many of the migrants come from urban and suburban areas, the index of literacy of the children is higher than that of the parents.

Housing conditions are poor and often worse than in the area from which the migrants came. But they usually improve over time. Mangin[80] notes that land titles play a major role in housing investment. The implication of some of his statements is that by making these titles more secure it would be possible to induce much more investment from these people. He also notes that the older the settlement, the higher the percentage of renters. This is presumably because in

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[80] Mangin, op. cit..

a young settlement almost everyone had to build their own house.

Mar[81] notes that in Lima "the original construction is usually thatch, and the quality of the buildings gradually improves over time."

Germani found that in Buenos Aires the majority of the migrants had their expectations satisfied in terms of search for employment and better working conditions. (The majority found work within a fortnight of their arrival, others a little later, but almost all did find work.) But the majority view on housing conditions is just as definitely that they are worse than in the place of origin. The conditions prevailing in the interior are very bad but the migrants consider those of Buenos Aires to be even worse.

Mangin notes that the birth rate is higher than the national average in all the squatter settlements in which the matter was studied. But evidence does not give enough information to know whether this would be true on an age specific basis.

The extent of social disorganization and unhappiness found in the squatter settlements, while high, is often lower than believed. Mangin notes that petty thievery is common and low level tax evasion a pasttime with wife and child beating frequent and drunkenness common. But organized crime was practically nonexistent. There is no indication to date that crimes occur with more frequency within squatter settlements than outside. The traffic in most squatter settlements doesn't warrant serious prostitution efforts and gambling is also on a low level because of the lack of money. The extent of family breakup seems to be a matter of dispute among the different studies.

Mar found in his Lima study that there is a constant atmosphere of anxiety

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[81]Jose Mar, "The Barriadas of Lima: An Example of Integration into Urban Life," in Urbanization in Latin America, edited by Philip M. Hauser, International Documents Service, Columbia University Press, New York, 1961.

through fear of being dispossessed which makes the people subject to pressure from politicians, etc.. The Residents' Associations are unable to overcome this insecurity, partly through lack of unity due to the diverse origins of the people living in the settlements, and partly because their own bad management in financial matters further discredits them. The family remains the sole effective compensating unit.

Despite such problems, Mar felt that integration into urban life might be said to be taking place gradually. Unemployment was not acute and the great majority were succeeding in adapting themselves to urban life. The struggles they faced helped to bind the family together. A variety of institutions such as parishes and religious groups in the city's social services helped the process of adaptation. Major misfortunes could be alleviated through assistance obtained through the newspapers or through the Residents' Associations. Most of these avenues would not have been available in the home village.

Germani's investigations revealed that the immigrants considered other disadvantages of Buenos Aires, apart from housing, to be the "climate," the "people," and less frequently the decreased "family life." The recent migrants, in particular, tended to consider family life is better in the provinces.

Often the aspiration levels of the immigrants are relatively low (a steady income, a house of their own and their children in school) but they have very high aspirations for their children. Some of these are not likely to be satisfied, and this may give these settlements more political relevance. And it is possible that some migrant families will ultimately be frustrated if their children fall short of the sights set for them. In this sense, one may not be able to say for many years whether their move was a wise one or not. If they have been deceived, it does not become quickly apparent.

An interesting characteristic of most squatter settlements, though not directly relevant for our purposes here, is their lack of political radicalism, showing itself either in apathy or conservatism. Turner notes that the assumption that squatters are political radicals is almost universal but the opposite is actually true. But the political fear of the groups does exist in the city and results in inexcusable action and harsh reaction by the people in power.[82]

Studies of Immigrants to Cities in Colombia

Several studies in Colombia have analysed various aspects of the changes which accompany migration into large cities and others have produced data which can be used for that purpose. Like studies elsewhere, they have universally found that the major stated reasons for migration were of an economic nature, usually desire for better employment opportunities.[83] Some of the other conclusions are worth pursuing in detail.

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[82]Mangin, op. cit., p. 83.

[83]In the particular case of Colombia, rural violence might reasonably have been hypothesized as an important push factor. But it has not been indicated to be a major cause of rural to urban migration. Flinn notes that barrio studies completed in Bogota indicate that between 1 and 12 per cent moved for this reason. (William L. Flinn, "Rural to Urban Migration: A Colombian Case," Research Paper No. 19, Land Tenure Center, University of Wisconsin, July 1966.) Flinn's own study in the barrio of El Carmen, a shanty town on the west edge of Bogota, came up with a figure of 13 per cent.

German Guzman, in the famous study La Violencia en Colombia, estimated that by 1961 emigrants to Venezuela numbered 150,000 and that a total of approximately 800,000 persons had changed residences inside Colombia because of the violence. These figures are not necessarily inconsistent with the relatively small role the violence has played in migration into large cities like Bogota, according to most of the surveys taken in these cities. It is clear that many farmers were simply pushed from one rural area to another, but being farmers, they did not attempt town or city life. Others were pushed into villages or small towns when it became unsafe to live in the country, though perhaps still safe to work there. Since many of the migrants to large cities do not come from rural areas but from villages, towns, and smaller cities, the violence would have less effect on this

Reyes[84] uses the statistics from the unemployment surveys conducted by Urrutia and Castellaños[85] to obtain relative income figures for migrants and non-migrants in Bogota. These indicate that the non-migrants have substantially higher incomes (see Table VII-3). Reyes puts this together with the fact that the male immigrants have higher levels of education than the male non-immigrants (a conclusion reached by Urrutia and Castellaños in their study) to conclude that the migrant has a good number of obstacles to overcome in order to make his way

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particular flow. It would presumably have an indirect effect to the extent that rural to town migration made employment scarcer and pushed down wages in the town --anyone considering moving to the larger city would then be stimulated to do so. In such a case the migrant being questioned would say he was moving for economic reasons, but the original cause might really have been the violence. There is thus a serious problem in trying to estimate the more indirect effects of the violence on migration, as well as on the development of the economy in general. Results of the sort of questions asked by the interviewers, while useful, must be interpreted with much care.

Education is another frequently mentioned reason for the migration; in the city one's children can go to school full time, and receive instruction from substantially better qualified teachers. In the studies to date, usually between 1 and 9 per cent of the families interviewed have indicated education as the primary reason for migration. Health is seldom the primary reason. The military is listed in between 1 and 6 per cent of the cases.

Flinn notes that typically about 12 to 13 per cent of the respondents list "better living conditions" as the major motivating force. In fact this is very hard to separate from "economic reasons." Monetary incomes differ from country to city, and so does the bundle of goods and services available and the price tag on each item. It is not clear that there is much value in distinguishing between "differing incomes" and "differing living conditions" in cases where the better living conditions result from the higher incomes. It is meaningful to distinguish between the ability in the city to get more of what could be obtained in the country because of higher income, and the ability to get things simply unavailable in the country (e.g., various cultural items, concentration of population, etc., which are characteristic of cities but typically (or in some cases by definition) unavailable in the country.) If "better living conditions" refers to this category, the distinction is meaningful but I am not aware of how it has typically been used.

[84]Marco F. Reyes Carmona, "Estudio Socio-Economico del Fenomeno de la Inmigracion a Bogota," Economia Colombiana, Enero, 1965.

[85]Miguel Urrutia M. and Luis Castellaños, "Estudio Economico Social de la Poblacion de Bogota," Corporacion Autonoma Regional de la Sabana de Bogota e de los Valles des Ubate e Chiquinquira, Bogota, December 1962.

Table VII-3

Monthly Salary: Immigrants and Non-Immigrants

(from the Unemployment Surveys)

	Immigrants	Non-Immigrants	Total
Men	1216	1790	1384
Women	416	759	498
Total	898	1445	1047

Source: Figures presented in Marco F. Reyes Carmona, "Estudio Socio-Economico del Fenomeno de la Inmigraciona Bogota," Economia Colombiana, Enero, 1965.

financially in the city.[86]

While immigrants earned less than native Bogotanos, their income levels were not depressingly low relative to some others in the economy. (See Table VII-3.5).

These figures are not easily comparable. In the sample from which the income figures for the migrants come, most of the individuals came from "urban" centers; only 34.6 were born in rural areas and 30.6 came directly from rural areas. And all the problems of comparing rural and urban monetary incomes are present. Still the gaps are striking.

Incomes figures for people in specific occupations can be helpful in that the occupations to which rural and other unskilled workers move can be guessed fairly easily.

A distribution of income by type of occupation is presented in Table VII-4, from Reyes.[87] It is interesting to note that most of the very low income people (17 of 22) are working in personal services and the like, presumably most of these are women, (although it is not certain that women were included in this table). The low income but not very low income people are scattered in office employees, artisans, and others. (Most of the high income people are also in

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[86]Reyes, however, notes that the income figures used were preliminary. The nature of the educational difference between male migrants and non-migrants lay primarily in that more of the former group had reached secondary school. The per cent with no education was about the same for both groups (see Table VII-3.6) from Urrutia and Castellaños). (Women immigrants were less well educated than those born in Bogota.) The average age of the two groups may have been different, as may other relevent characteristics, so while Reyes' result is a valuable one, its precise meaning is not yet clear. Its persuasiveness is increased by the overall finding that unemployment for men was a decreasing function of educational level. (The opposite was true for women.) The unemployment rate for men appeared to be a little lower for immigrants (5-6%) than Bogotanos (around 7%), though the authors, apparently due to an arithmetical slip, did not come to this conclusion.

[87]Unfortunately it is not clear to what sample of people this table refers; it could be some subset of all the data of Urrutia and Castellaños. Hence its meaning cannot be precise.

Table VII+3.5

Monthly Salary of Males; Selected Categories

Bogota- all immigrants	1216	pesos
15th percentile income of all immigrants to Bogota	450	pesos (rough guess)[1]
Average monthly salary of an agricultural worker in Cundinamarca	150	pesos[2]
Average monthly income per man in the agricultural labor force in Colombia	400	pesos[3]

[1]This figure is no more than illustrative, being based on a dubious interpolation of data in Reyes, op. cit., Resumen 22, p. 29.

[2]Based on the arbitrary assumption of 250 days worked per year, or 21 per month. The average daily wage reported for 1962 by DANE (Anuario General de Estadistica) was about 7 pesos.

[3]A crude figure based on the value added in agriculture (Cuentas Nacionales) and an estimated figure for the agricultural labor force.

Table VII-3.6

Comparative Levels of Education:

Immigrants and Non-Immigrants

Immigrants	Men	Per cent	Women	Per cent	Total	Per cent
No Education	387	13	844	21	1,231	18
Up to Second Primary	381	13	603	15	984	14
Third to Fifth Primary	1,095	37	1,650	41	2,745	39
Some Secondary	715	24	827	20	1,542	22
Some University	220	8	40	1	260	4
No Information	149	5	88	2	237	3
Total	2,947	100	4,052	100	6,999	100
Born in Bogota						
No Education	251	14	307	15	558	15
Up to Second Primary	420	23	410	21	830	22
Third to Fifth Primary	705	38	763	38	1,468	38
Some Secondary	335	18	489	24	824	21
Some University	90	5	27	1	117	3
No Information	38	2	14	1	52	1
Total	1,839	100	2,010	100	3,849	100

Source: Urrutia and Castellanos, op. cit., p. 33.

Table VII-4

Disposable Personal Monthly Income

of the Immigrant Population by Occupation

Occupations	(Pesos)									
	50 to 199	200 to 299	300 to 499	500 to 899	900 to 1999	2000 to 4999	5000 or more	No Information	Total	Per cent
Professionals, technicians and the like	-	-	2	4	5	1	1	-	13	7.4
Managers, administrators and the like	-	-	-	1	-	-	-	-	1	0.6
White collar workers, etc.	1	4	7	12	6	-	-	2	32	18.4
Sellers, etc.	4	1	9	8	9	5	-	3	39	22.4
Farmers, etc.	-	-	-	1	-	1	-	-	2	1.2
Miners, etc.	-	-	-	1	-	-	-	-	1	0.6
Artisans, factory workers, etc.	-	4	14	10	-	3	-	3	34	19.5
Workers and day laborers	-	-	1	3	-	-	-	1	5	2.9
Furnishers of personal services, etc.	17	1	12	2	22	1	-	-	26	24.9
Military (including police)	-	-	1	1	3	-	-	-	5	2.9
Transport workers	-	1	4	7	2	1	-	1	16	9.2
Totals	22	11	40	50	28	12	1	10	174	
Per cent	12.7	6.3	22.9	28.7	16.1	6.9	0.6	5.8	-	100.0

the personal services category, presumably professionals.) If indeed women were included in the sample, one could with reasonable assurance conclude that few male immigrants earned less than 300 pesos per month.

Unfortunately, the significance of all of the figures is reduced substantially by the lack of a breakdown of incomes by length of residence in Bogota. About 63 per cent of the immigrants had been in the city for over 5 years.

The way in which the occupational structure of the immigrants differed from that of the Bogota population as a whole was probably fairly typical.

More than twice as high a percentage are engaged in selling and related occupations, and a substantially smaller percentage are engaged in artisanry and factory work. Unfortunately these two categories are not separated; we would expect the immigrants to be less involved in factory work, but it would be very interesting to see if the same holds for artisanry; we would not necessarily expect it to hold. Finally, a substantially small proportion of women are engaged in the service industries. A higher per cent of female immigrants are engaged in office work. This must be due to the number of the women who came to Bogota for education and then stayed to work.

Urrutia and Castellanos found rather low unemployment rates for both migrants and non-migrants. No cross classification indicating degree of unemployment by occupation was presented for migrants alone but the occupational categories with most underemployment in general were manual workers (not distinguished by economic sector) and transport workers. In one category "other manual laborers" only 78 per cent had worked 21-28 days in February, the month preceding the interviewing.

The Reyes and Urrutia-Castellanos studies are helpful but do not focus directly on the question at hand since

a) the immigrants considered include highly educated people whereas our interest here is in people at the bottom of the ladder, and

b) they do not separate out immigrants from agriculture and immigrants from towns. To get a thorough picture of the implications of out-migration from agriculture one would have to look for many of the migrants in villages, towns, etc..

A more relevant sort of study to the issue at hand is one which considers immigrants into poor barrios rather than all immigrants. A study by Usandizaga and Havens[88] discusses the cases of three such barrios[89] in Barranquilla. The study was also of more direct relevance than most others because a relatively high proportion of the immigrants had originated in rural areas.[90] Although substantially fewer probably migrated directly from the country, (more than 50 per cent came to Barranquilla from a place other than their birthplace), it is still more relevant to be describing the success of a migrant who is two or three stops removed from agriculture than one who was never in agriculture at all.

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[88] Elsa Usandizaga and A. Eugene Havens, "Tres Barrios de Invasion: Estudio de Nivel de Vida y Actitudes en Barranquilla," Universidad Nacional., Bogota, 1966.

[89] Carrizal, seven years old, El Bosqe, five years old, and Santa Domingo, two or three years old. The barrios studied originated in illegal invasions of the land. About 70 per cent of all the people interviewed (i.e., heads of households) were immigrants. In the newest barrio, Santa Domingo, almost 75 per cent were immigrants. But for the three barrios as a whole 75 per cent of the migrants had arrived more than five years ago, and about 55 per cent more than 10 years ago.

[90] In the three barrios combined, 74 of the people had been born in Barranquilla, 69 in other cities and 102 in rural areas, especially in Bolivar; thus about 60 per cent of the migrants were originally from rural areas. Forty-five per cent of the immigrants were owners in their place of origin, 21 per cent renters and the rest workers and sharecroppers. (See Usandizaga and Havens, op. cit., p. 38.) This data must refer only to the immigrants of rural origin, since it would seem to have no meaning for those of urban origin.

In some aspects of the study which overlapped with those of Reyes and Urrutia-Castellanos in Bogota, the results tended to be similar. With respect to the cause of migration, the responses were typical.[91]

The results with respect to the wisdom of the migration as viewed by the people later were considerably more negative than in most other studies. A substantial proportion, (about 40 per cent) said they would return to their place of origin, if they had the chance. This was a little greater than the per cent who said their current economic situation was worse than in their place of origin. Only about 43 per cent said it was better, and the rest said it was about the same. These comments would be less disturbing if the disaffection had been concentrated among the recent immigrants. (Since three barrios of differing ages were considered, it was possible to get at least some tentative conclusions on the time patterns of migrant's incomes after arrival,[92] as well as to distinguish the general reactions of people with varying lengths of stay in Barranquilla.) But the opposite was the case. Income levels and housing conditions were both superior in Carrizal but peoples' attitudes there were more negative than in either of the other two barrios. A comparison of the housing characteristics of the

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[91]Sixty-two per cent of those interviewed gave as the most important reason for their migration to Barranquilla a better opportunity for work. Of the remainder who gave meaningful replies at all about 13 per cent might be classed also as economic reasons (cheaper housing, better schools, and more services); for 21 per cent the main reason was given the presence of friends in Barranquilla. This is difficult to interpret. Eighty per cent of those interviewed had relatives or friends in Barranquilla.

[92]Since people move around within the city considerably after arriving, it does not follow logically that the newest barrio would necessarily house the most recent immigrants. But this is in fact the case; in particular the immigrants now living in Carrizal have been in the city substantially longer than those living in either of the other two barrios. Several other implicit assumptions are being made here, e.g., that average income of new migrants of given ability levels was about the same when the earlier municipios were being formed as now, and that the skill levels of new migrants have not varied importantly over time. It is not clear that these hold, although it seems probable they are not too far in error.

three barrios indicates a substantial improvement over time[93] in living conditions. And, the income data suggest improvement over time.

The people born in Barranquilla have an average income higher than the immigrants; the difference is insignificant in El Bosqe, only about 10 per cent in Carrizal, but about 25 or 30 per cent in Santo Domingo. Since the average income of non-immigrants in the three barrios is very similar, this suggests that there has been an upward movement for the immigrants over time. (The typical immigrant in Santo Domingo is more recently arrived in the city than the one in Carrizal, though about the same as the one in El Bosqe.)

It is possible that some difference not uncovered in the study explains the more negative attitudes in the best off barrio. Possibly the immigrants of six to ten or more years ago had better living conditions in the rural areas and so expected more in the first place. Or possibly there has been selective migration of migrants after they reached the city, and those that move often are the least

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[93]The walls are largely made of wood in Santo Domingo, substantially more of brick in El Bosqe though wood is still the main ingredient, and over half of either cement block or brick in Carrizal. (This was the only barrio in which cement block houses were typical.) Tile roofing predominated in each barrio. So did dirt floors. Again, however, Carrizal was the best off with close to one-half of its houses having cement floors. Almost none had this characteristic in Santo Domingo, and about one-quarter in El Bosqe. One-quarter of the houses had no windows at all, and one-half had one or two. Usually the windows are wood.

The modal number of people per house was four to seven in each barrio; but the next highest group, usually involving between 25 and 30 percent of the people, was eight to eleven. Crowding was no less in Carrizal than in the other barrios, although this is hard to interpret.

Almost all the houses in Carrizal and Santo Domingo had to buy water, and 60 per cent of those in El Bosqe. Where there are water spouts the lines of children, donkeys, etc., are often interminable. Only in Carrizal did the majority of the people have electric lights (about 85 per cent); in El Bosqe about 25 per cent did, and only one family in Santo Domingo. An oil lamp was the major alternative.

successful or least suited.[94] This would suggest that the population of Carrizal was by now a negative selection of all migrants to the city whereas that of Santo Domingo was not. However, the average number of moves was little greater in Carrizal if at all than in El Bosqe where attitudes were substantially better.[95] Finally, improvements may have been occurring less rapidly than had been anticipated. This may suggest that the initial will to strive can be worn down if events do not live up reasonably well to expectations.[96]

The absolute standard of living is very low in these settlements. And the agricultural worker-urban squatter income gap appears to be smaller than one might expect. Average income for non-immigrant family heads in the three barrios was about 375 pesos per month at the time of the interviews (probably in late 1963 or early 1964). For immigrants the corresponding average ranged from 288 in Santo Domingo to 372 in El Bosqe. (The great bulk of the families in either category who replied had incomes between 200 and 600 pesos per month.)

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[94] Several authors, including Wingo and Silvert, have made a distinction between Argentina, Uruguay, and Cuba (Silvert also added Costa Rico) and the other Latin American countries, arguing that in this former group the squatter settlements reflect pushing out of the least competitive members of the society rather than an outlet for the pressures of rapid urbanization. See Lowdon Wingo, Jr., Some Aspects of Recent Urbanization in Latin America (Resources for the Future, mimeo., Washington, D.C.), and Kalman H. Silvert, The Conflict Society: Reaction and Revolution in Latin America (American Universities Field Staff, New York.)

[95] Four-fifths of the immigrants had lived in other barrios before coming to the one in which they were found at the date of interview. The average number of barrios lived in was three, and a considerable number had lived in five or more. Only seven of the 63 families interviewed in Carrizal had come there directly.

[96] The economy of Barranquilla (and to a lesser extent of Colombia in general) has not advanced rapidly during the last decade; this suggests the possibility that the more negative response encountered in the relatively older barrio of Barranquilla than is typical elsewhere (in Colombia and in Latin America in general) could be because the differing degrees of economic progress made the difference.

One man working in factory industry at the same time in Barranquilla would earn an average of about 600 pesos per month. (The average salary for an agricultural laborer in Atlantico was about 185 pesos for a 21 day month; 220 pesos for 25 days. In Bolivar the average was a little higher; in Cordoba a little lower.)

Only half of the interviewed people worked the full 12 months per year; the average number worked was between 8 and 11. The mean number of family members working was somewhat less than two; income not earned by the head of the family added an additional 100 pesos per month to total income.[97,98] (The earnings per person for non-family heads are only between one-third and one-half as great as that of the family head.) Thirty per cent of the heads' wives work, presumably at substantially lower paying jobs.

In terms of their own awareness, the inhabitants of Santo Domingo listed lack of money as their major problem more often than any other, and lack of housing second most often. In El Bosqe and Carrizal lack of services and employment problems have become relatively more often mentioned, consistent with their higher

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[97]In Carrizal the inclusion of incomes other than those of the head of the family leads to a substantial differential between non-immigrants and immigrants total family income. This could be because the average size is greater for non-immigrants than for immigrants; average number of people per house is greater in Carrizal than in the other two barrios.

[98]It is interesting to compare these figures for family income per month with those calculated in the 1953 Consumer Survey for blue collar workers. The inhabitants of these barrios are substantially worse off than the average blue collar worker was in 1953. (See Table A-196.) This is not surprising since over one-half of the employed blue collar workers in that survey were in manufacturing. (See DANE, Economia y Estadistica No. 85, pp. 44-47.) But the income of the bottom half of the families in the 1953 survey averaged about 600 1963 (4th quarter) pesos while the families of the three barrios averaged around 475 (median). This is still not surprising since the definition of the sample in 1953 was such as to exclude people working on own account; about 65 per cent of the family heads who

standard of living.

Occupation-wise only 30 per cent of the heads of household were working for a firm, 8 per cent were out of work and 62 per cent were independent workers.[99] The most common occupations were construction workers and various types of sellers, with personal services in third place. There is no separate category for workers in industrial factories but the number must be small. Construction workers were considerably more important among the non-immigrants (31 per cent) than among the immigrants (18 per cent); personal services and commerce added up to 39 per cent for the immigrants and 30 per cent for the non-immigrants. This may suggest a sequence of occupations from personal services to construction, although this does not seem necessarily reasonable.[100]

The educational level of the immigrants is somewhat less than that of the non-immigrants.[101] Specific figures are not given indicating what proportion of these families' children in various age groups are in school, but it is presumably higher than the level of the parents.

An empathy test, performed by asking what the individual would do if he were president of Accion Communal and if he were president of the city revealed a very low response. Only 27 per cent could give ideas that fit with the role of

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had work in the three barrios worked on own account. So a comparison of the figures does not help much in indicating the direction of change over time of the income of such marginal people as those studied by Usandizaga and Havens.

[99]The corresponding figures are probably different for the total active population, since most of the people interviewed were men, and are probably more likely to be working than wives or even brothers. The 8 per cent unemployment rate appears to be very low and may be substantially less than that for the total active population. There were only 37 female heads of households in the group.

[100]The authors note that some of the sellers in small stores of food have their businesses partly : .just to get their own food at wholesale prices.

[101]See Table 46, p. 70 of Usandizaga and Havens.

president of the Accion Communal and only two per cent ideas in keeping with the role of mayor. The authors conclude that the inhabitants are not integrated in the city. This does not seem very surprising.

Many questions remain unanswered by the studies carried out so far in Colombia. Migration to the cities has certainly benefitted many families--probably most. But the case may be less one-sided than in some other countries in Latin America. The recent sharp rises in open unemployment rates in all four of the major cities in Colombia must be considered, along with the relatively slow growth in national income over the last decade. The frustrations found in Barranquilla by Usandizaga and Havens may by now be widespread in the other cities. Only more research will tell us.

Social Welfare Effects of Migration

It is possible that even if a man earns more after moving to the city or town than before; overall output will have fallen if he had external benefits in the country or external diseconomies in the town.

One consideration in this connection is the extent to which migrant workers swell the number of people engaged in monopolistically competitive services such as many forms of commerce; in this situation the marginal social productivity of their work may be less than their marginal private productivity or income. The typical time sequence of occupations for migrants and later for their children involves a heavy flow into personal services, commerce and construction at the start; only later (and possibly in the next generation) are such relatively lucrative jobs as factory work and white collar positions reached.[102] Few of the

[102]It must be remembered, however, that some people operating in monopolistically competitive occupations in the city were probably doing so in the town

studies distinguished between factory and artisan workers so it is hard to know how many migrants enter the latter category, though popular mythology suggests that a good number do.

It is hard to generalize about the relative degree to which different industries or occupations are monopolistically competitive. Commerce often is, construction work probably is not, artisanry might or might not be, as with personal services according to their type. While these distinctions are open to question, the grounds for them is probably strong enough to make it relevant to view the occupational distribution of recent migrants in this light. The two most general studies in Colombia suggest jointly that immigrants do indeed play relatively prominent roles in construction, commerce, and personal services. These three categories gave employment to two-thirds of the family heads in the three Barranquilla barrios studied by Usandizaga and Havens.[103] Commerce and personal services occupied 40 per cent. The occupational distribution for the city as a whole is unknown, but as of 1951 only about 7 per cent of economically active men were in construction, 14 per cent in commerce and 13 per cent in all services (including government). The Urrutia and Castellanos study in Bogota was not presented in such a way as to clarify the jobs typically held by recent immigrants, but a comparison of the occupational break downs for male immigrants and non-immigrants

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from which they came. Only if their migration adds to the total of people engaged in a socially little productive sector can an argument for curbing the migration be marshalled. But this event is not unlikely. Reyes presents figures on jobs held in place of birth, place of second residence (for migrants who did not come directly to Bogota), and first job in Bogota. (See Table A-197.) Unfortunately not enough data is given to allow the reader to follow one cohort through all steps (some were minors or students before migrating). But if one makes some plausible suppositions, he concludes that there was probably at least a fair amount of switching, primarily from agriculture to selling, personal services, artisans and workers and transportation workers. People who were students or minors before arriving move also into these lines as well as white collar office work.

[103] Usandizaga and Havens, op. cit., p. 60.

does suggest that a higher proportion of the former are in commerce, and a smaller proportion in manufacturing activities (factory and artisanry). Construction is not a separate category nor is personal services.

It must be recognized, in any case, that even if in a static sense one could conclude that migration had been too fast, it might be argued that recent migrants are concentrated in the occupations more likely to be monopolistically competitive not just because the other jobs are "filled up" but because there is nothing else they can do during a certain "learning cycle" after arriving in the city. This issue remains to be settled through more empirical research.

One positive effect of migration lies in its tendency to lower birth rates and population growth rates. The advantages of this are coming more and more to be recognized.[104]

Desirable Characteristics of Migrants

It is possible that the net social gains from migration are not maximized (or losses minimized) because the "wrong" people do the migrating. Adams at least implies this when he says that "the selectivity of the migration process results in a high proportion of non-productive people living in rural areas, a result only

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[104] Echavarria and Hauser (Rapporteur's report, Chapter I in Urbanization in Latin America, edited by Philip M. Hauser, International Documents Service, Columbia University Press, New York, 1960.) note that without exception the sex ratio is decidedly lower for the urban than for the total population for each of the Latin American countries. Again, without exception, the urban population has a lower fertility rate than the total population. (See p. 28.) (The data underlying this conclusion is not given, and surely at the time of the publication of this book (1960) it cannot have been too strong.) They note also that: the cities have a disproportionate number of single persons and a lower proportion of married people; the proportion of divorced and separated persons is higher; the few data available on the infant mortality suggests that it is lower in the towns. With lower fertility and lower infant mortality, the natural growth rate would not necessarily be lower. But most observers feel that it is. The topic needs much more research, however.

partially offset by funds sent from relatives living in urban areas. Many potential innovators and adopters of new techniques are migrating out of agriculture."[105]

In many countries, including Colombia (see below) a positive relation exists between the level of education and the tendency to out-migration. To the extent that the jobs which these more enterprising members of the agricultural community get could be done by anyone (e.g., street-sweeping, etc.), then it is probable that migration, even if occurring at the optimal rate, includes the "wrong" people from some social point of view. It is possible that the best type of migration, both rural-urban and rural-rural would be of the most poorly educated people. This might not be true if a low educational level would imply serious adjustment problems for the individual or if even the simplest urban job or change in activity really required a fair degree of sophistication. The first of these questions is a sociological one. But two factors do suggest that education may be relatively unimportant in effecting socially successful rural-urban migration. First, migration often does occur in steps, e.g., farm to village, village to small town, etc.. Migrants usually have family, friends, or both in the area to which they move; this undoubtedly lowers the difficulties of adjustment. Second, most migrants

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[105]Dale W. Adams, Rural Migration and Agricultural Development in Colombia, mimeo., 1966, p. 14. In discussing this problem from the point of view of the agricultural sector, Adams suggests that the evidence points to the fact that specific agricultural training rather than general education would not likely help much to remedy this situation. Few of the students trained to be "future farmers" in Colombia's 38 vocational agricultural schools returned to the rural areas. Adams therefore suggests that "educational inputs aimed at improving agricultural production must be directed at individuals who are fixed to the agricultural sector." "Adult vocational training programs, extension, and close supervision of development programs might be more beneficial." (See p. 15.) At the same time Adams argues that "a substantially improved educational program in rural areas would help induce middle size operators to stay on their farms, and not move to the cities to educate their children. "I doubt that a broad base of medium size, commercial, family type farm units can be formed in Colombia without better educational facilities in rural areas."

are quite young,[106] and should be more flexible in general and more able to learn the type of job they acquire after moving. If, then, one could argue that education was not important to successful migration, and if level of income was closely correlated to level of education, one would hope that the least educated people would be the ones migrating, given the basic goal of improving the incomes of the people in the direst straits. But, again, too many relationships remain unexplored for any conclusions to be reached.

Education and Migration

Whether because migration out of agriculture is good and education helps to bring it about, or because it is undesirable to have the better educated people leave the rural areas even though migration itself is good, the nexus between the two is an important one.

Adams, in his study of several different rural areas in Colombia, found that better education is associated with a greater propensity to rural-urban migration.[107]

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[106] A tentative study carried out by myself indicated that, as of 1951, the modal category for female migrants to Bogota was the age group 15 to 19, and for males the group 20 to 24. Adams notes, and this is substantiated by a number of other studies, that a large proportion of rural to urban migrants are young at the time they move. In the areas of his study about 80 per cent of the individuals who migrated left before 25 years of age and almost 90 per cent had left by 30. A large majority were single when they left, especially males. In remote areas it is more difficult for girls to migrate than boys, with entrance into military service helping the men out. But near large cities it is easier for girls to migrate. The sex ratios in the large cities indicate that the latter factor wins out, since large cities tend to have many more women than men, especially in the younger age groups. Converse's study of a barrio in Bogota revealed that 95 per cent of the people interviewed came to town before they were married. (James Converse, "Some Aspects of the Adjustment of Rural to Urban Migrants in Bogota, Colombia," manuscript, 1965.)

[107] This is a very typical result, also found in W. L. Flinn, "Rural to Urban Migration: A Colombian Case," University of Wisconsin, Land Tenure Center, Research

But, delving further into the mechanism of migration from rural areas, he found that rural to rural or rural to village migrants tend to have educational levels as low or lower than non-migrants. This is illustrated in Table VII-5, reproduced from his study. "People who had moved out of the general area, but stayed within the department, usually a rural to urban movement, had significantly higher levels of education than the average migrant. Relatively high levels of education were also generally noted for migrants who had moved out of the department of their birth. Again, this movement was largely a rural to urban migration."[108] Most people migrating into newly developed areas as colonizers have relatively low levels of education. "The second wave of farm operators who move in behind the colonizers and the original settlers have relatively high levels of education (as in the case of Villavicencio). Many of these new operators become absentee owners of land."[109]

Some rural to urban migration occurs with the aim of getting education. The desire for secondary education was illustrated by some farm operators who had moved their families into the capital cities of the department in order to make it available, in the process becoming absentee operators and finding it difficult to make sufficient income on the farm. It is instructive to see what relation

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Paper No. 19, July 1966, and in Miguel Urrutia and Luis Castellanos, Estudio Economico y Social de la Poblacion de Bogota (Bogota: Corporacion de la Sabana de Bogota y de los Valles de Ubate y Chiquinquira, 1962). Adams refers also to a study of migration in Sweden, carried out by Ejnar Neymark, who concluded that rural to urban migration lowered the average intelligence levels of both areas.

[108] Adams, op. cit., pp. 7-9.

[109] Adams, op. cit., p. 9.

Table VII.5

The Average Years of Education of Migrants and Non-Migrants by Areas and Types of Migration

Areas of Migration by Types	Average Years of Education				
	Non-Migrants	All Migrants	Migrants To adjacent municipios	Within a/ department	Outside department
Areas' Average	2.9	3.6 b/	2.8	3.9	3.7
A. Out-migration					
1. Sopo	3.1	3.8	3.1	4.1	3.7
2. Barbosa	2.8	3.7	1.9	3.6	4.6
3. Guamo	2.1	2.9	1.6	3.1	3.5
4. Tamesis	3.8	4.2	4.6	4.1	3.9
5. San Gil	1.7	2.3	2.1	2.2	2.8
6. Urrao	3.1	4.7	1.9	4.1	6.4
7. Contadero	3.0	4.0	c/	3.9	4.2
B. In-migration d/					
1. San Vicente		(2.0)			
2. Avicure		(2.1)			
3. Caqueta e/		(2.2)			
4. Villavicencio		(5.2)			

a/ Movement to a municipio within the Department of birth, but not adjacent to municipio of birth.

b/ Does not include areas of in-migration.

c/ None of the individuals enumerated had moved to adjacent municipios.

d/ Information on farm operators only.

e/ Taken from data collected by R. L. Tinnermeier in 1963-1964.

Source: Adams, op. cit., p. 8.

exists between education and migration if these people are left out of consideration. To remove the problem, Adams analyzed migratory tendencies of those who had four years or less of education. This did not affect the relative differences between average levels of education of non-migrants and migrants.

A positive education-migration relation may be unfortunate, if education and income in the rural sector are also positively correlated. It was not clear whether this was the case in Adams' study or not. In all of the areas to which he refers, about the same proportion of children from landless families and families with small land holdings migrated. And there was no significant difference in migratory tendencies according to the amount of land owned by parents; most of the families interviewed had less than 50 acres so the data had limitations, but Adams points out that a large number of the families owning more than this already live in the large cities.

The fact that there was no significant relationship between educational achievement of the children and the amount of land owned by the parents would facilitate the analysis,[110] if in fact land farmed was a good measure of income. But Adams notes that there was a significant relationship between average level of education of parents and that of children, and suggests that the parents' education may be a better indicator of family income levels than amount of land owned by the family. So the income-education relation remains uncertain. It does seem

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[110]The major factor determining whether children completed more than two or three years of schooling was the distance of the home from the village where additional schooling was available. Families in general placed high priority on their children getting an education.

Havens in his study of Tamesis (Tamesis: Estructura y Cambio (Bogota: Tercer Mundo, 1966)) found that the major determinant of additional schooling was the proximity of the school. And Adams notes that when families were asked to compare the importance of education for their children to more land, more children, and more cattle, the education was an overwhelming winner.

safe to conclude that it is not a really tight one. And this is consistent with the observations that everyone wants education and the main determinant of whether they get it is the existence of a school. But the question of whether the "right" group of people are migrating remains unanswered.

Summary

Research on the effects of various possible policy alternatives has been too scanty to date to support strong statements on their relative merits. But a few points may be made with at least some confidence.

1. Expenditures on research on crops and animals have paid off very well.
2. Directed colonization of the llanos has not been very successful; spontaneous settlements, now being aided by INCORA have done considerably better. Although relocation might be successful if carried out more efficiently than in the past, its use on a grand scale would probably be uneconomical.
3. Migration to the cities has for the most part raised the welfare of the people involved. But research on this is scanty and there is enough conflicting evidence to leave some doubt.

These conclusions (with no generalizations being possible about mechanization, infrastructure investments, etc.) hardly form the basis for a detailed policy. In fact, it seems likely that some investments should be made along most of the lines discussed in this chapter and that much of the savings which can be achieved involve colonizing the "right" areas, mechanizing the "right" areas and crops, and choosing the "right" irrigation projects. If this is done, investment in the sector can pay off very handsomely.

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APPENDIX TABLES

Section I: Aggregate Figures on Output, Area, and Labour Force.

The tables in this section are essentially self-explanatory with the data problems being explained in some detail in the accompanying Sources and Methodology.

Table A-9, which summarizes a number of the aggregate time series, is also presented in the text as Table II-1.

Table A-9.1 presents an interesting breakdown of the direction of output by rural consumption, urban consumption and exports, as calculated by Wm. McGreevey.

Estimation of agricultural output is very difficult in Colombia as one would expect; this holds even at present, much more for the pre-1950 period. Even the coffee series is not necessarily accurate, since the only easily available figure, especially for earlier years, is registered exports; these are not necessarily equal to total exports in years of substantial contraband (mostly recent years, and due to exchange rate differentials); in any case exports vary somewhat with respect to output in the short run (though much less over a 2-3 year period). The general contours of this series are relatively easy to measure. Livestock output, concentrated mainly in cattle, is difficult to estimate in absolute terms, but there is probably less error in the estimated rates of change. The most difficult categories are the relatively untraded crops, such as platano, corn, yucca, etc. But even allowing for substantial errors in such cases, the ECLA 1925-1950 series probably gives a meaningful picture of the rate of change of agricultural output over the period, though not neces-

sarily in individual years. In Chapter II, certain independent pieces of evidence, such as price series over time, are used to provide crude consistency checks on the overall output series, and it stands up reasonably well.

In the years 1950 through 1953 the ECLA series and the National Accounts series overlapped, with some discrepancy showing up, but not an overwhelming one; the National Accounts series since 1950 this suggests a parallel stability in whatever biases have been present in the estimation of absolute output levels, and therefore, hopefully, little reason to expect a different bias in the estimated growth rate of output for the two periods. Since coffee has often (according to the official statistics) accounted for one-third to one-half of total value of output in the crop sector, the per cent error in the estimation of other crops would have to be high, assuming the figures for coffee are relatively accurate, to produce an overall upward or downward error of as much as 15-20 per cent in the value of crop output. For example, if the coffee estimate were accurate, all of the other crop estimates would have to be in error by about 30 per cent in order to imply a 20 per cent error for the total crop estimate in 1950.

Still the estimates, especially those for the pre-1950 period, must be interpreted with substantial care. ECLA did not publish its methodology in detail, so there is no way to judge exactly how satisfactory it was even from a conceptual point of view, let alone from an empirical point of view.

TABLE A-1

Major Output Series

Year	Total Crops and Livestock: Value Added		Value of Product Indices: ECLA, Banco and Atkinson			Value of Product Indices: Banco de la Republica			Coffee: Metric Tons	Coffee (Index) 1958 = 100	Non Coffee Crops (Index) 1958 = 100
	ECLA: Millions of 1950 Pesos	National Accounts (Millions of 1950 Pesos; Factor Costs)	1958 = 100			1958 = 100					
			Total	Crops	Livestock	Total	Crops	Livestock			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1918									93.6	15.9	
1919									137.8	23.4	
1920									118.3	10.1	
1921									191.1	32.4	
1922									144.3	24.5	
1923									169.0	28.7	
1924									180.7	30.7	
1925	1,288		37.4	31.7	45.4	38.0	32.0	49.4	158.6	26.9	34.2
1926	1,434		41.6	39.4	46.3	41.2	39.7	50.3	200.2	34.0	42.3
1927	1,414		41.0	36.8	47.8	43.2	37.1	52.0	192.4	32.6	39.1
1928	1,529		44.3	41.9	49.3	47.7	42.3	53.6	217.1	36.8	43.5
1929	1,549		44.9	44.5	47.8	48.7	44.9	52.0	231.4	39.3	47.5
1930	1,626		47.2	48.8	47.0	50.3	49.2	51.1	254.8	43.2	52.0
1931	1,546		44.8	44.5	46.3	47.7	44.9	50.3	247.0	41.9	46.6
1932	1,638		47.5	42.1	50.9	50.3	47.3	55.3	260.0	44.1	49.3
1933	1,729		50.1	49.7	54.0	53.0	50.1	58.7	267.8	45.4	52.4
1934	1,766		51.2	48.8	59.3	54.7	49.2	64.5	257.4	43.7	51.9
1935	1,792		52.0	49.6	58.6	55.6	50.1	63.7	309.4	52.5	50.0
1936	1,892		54.9	53.9	57.9	59.2	54.4	62.9	325.0	55.1	55.0
1937	1,884		54.6	54.7	56.3	58.3	55.2	61.2	331.5	56.2	55.7
1938	1,992		57.8	56.5	57.9	60.9	57.0	62.9	348.5	59.1	57.2
1939	2,024		58.7	58.2	57.0	61.8	58.7	62.0	344.5	58.4	59.6
1940	2,070		60.0	65.8	56.3	63.6	66.4	61.2	447.1	75.8	64.2
1941	2,098		60.8	61.1	58.6	64.5	61.7	63.7	371.8	63.1	62.2
1942	2,164		62.8	62.4	60.9	67.1	63.0	66.2	427.7	72.6	60.6
1943	2,118		61.4	59.0	64.8	65.3	59.5	70.4	412.1	69.9	56.9
1944	2,227		64.6	62.4	68.6	68.9	63.0	74.6	431.6	73.2	60.4
1945	2,307		66.9	65.9	70.2	72.4	66.5	76.3	429.0	72.8	65.4

Table A-1 (continued)

Year	Total Crops and Livestock: Value Added		Value of Product Indices: ECLA, Banco and Atkinson			Value of Product Indices: Banco de la Republica					
	ECLA: Millions of 1950 Pesos	National Accounts (Millions of 1950 Pesos; Factor Costs)	1958 = 100			1958 = 100			Coffee: Metric Tons	Coffee (Index) 1958 = 100	Non Coffee Crops (Index) 1958 = 100
			Total	Crops	Livestock	Total	Crops	Livestock			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1946	2,465		72.0	70.9	73.7	75.9	71.6	79.6	436.8	74.1	71.8
1947	2,556		74.0	73.5	76.7	78.6	74.2	82.1	465.4	78.9	73.6
1948	2,562		74.7	72.6	77.8	77.7	73.3	80.4	478.4	81.2	71.8
1949	2,728		80.4	81.4	79.0	84.8	80.3	83.0	453.7	77.0	82.6
1950	2,505	2,808	77.7	73.8	83.1	78.0	69.7	86.3	412.5	70.0	70.7
1951	2,591	2,842	76.7	78.6	73.2	78.6	79.1	74.9	452.3	76.7	81.1
1952	2,877	3,036	84.8	89.7	76.6	83.9	85.8	76.9	504.1	85.5	85.9
1953	2,863	3,043	82.8	87.6	74.7	84.0	87.1	76.6	506.7	86.0	88.1
1954		3,124	86.3	92.3	76.1	86.6	88.3	78.9	498.1	84.5	91.7
1955		3,201	88.4	90.3	84.5	89.0	87.1	88.4	454.1	77.0	94.1
1956		3,301	89.3	87.1	91.6	91.6	89.5	93.1	493.1	83.6	87.1
1957		3,503	92.9	89.7	96.7	96.7	95.6	97.2	584.2	99.1	92.5
1958		3,614	100.0	100.0	100.0	100.0	100.0	100.0	589.5	100.0	100.0
1959		3,795	108.0	108.5	102.6	105.1	107.4	102.0	619.8	105.1	109.2
1960		3,798	109.5	109.9	107.1	105.6	104.2	107.7	562.8	95.5	110.8
1961		3,947	110.5	110.7	108.8	109.6	107.7	110.0	619.0	105.0	109.6
1962		4.077	118.7	120.2	114.2	113.6	111.7	116.2	587.0	99.6	120.6
1963		4,101	117.1	112.9	122.0	113.7	108.6	124.8	588.7	99.9	114.8
1964		4,331	121.7	119.2	123.8	120.3	117.5	127.0	628.7	106.6	123.3
1965		4,328	124.7	124.1	125.5	120.5	116.4	127.4	594.0	100.8	
1966		4,473	126.4	126.7	126.0	124.9	121.7	127.7	613.6	104.1	
1967		4,687	131.2	132.2	129.7	133.8	130.2	136.1	587.2	98.6	
1968		4,993	139.3	141.3	135.9	143.0	140.7	142.6	603.6	102.4	
1969		5.168	143.3	145.6	141.9	147.4	142.4	152.2	603.6	102.4	
1970		5,437				154.9	148.9	160.1	603.6	102.4	

Sources and Methodology for Table A-1:

Column 1 is from the United Nations, Economic Commission for Latin America, Analyses and Projections of Economic Development, Vol. III, Economic Development of Colombia (Geneva, United Nations, 1957), Anexo Estadistico, p. 1. This is a value added series expressed in 1950 pesos; the methodology, inevitably subject to error though probably as good a one as possible under the data constraints, is explained in the cited Annex.

Column 2 is from the National Accounts (Banco de la Republica, Cuentas Nacionales 1950-61 and subsequent publications). Methodology is explained in Banco de la Republica, Departamento de Investigaciones Economicas, Conceptos, Definitiones y Metodologia de las Cuentas Nacionales de Colombia, 1950-1961, Bogota, August 1963.

Columns 3, 4, and 5 are from ECIA, op. cit., p. 152 for the years up to 1950 and information from both the Central Bank's National Accounts and Atkinson's estimates for subsequent years. (For more detail see Table A-9.) Splicing was done on the basis of the overlapping period 1950-53. These figures correspond to value of output, not to value added.

Columns 6, 7, and 8 present the National Accounts based indices for 1950 and on. These are adjudged here to be less satisfactory than the estimates of columns 3, 4, and 5 but are presented for comparison and because it is easier to add new years to this series as the data are published by the Central Bank. This series was not, however, extrapolated back to 1925.

Column 9 is from Table A-150 where the methodology is explained in detail.

Sources and Methodology for Table A-1: (continued)

Column 10 is based on column 9.

Column 11 is, for 1950 and on, calculated by the author from the output indices for different crops in the National Accounts. For pre-1950 years, based on the ECLA statistics used in columns 3 to 5.

TABLE A-2

Output Price Series, Livestock and Crops

	Livestock		All Crops		Coffee	Non-Coffee Crops		Livestock and Non-Coffee Crops		Total Livestock and Crops	(Price of Value Added)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1925	--		--		7.8-10.2	--		13.7		11.5-11.9	
1926	--		--		7.1- 9.3	--		14.9		12.4-12.8	
1927	--		--		6.7- 8.8	--		15.3		11.8-12.2	
1928	--		--		6.4- 8.4	--		14.6		12.1-12.5	
1929	--		--		6.0- 7.9	--		15.0		12.4-12.7	
1930	--		--		5.7- 7.5	--		11.6		9.8	
1931	--		--		8.4	--		10.1		8.9	
1932	--		--		8.4	--		7.7		6.9	
1933	--		--		8.1	--		8.1		7.2	
1934	--		--		8.1	--		12.4		10.6	
1935	--		--		8.5	--		12.0		10.3	
1936	--		--		8.7	--		13.1		11.2	
1937	--		--		7.1	--		13.6		11.4	
1938	12.0		12.3		7.1	16.1		14.0		12.3	
1939	12.1		13.9		7.6	18.6		15.4		13.5	
1940	12.0		11.8		5.5	16.5		14.3		11.9	
1941	12.0		11.7		8.1	14.4		13.2		11.9	
1942	11.4		14.8		8.4	19.4		15.4		13.8	
1943	13.7		18.5		9.2	25.4		19.6		17.2	
1944	19.6		21.9		11.1	29.8		24.7		21.4	
1945	23.3		23.9		12.4	32.3		27.8		23.9	
1946	24.9		26.9		17.1	34.1		29.5		25.5	
1947	35.5		31.7		21.9	39.0		37.8		33.2	
1948	35.4	or	34.4	or	22.5	43.1	or	39.3	or	35.1	
1949	46.6		36.5		28.1	42.7		44.7		40.0	
1950	49.0	46.8	50.9	51.3	42.2	57.5	59.2	53.3	53.8	51.0	50.8
1951	53.7	57.4	58.3	59.2	53.6	61.6	63.8	57.7	58.5	57.2	57.1
1952	60.1	59.8	55.6	56.7	57.2	54.4	56.2	57.3	58.0	58.0	57.8
1953	65.3	64.5	60.0	61.2	59.9	49.9	62.3	57.6	63.6	62.6	62.5
1954	74.4	72.1	75.2	77.1	81.0	71.1	73.8	72.8	72.5	75.1	74.9
1955	75.2	75.7	67.9	69.0	70.6	66.2	67.9	70.7	71.6	71.3	71.3
1956	75.2	74.6	81.3	83.0	93.4	73.0	75.1	74.1	75.0	79.9	79.9
1957	86.4	85.8	96.6	97.3	103.9	90.4	91.1	88.4	88.3	93.0	92.9
1958	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1959	118.6	119.3	95.7	96.7	81.2	107.8	109.9	113.2	113.9	104.3	104.4
1960	130.0	132.5	101.4	102.5	88.7	109.6	111.9	119.8	121.1	111.3	112.9
1961	131.3	133.4	112.0	112.7	93.7	125.1	128.4	128.2	131.0	120.5	120.7
1962	134.9	136.2	112.9	114.4	91.6	125.8	130.7	130.4	135.3	124.0	124.2
1963		153.0		148.6	113.3		175.0		166.2		152.7
1964		179.9		197.8	147.6		238.2		209.7		192.4
1965		209.5		195.7	142.9		231.3		223.4		203.8
1966		249.1		220.2	149.4		266.0		258.6		232.5
1967		288.1									247.7

Sources and Methodology for Table A-2:

The series in this table correspond to product prices with the exception of column 11 which presents a value added price series for the sector as a whole, primarily for comparative purposes. (Its source is Banca de la Republica, Cuentas Nacionales, 1950-1967 and subsequent editions.) Columns 1 to 10 are, in other words, simply index numbers of the prices of the products included in the category in question. Alternative series are presented, based respectively on Banco de la Republica sources (columns 1, 3, 5, 6, 8, and 10) and on Atkinson (USDA, Agricultural Productivity..., op. cit., p. 56.) for columns 2, 4, 7, and 9. In the case of coffee, the two series were essentially equivalent.

For some purposes value added series are more relevant but in the present case availability of data has dictated what could with reasonable accuracy be calculated. Only for the 1950 and on period was even a total sector value added price series feasible.

For the product price series, the methodology was as follows.

In the post-1950 period, for columns 1, 3, 5, 6, 8, and 10 the current value of production series (unpublished Central Bank data) and the national accounts physical output series were used to deduce the price series. Quantity indices were derived by the Central Bank (or by myself as in the case of crops other than coffee) using 1958 prices. (These physical output series were Laspeyres indices; hence, the derived price series is a Paasche series. The importance of the type of index used should not be overemphasized however, since the errors due to poor data probably far outweigh the difference which might exist between Laspeyres and Paasche indices over periods of the duration considered here.) Since I did not have

Sources and Methodology for Table A-2: (continued)

available the crop-livestock breakdown in current prices some guesswork was involved but errors from this source are likely to be small.

The figures in these same columns for the period 1938-1948 are the author's calculations based on the price figures presented in the World Bank Study. (International Bank for Reconstruction and Development, The Bases of a Development Program for Colombia, Baltimore, The Johns Hopkins Press, 1950.) Prices were weighted by 1942 values; this part of the series is a Paasche index.

The splice between 1948 and 1950 was effected by using trends in the urban prices of the products in question, with 1950 value weights.

Columns 2, 4, 7, and 9 which, as noted above, come from Atkinson's study for the USDA , differ from the parallel series based directly on the Central Bank's national accounts data because Atkinson's output series differ for some products. He used the Central Bank's price series for each specific good.

Column 11 is from Cuentas Nacionales, op. cit. and refers to the implicit price of gross domestic product (i.e., gross value added) in the sector (excluding fishing, hunting, and silvaculture) at market prices. It makes very little difference whether factor costs are used. The revised accounts (Cuentas Nacionales, 1967-1970) produced a lower figure in 1967 than the earlier ones Cuentas Nacionales, 1950-1967, and the revised figure is used here; it remains uncertain whether the revision implies the figures just before 1967 were also overestimated or not. We assume here that they were wrong only in 1967. The difference between columns 10 and 11 should, at least theoretically, be due to the difference in time trend between

Sources and Methodology for Table A-2: (continued)

purchased inputs and outputs of the sectors since purchased inputs are very limited in agriculture, the fact that the difference between the two sectors is small is to be expected.

TABLE A-3

Value of Product Series: Current Prices

Year	Absolute Value Series			Total (Alternative) = (2) + (3)	Indices Based on Tables A-1 and A-2: 1958 = 100			Alternative Estimates for 1950 and On					
								Total		Crops		Livestock	
	Total	Crops	Livestock		Total	Crops	Livestock	National Accounts	Atkinson	National Accounts	Atkinson	National Accounts	Atkinson
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1925	314.0 - 324.9				4.301 - 4.451								
1926	376.6 - 388.8				5.158 - 5.325								
1927	353.2 - 365.2				4.838 - 5.002								
1928	391.3 - 404.3				5.360 - 5.538								
1929	406.5 - 416.3				5.568 - 5.702								
1930	337.7				4.626								
1931	291.1				3.987								
1932	239.3				3.278								
1933	263.3				3.607								
1934	396.2				5.427								
1935	391.0				5.356								
1936	448.9				6.149								
1937	454.4				6.224								
1938	519.0	332.9	174.4	507.3	7.109	6.950	6.948						
1939	578.5	387.5	173.2	560.7	7.924	8.090	6.897						
1940	521.3	371.9	169.6	541.5	7.140	7.764	6.756						
1941	528.2	342.4	176.6	519.0	7.235	7.149	7.032						
1942	632.7	442.3	174.3	616.6	8.666	9.235	6.943						
1943	771.0	522.8	222.9	745.7	10.561	10.915	8.878						
1944	1,009.2	654.6	337.6	992.2	13.824	13.666	13.446						
1945	1,167.3	754.4	410.7	1,165.1	15.989	15.750	16.357						
1946	1,392.9	913.5	460.7	1,374.2	19.080	19.072	18.351						
1947	1,793.6	1,116.0	683.6	1,799.6	24.568	23.300	27.228						
1948	1,914.2	1,196.2	691.5	1,887.7	26.220	24.974	27.541						
1949	2,347.8	1,423.1	924.3	2,347.4	32.160	29.711	36.814						
1950	2,893.0	1,799.2	1,022.3	2,821.5	39.627	37.564	40.719	2,795.6	2,866.9	1,701.8	1,663.7	1,093.8	1,203.2
1951	3,202.9	2,194.9	986.9	3,181.8	43.872	45.824	39.308	3,227.9	3,175.5	2,205.5	2,023.3	1,022.4	1,152.2
1952	3,590.7	2,388.8	1,155.9	3,544.7	49.184	49.873	46.037	3,489.0	3,567.4	2,285.0	2,206.6	1,204.0	1,360.8
1953	3,784.1	2,517.5	1,224.7	3,742.2	51.833	52.560	48.779	3,804.1	3,777.0	2,499.7	2,321.9	1,304.4	1,435.1
1954	4,731.5	3,324.6	1,421.5	4,746.1	64.811	69.410	56.618	4,770.4	4,821.4	3,180.1	3,066.3	1,590.3	1,755.1
1955	4,601.4	2,936.8	1,595.4	4,532.2	63.029	61.314	63.544	4,550.6	4,590.2	2,832.3	2,711.4	1,718.3	1,878.8
1956	5,209.0	3,391.8	1,729.4	5,121.2	71.351	70.812	68.883	5,311.1	5,191.9	3,481.9	3,130.6	1,829.2	2,061.3
1957	6,307.4	4,150.4	2,097.7	6,248.3	86.397	86.650	83.549	6,571.0	5,460.0	4,419.0	3,011.5	2,152.0	2,448.5
1958	7,300.5	4,789.8	2,510.7	7,300.5	100.0	100.0	100.0	7,300.5	7,276.7	4,789.8	4,400.5	2,276.7	2,876.2
1959	8,223.6	4,973.5	3,055.1	8,028.6	112.644	103.835	121.684	7,993.3	8,114.6	4,922.5	4,578.9	3,070.8	3,535.7
1960	8,897.4	5,337.7	3,495.6	8,833.3	121.874	111.439	139.230	8,644.1	8,998.0	5,053.6	4,910.6	3,590.5	4,087.4
1961	9,720.8	5,938.6	3,586.6	9,525.2	133.152	123.984	142.854	9,455.4	9,635.1	5,771.3	5,461.4	3,684.1	4,173.7
1962	10,745.5	6,500.0	3,867.9	10,367.9	147.188	135.706	154.056	10,040.8	10,539.5	6,028.6	5,974.3	4,012.2	4,510.9
1963								12,479.7	13,045.0	7,705.4	7,374.1	4,774.3	5,339.6
1964								16,805.0	17,468.6	11,074.4	10,350.1	5,730.6	6,394.2
1965								17,889.4	18,791.1	10,844.8	10,625.7	7,044.6	7,946.3
1966										12,773.9			
1967										14,520.0			

Sources and Methodology for Table A-3:

Columns (5), (6) and (7) are the result of a multiplication of the physical output index found in Table A-1 (Columns (3), (4) and (5) respectively) and the price indices (partly Laspeyres and partly Paasche) found in Table A-2 (Columns (10), (1) and (3)). This gives the three value indices, one for livestock, one for crops, and one for the total, with base 1958 = 100 in each case (Columns (3), (2) and (1) respectively). The indices were then converted into absolute figures by using 1958 values from the national accounts and using that year as the base in the calculation for the others.

Several sources of possible ambiguity, error or inconsistency should be noted. The weaknesses of the basic data are serious but need no further elaboration here. A difficulty arises from the fact that inappropriate combinations of types of indices (Laspeyres and Paasche) were used to calculate the value series. For 1938-48 both the price and quantity series were Laspeyres indices; multiplying them together does not give a true current value series, and also produces such incongruities as the total value index lying outside the two component value indices (crops and livestock). (This same incongruity appeared in the 1950 and on period, though not for the same reason since during this period the output series were Laspeyres indices and the price series were Paasche indices; it presumably resulted from the guesses taken as to the current price breakdown of output between crops and livestock which had to be made for want of complete information, and which was alluded to in Table A-2.) Due to the weaknesses of the methodology used in obtaining these value series, the total value series was derived both by multiplication of the total (crops plus livestock) price and quantity series (Column (1)) and by the addition of the separately estimated current values of crop and livestock output (Column (4)). The rational for the presentation of Column (4) is that the errors introduced by multiplying two Laspeyres series together is likely to be reduced if the bundles for which this is done are small (in the limit, of course, there is no error if the bundles include only one item) and possibly tend to have less divergence of price movements within them than between them (though this is not clear). Also, in a vaguer sense, it is presented just to see how much the results are affected by such alternate methodologies.

For purposes of comparison, National Accounts and Atkinson estimates of current values are presented for total (Columns (8) and (9)), crops (Columns (10) and (11)) and livestock (Columns (12) and (13)). A National Accounts current price value of product series (at factor cost) was not available for livestock or total and was estimated assuming the same price deflator as for value added (that deflator was available). Atkinson's series were not presented in current pesos but he used the Banco's price data so it was assumed here that his current and constant price series bore the same relation to the respective Banco series. This introduces a slight error since Atkinson's implicit deflator would be a little different (with the same price series for each product) given the different estimates of the quantity of the various products.

TABLE A-4

Value of Output and Value Added in Agriculture
1950-1965, Banco de la Republica Estimates.

(1958 prices)

Year	Cattle		Cattle and Crops			Other Output from the Agricultural Sector	Total	
	Value of Production	Gross Value Added at Market Prices	Value of Production	Gross Value Added at Market Prices	Gross Value Added at Factor Cost		Value Added at Market Prices	Value Added at Factor Prices
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1950	2,167.8	1,839.6	5,508.5	4,969.6	4,922.6	583.7	5,553.3	5,506.3
1951	1,881.6	1,596.6	5,672.4	5,122.5	5,072.6	499.9	5,622.4	5,572.5
1952	1,930.7	1,639.2	6,038.5	5,464.6	5,411.6	541.2	6,005.8	5,952.8
1953	1,924.3	1,632.8	6,094.3	5,506.8	5,457.2	510.9	6,017.7	5,968.1
1954	1,980.4	1,681.8	6,210.7	5,601.1	5,548.5	577.0	6,178.1	6,125.5
1955	2,220.5	1,884.3	6,391.9	5,742.4	5,692.0	584.8	6,327.2	6,276.8
1956	2,336.2	1,984.5	6,525.0	5,963.2	5,907.1	564.9	6,528.1	6,472.0
1957	2,440.4	2,071.9	7,021.4	6,350.5	6,291.8	577.6	6,928.1	6,869.4
1958	2,510.7	2,131.7	7,300.5	6,580.1	6,520.0	566.0	7,146.2	7,086.1
1959	2,560.9	2,174.2	7,704.4	6,935.0	6,872.1	569.8	7,504.8	7,441.9
1960	2,703.0	2,295.8	7,693.2	6,904.2	6,839.5	608.3	7,512.5	7,447.8
1961	2,762.0	2,344.9	7,921.2	7,135.2	7,067.7	672.4	7,807.6	7,740.1
1962	2,918.7	2,477.0	8,269.2	7,408.8	7,341.5	653.9	8,062.7	7,995.4
1963	3,134.0	2,660.4	8,336.5	7,486.6	7,419.8			
1964	3,187.7	2,707.3	8,816.9	7,915.3	7,843.6			
1965	3,198.9	2,715.8	8,773.6	7,870.3	7,797.9			

Source: Unpublished data of Banco de la Republica.

Table A-6

	Output of Non-Coffee Crops (Index based on value of output at 1958 prices)	Output of All Crops	Value of Output of the Commercial Sector	Output of the Commercial Sector / Output of all Crops	Output of the Commercial Sector / Output of Non-Coffee Crops
1950	75.5	74.2	57.0	14.1	22.4
1951	87.9	79.0	68.3	15.9	23.0
1952	92.7	90.2	74.7	15.2	23.9
1953	91.7	88.0	73.6	15.4	23.8
1954	96.8	92.7	86.8	17.2	26.6
1955	97.0	90.7	87.8	17.8	26.8
1956	97.5	87.6	90.0	18.9	27.4
1957	97.5	90.0	86.4	17.6	26.3
1958	100.0	100.0	100.0	18.4	29.6
1959	114.9	108.7	131.8	22.3	34.0
1960	114.9	110.2	140.2	23.4	36.2
1961	120.1	111.0	150.5	24.9	37.1
1962	131.3	120.5	171.2	26.1	38.6
1963	123.6	113.1	158.3	25.7	38.0
1964	131.6	119.6	170.2	26.2	38.3
1965	135.9	124.1	182.9	27.1	39.9
1966	144.7	126.7	202.3	29.4	41.5
1967	150.8	132.2	212.0	29.5	41.7

Table A-7

Food Consumption Per Capita, 1950-67
(1958 Pesos)

	Domestically Produced Food Millions of Pesos of 1958	Imported Food (Millions of 1958 Pesos)		Total Domestic Supply (Millions of 1958 Pesos)		Population (Thousands)	Rate of Population Growth from previous years	Food Per Person	
		Estimate a	Estimate b	Estimate a	Estimate b			Estimate a	Estimate b
1950	4136.7								
	4450.7	161.7	138.5	4.612.4	4.589.2	12,063	2.55	382	380
	4587.4	170.6	138.2	4.758.0	4.725.6	12,377	2.60	384	382
	4538.3	219.4	164.6	4.757.7	4.702.9	12,706	2.66	374	370
	4662.6	346.3	204.4	5.008.9	4.857.0	13,052	2.72	384	373
1955	4740.5	----	-----	------	------	13,414	2.78	---	---
	4902.0	205.8	105.7	5.107.8	5.007.7	13,795	2.84	372	370
	5065.2	227.3	192.7	5.292.5	5.257.9	14,195	2.90	367	367
	5180.0	181.5	181.5	5.361.5	5.361.5	14,615	2.96	375	374
	5451.1	196.1	182.9	5.647.2	5.634.0	15,056	3.02	366	365
1960	5507.9	182.0	163.7	5.689.9	5.671.6	15.520	3.08	376	373
	5778.4	244.9	201.9	6.023.3	5.980.3	16,007	3.14	388	385
	6196.8	217.4	181.1	6.414.2	6.377.9	16,519	3.20	373	371
	6228.2	144.2	134.6	6.372.4	6.362.8	17.057	3.26	384	---
	6508.7	265.3	-----	6.774.0	-------	17,623	3.32	375	---
1965	6617.8	209.6	-----	6.827.4	------	18,219	3.38	376	---
	6750.6	338.9	-----	7.089.5	------	18,845	3.44	366	---
	6940.8	198.9	-----	7.139.7	------	19,504	3.50	---	---

Sources and Methodology: Col. (1) is based on figures from Atkinson (USDA, Changes in ..., op. cit., p. 72. Two alternative calculations of food imports are presented; Col. (2a) is a conversion of dollar estimates from Table A-16 at an exchange rate (of 1958) of 6.4 pesos per dollar. Col. (2b) is based on peso value estimates of imports deflated to 1958. Food imports exclude malt. For Col. (4) we used as a benchmark population estimate the "probable" estimate of 1951 population made by Lemieux, the demographic expert who carried out some follow-up studies after the 1951 census. We assumed a gradually increasing population growth rate from then to the present. (Col. 5). We assume a rate of 2.6 around 1951 rising gradually to 3.5 in 1967 and giving an average of 2.95 for the intercensal period 1951-64. This is a guess based on conclusions of Alvaro Lopez (Analisis Demografico de los Censos Colombianos: 1951 y 1964, CEDE, 1968, p. 85).

TABLE A-8

Estimates of Crop Output, 1950-1967

(Value figures in current prices)

	1950			1951			1952		
	Thousands of Tons	Average Producer Price	Value (Millions of pesos)	Thousands of Tons	Average Producer Price	Value (Millions of pesos)	Thousands of Tons	Average Producer Price	(Millions of pesos)
Sesame	10.6	588	6.2	7.9	588	4.6	5.2	588	3.1
Garlic and Onions	23.4	1,330	31.1	25.0	1,290	32.3	25.0	1,350	33.8
Cotton in bulk	21.4	807	17.3	19.0	897	17.0	31.7	953	30.2
Rice with hull	260.9	350	91.3	289.4	465	134.6	287.6	345	99.2
Bananas for Export	143.8	192	27.6	154.5	282	35.8	152.6	251	38.3
Cocoa in grain	8.4	2,150	18.1	8.4	2,250	18.9	11.1	2,200	24.4
Coffee	412.5	1,476.28	609.0	452.3	1,875.07	848.1	504.1	2,002.78	1,010.4
Sugar Cane	1,637.8	7.43	12.2	1,973.1	9.08	17.9	1,666.7	10.60	17.7
Rubber	0.22	3,419	752	0.22	3,419	752	.43	3,135	13
Barley	50.4	300	15.1	56.2	365	20.5	61.0	410	25.0
Copra	5.0	589	2.9	4.5	832	3.7	4.2	665	2.8
Beans	26.1	1,180	30.8	50.0	1,080	54.0	55.0	880	48.4
Corn	620.3	290	179.9	845.0	280	236.6	928.9	205	190.2
Potatoes	360.0	337	121.3	550.0	282	155.1	600.0	212	127.2
Platano	942.8	128	120.7	940.0	138	129.7	960.0	137	131.5
Tobacco in bulk	20.4	1,290	26.3	22.0	1,200	26.4	21.1	1,370	28.9
Wheat	101.9	610	62.2	130.0	620	80.6	140.0	630	88.2
Yuca	768.0	110	84.5	870.0	130	113.1	870.0	100	87.0
Panela	360.5	184	66.3	349.1	205	71.6	394.5	233	91.9
Sub Total	5,774.4		1,523.6	6,746.6		2,001.3	6,719.5		2,079.5
Minor Crops*	1,024.0		178.2	1,070.9		204.2	1,122.6		205.5
Total	6,798.4		1,701.8	7,817.5		2,205.5	2,842.1		2,285.0
Sugar Cane for Panela+	6,323.7	7.43	47.0	6,346.9	9.08	57.6		10.60	76.0

Table A-8 (continued)

	1953			1954			1955		
	Thousands of Tons	Average Producer Price	Value (Millions of Pesos)	Thousands of Tons	Average Producer Price	Value (Millions of Pesos)	Thousands of Tons	Average Producer Price	Value (Millions of Pesos)
Sesame	5.7	588	8.4	7.9	588	4.4	11.2	686	7.7
Garlic and Onions	25.0	1,435	35.9	25.0	1,445	36.1	22.8	2,025	46.2
Cotton in bulk	50.6	938	47.5	80.3	882	70.8	70.1	858	60.1
Rice with hull	293.8	400	117.5	318.4	470	149.6	345.8	475	164.3
Bananas for Export	196.2	251	49.2	195.7	258	50.5	209.6	256	53.7
Cocoa in grain	11.2	2,300	25.8	11.3	3,100	35.0	10.9	2,700	29.4
Coffee	506.7	2,098.19	1,063.2	498.1	2,836	1,412.6	454.1	2,471.84	1,122.5
Sugar Cane	2,004.3	11.40	22.8	2,355.3	11.70	27.6	2,349.8	12.20	28.7
Rubber	.31	3,180	979	.31	3,500	1.1	.38	3,500	1.3
Barley	79.0	390	30.8	65.0	380	24.7	52.0	400	20.8
Copra	4.0	780	3.1	3.2	698	2.2	2.8	665	1.9
Beans	52.0	980	51.0	50.0	1,140	57.0	69.0	1,070	73.3
Corn	890.0	240	213.6	850.0	330	280.5	769.9	300	231.0
Potatoes	610.0	278	169.6	650.0	319	207.4	665.0	211	140.3
Platano	986.7	138	136.2	1,018.5	180	182.4	1,048.9	185	194.0
Tobacco in bulk	23.0	1,175	27.0	25.3	1,370	34.7	28.7	1,360	39.0
Wheat	143.0	630	90.1	146.0	710	103.7	147.0	650	95.6
Yuca	870.0	107	93.1	870.0	173	150.5	674.0	193	130.1
Panela	338.5	256	86.7	333.8	243	81.1	538.1	217	116.8
Sub Total	7,090.0		2,267.5	7,498.7		2,911.9	7,470.1		2,557.1
Minor Crops*	1,168.7		232.4	1,234.1		268.2	1,187.6		257.1
Total	8,258.7		2,499.9	8,723.8		3,180.1	8,657.7		2,832.3
Sugar Cane for Panela+	6,155.7	11.40	70.2	5,960.7	11.70	69.7	9,440.2	12.20	115.2

TABLE A-8 (continued)

	1956			1957			1958		
	Thousands of Tons	Average Producer Price	Value (Millions of pesos)	Thousands of Tons	Average Producer Price	Value (Millions of pesos)	Thousands of Tons	Average Producer Price	Value (Millions of Pesos)
Sesame	12.8	833	10.7	15.4	1,323	20.4	20.8	1,323	27.5
Garlic and Onions	24.0	2,055	48.1	226.3	1,795	47.2	26.3	2,045	53.8
Cotton in bulk	64.1	883	56.6	57.9	1,173	67.9	73.2	1,550	113.5
Rice with hull	369.9	485	179.4	378.4	615	232.6	410.8	750	308.1
Bananas for Export	215.9	302	65.2	184.1	516	95.0	174.1	501	87.2
Cocoa in grain	11.3	2,650	29.9	12.0	3,600	43.2	11.7	4,000	46.8
Coffee	493.1	3,269.7	1,612.3	584.2	3,640.22	2,126.6	589.5	3,500.73	2,063.7
Sugar Cane	2,422.0	1,237	30.0	2,122.3	20.60	43.7	2,466.9	27.60	66.6
Rubber	.49	3,500	1.7	.46	3,543	1.6	.52	4,793	2.5
Barley	70.0	425	29.8	60.0	480	28.8	77.2	580	44.8
Copra	2.2	652	1.4	1.8	1,100	2.0	1.5	1,680	2.5
Beans	50.0	1,360	68.0	72.0	1,440	103.7	60.0	1,440	86.4
Corn	790.0	350	276.5	746.0	430	320.8	823.2	385	316.9
Potatoes	545.0	312	170.0	540.0	311	167.9	700.0	370	259.0
Platano	1,091.0	188	250.1	1,100	221	243.1	1,130.0	230	259.9
Tobacco in bulk	36.7	1,370	50.3	37.6	1,870	70.3	38.0	1,870	71.1
Wheat	140.0	680	95.2	100.0	760	76.0	155.6	870	135.4
Yuca	700.0	198	138.6	700.0	215	150.5	700	200	140.0
Panela	550.5	235	129.4	506.0	423	214.0	518.2	500	259.1
Sub Total	7,589.0		3,198.2	7,244.5		4,055.3	8,006.3		4,344.8
Minor Crops*	1,222.3		283.7	1,256.2		363.7	1,263.2		445.1
Total	8,811.3		3,481.9	8,500.7		4,419.0	9,240.7		4,789.9
Sugar Cane for Panela+	9,490.5	37	117.4	8,877.7	20.60	182.9	8,783.1	2.76	237.1

Table A-8 (continued)

	1959			1960			1961		
	Thousands of Tons	Average Producer Price	Value (Millions of Pesos)	Thousands of Tons	Average Producer Price	Value (Millions of Pesos)	Thousands of Tons	Average Producer Price	Value (Millions of Pesos)
Sesame	10.2	1,323	13.5	60.0	1,519	30.4	22.0	1,617.00	35.6
Garlic and Onions	27.0	2,230	60.2	27.8	2,337	65.0	28.1	2,055.00	57.7
Cotton in bulk	157.4	1,770	278.6	193.7	1,726	334.3	196.9	1,752.00	345.2
Rice with hull	456.3	770	351.4	430.7	883	380.3	417.8	954.00	398.6
Bananas for Export	203.3	387	78.7	197.1	440	86.7	205.6	444.00	91.3
Cocoa in grain	12.0	5,950	71.4	13.5	5,759	77.7	14.3	5,480.00	78.4
Coffee	619.8	2,842.17	1,716.6	562.8	3,104.94	1,747.5	619.0	3,281.02	2,031.0
Sugar Cane	2,759.95	30	82.8	3,146.9	30	94.4	3,415.3	33.00	112.7
Rubber	.51	5,288	2.7	.51	6,325	3.2	.51	6,351.00	3.2
Barley	115.0	630	72.5	125.4	624	78.2	99.4	637.00	63.3
Copra	1.5	2,021	3.0	1.5	1,983	3.0	1.5	1,688.00	2.5
Beans	60.0	1,400	84.0	39.8	2,000	79.6	44.0	2,277.00	100.2
Corn	857.5	450	385.9	865.7	474	410.3	757.5	629.00	476.5
Potatoes	685.0	304	208.2	653.3	350	228.7	545.0	504.00	274.7
Platano	1,220.0	265	323.3	1,255.4	224	281.2	1,275.0	305.00	388.9
Tobacco in bulk	38.7	1,900	73.5	24.9	1,989	49.5	27.9	2,009.00	56.1
Wheat	143.5	940	134.9	145.2	880	127.8	142.1	975.00	138.5
Yuca	720.0	250	180.0	741.12	303	224.6	752.0	378.00	284.3
Panela	553.6	460	254.7	561.1	392.0	220.0	608.9	377.00	229.6
Sub Total	8,640.8		4,420.9	9,006.5		4,582.4	9,172.8		5,168.3
Minor Crops*	1,299.0		501.6	1,352.2		531.2	1,379.2		603.0
Total	9,939.8		4,922.5	10,358.7		5,053.6	10,552.0		5,771.3
Sugar Cane for Panela*	9,075.5	30	272.3	9,198.5	30	276.0	9,983.9	37	396.3

TABLE A-8 (continued)

	1962			1963			1964		
	Thousands of Tons	Average Producer Price	Value (Millions of pesos)	Thousands of Tons	Average Producer Price	Value (Millions of pesos)	Thousands of Tons	Average Producer Price	Value (Millions of pesos)
Sesame	21.0	2,250	47.3	30.0	2,450	73.5	55.0	2,850	156.7
Garlic and Onions	29.2	2,641	77.1	30.5	2,694	82.2	31.8	2,866	91.1
Cotton in bulk	218.0	1,844	402.0	187.3	2,236	418.8	175.9	2,567	451.5
Rice with hull	488.0	919	448.5	458.7	1,046	479.8	500.4	1,347	674.0
Bananas for Export	147.1	438	64.4	202.6	607	123.0	171.6	701	120.3
Cocoa in grain	15.0	5,575	83.6	15.7	6,589	103.4	16.4	705.3	115.7
Coffee	587.0	3,209.30	1,883.9	588.7	3,966.23	2,334.9	628.7	4,900.25	3,137.4
Sugar Cane	3,847.0	37	142.3	3,527.7	44.86	158.3	3,625.4	66.78	242.1
Rubber	.51	6,327	3.2	.51	9,167	4.7	.51	10,016	5.1
Barley	108.0	642	69.3	117.6	828	97.4	106.4	898	95.5
Copra	1.5	1,739	2.6	1.5	2,302	3.5	1.5	2,417	3.6
Beans	47.0	2,006	94.3	44.0	2,419	106.4	40.0	4,151	166.0
Corn	795.0	526	418.2	781.6	794	620.6	968.1	1,040	1,006.8
Potatoes	871.0	291	253.5	572.5	730	417.9	866.7	1,054	913.5
Platano	1,292.0	368	475.5	1,309.0	459	600.8	1,345.5	672	904.2
Tobacco in bulk	38.0	2,706	103.4	41.8	3,000	125.4	41.4	4,067	168.4
Wheat	162.0	957	155.0	90.0	1,052	94.7	88.9	1,394	123.9
Yuca	780.0	338	263.6	800.0	398	318.4	820.0	755	619.1
Panela	653.3	541	353.4	699.0	933	694.1	744.7	1,133	843.7
Sub Total	10,100.8		5,341.1	9,498.7		6,852.8	10,228.9		9,836.6
Minor Crops*	1,427.6		687.5	1,470.2		847.6	1,583.0		1,237.8
Total	11,528.4		6,028.6	10,968.9		7,705.4	11,811.9		11,074.4
Sugar Cane for Panela+	10,711.9	37	396.3	12,334.8	44.86	553.3	13,141.2	66.78	877.6

Table A-8 (continued)

	1965			1966			1967		
	Thousands of Tons	Average Producer Price	Value (Millions of Pesos)	Thousands of Tons	Average Producer Price	Value (Millions of Pesos)	Thousands of Tons	Average Producer Price	Value (Millions of Pesos)
Sesame	55.8	3,283	180.6	57.5	3,682.0	211.7	60.0	3,934	236.0
Garlic and Onions	32.7	4,000	145.2	33.8	3,826.0	129.8	34.0	3,436	116.8
Cotton in bulk	161.7	3,506	566.9	208.6	3,550.0	740.5	265.3	3,753	995.7
Rice with hull	571.3	1,703	972.9	541.8	1,884.0	1,020.8	661.5	1,914	1,266.1
Bananas for Export	253.5	987	250.2	310.9	808.0	251.2	325.6	1,031	335.7
Cocoa in grain	17.1	7,179	122.8	17.8	7,938.0	141.3	18.3	8,274	151.4
Coffee	594.0	5,004.06	2,972.4	613.6	5,231.69	3,210.2	587.2	5,823	3,419.3
Sugar Cane	4,156.0	62.96	261.7	4,558.9	70.21	320.1	5,477.9	59	323.2
Rubber	0.51	11,126	5.7	0.51	11,740	6.0	0.57	1,260.9	6.4
Barley	85.0	999	84.9	92.1	1,284	118.3	95.2	1,274	121.3
Copra	1.5	2,584	3.9	1.5	3,006	4.5	1.5	3,095	4.6
Beans	35.8	3,477	124.5	30.0	3,662	109.9	50.0	4,494	224.7
Corn	870.8	903	786.3	895.0	1,104	988.1	950.0	1,203	1,142.9
Potatoes	762.3	612	466.5	832.4	983	818.2	900.0	876	778.4
Platano	1,383.9	668	924.4	1,423.3	801	1,140.1	1,590.4	747	1,188.0
Tobacco in bulk	46.2	4,858	195.3	42.5	5,060	215.1	38.2	5,488	209.6
Wheat	111.1	1,525	169.4	150.0	1,755	263.3	100.0	1,756	175.6
Yuca	840.0	658	552.7	865.0	691	597.7	1,500.0	795	1,192.5
Panela	790.4	885	699.5	836.1	1,003	838.6	836.1	854	714.0
Sub Total	10,762.8		9,485.8	11,511.3		11,124.9	13,491.7		12,602.2
Minor Crops*	1,569.4		1,359.0			1,649.0			1,917.8
Total	12,332.2		10,844.8			12,773.9			14,520.0
Sugar Cane for Panela+	13,947.6	62.97	878.3	14,754	70.21	1,035.9	14,754	58.93	869.5

Source: Unpublished data used by the Banco de la Republica in the elaboration of the National Accounts.

\+ Since the processing of panela is a typically rural activity, the Banco includes it is part of agricultural output (as it does with construction of rural dwellings); the figure in this row is the value of the sugarcane itself; the figure for panela is this one plus value added in processing.

* Arracacha, banana for internal consumption, various fruits, hemp, green coco, lentils, chick-peas, broad beans, ñame, millet, other roots and tubers, peas, african palm, soybean, peanuts, anis, medicinal plants.

TABLE A-9

Output, Inputs and Their Ratios: 1925-1967

Year	Value Added (Output) (Millions of 1958 pesos)	Value Added (Alternate Series)	Output Indices 1958 = 100			Active Population	Capital (Millions of 1958 Pesos)	Land in Major Crops	Index of Total Land Input	Output Man	Capital Man	Output/ Capital	Land in Major Crops/ Man	Index of Yields for Major Crops	Value Added (1958 pesos) Per Hectare in Major Crops
			Crops	Live-stock	Total										
	(1)	(1a)	(2)	(3)	(4)	(5)	(6)	(7)	(7.5)	(8)	(9)	(10)	(11)	(12)	(13)
1925	2,694.7		31.7	45.4	37.4	1,717	8,402.5			1.57	4.89	0.32		(Holding Crop Weights Constant)	
1926	2,997.3		39.4	46.3	41.6	1,737	8,582.8			1.73	4.94	0.35			
1927	2,954.1		36.8	47.8	41.0	1,756	8,757.3			1.68	4.99	0.34			
1928	3,191.8		41.9	49.3	44.3	1,776	8,967.0			1.80	5.05	0.36			
1929	3,235.0		44.5	47.8	44.9	1,796	9,145.4			1.80	5.09	0.35			
1930	3,400.8		48.8	47.0	47.5	1,814	9,349.2			1.87	5.15	0.36			
1931	3,227.8		44.5	46.3	44.8	1,841	9,523.6			1.75	5.17	0.34			
1932	3,422.4		42.1	50.9	47.5	1,869	10,001.9			1.83	5.35	0.34			
1933	3,609.7		49.7	54.0	50.1	1,898	10,162.6			1.90	5.35	0.36			
1934	3,689.0		48.8	59.3	51.2	1,927	10,319.4			1.91	5.35	0.36			
1935	3,746.6		49.6	58.6	52.0	1,956	10,511.5			1.91	5.37	0.36			
1936	3,955.5		53.9	57.9	54.9	1,987	10,715.3			1.99	5.39	0.37			
1937	3,933.9		54.7	56.3	54.6	2,016	10,907.4	1,815-1,965		1.95	5.41	0.36			
1938	4,164.5		56.5	57.9	57.8	2,047	11,105.5			2.03	5.42	0.37	0.89-0.97		
1939	4,229.3		58.2	57.0	58.7	2,067	11,317.0			2.05	5.47	0.37			
1940	4,323.0		65.8	56.3	60.0	2,086	11,607.1			2.07	5.56	0.37			
1941	4,380.6		61.1	58.6	60.8	2,104	11,938.4			2.08	5.67	0.37			
1942	4,524.7		62.4	60.9	62.8	2,124	12,346.0			2.13	5.81	0.37			
1943	4,423.9		59.0	64.8	61.4	2,146	12,804.7			2.06	5.97	0.35			
1944	4,654.4		62.4	68.6	64.6	2,166	13,282.9			2.15	6.13	0.35			
1945	4,820.1		65.9	70.2	66.9	2,186	13,735.7			2.21	6.28	0.35			
1946	5,187.6		70.9	73.7	72.0	2,191	14,184.5			2.37	6.47	0.37			
1947	5,396.5		73.5	76.7	74.9	2,193	14,590.2			2.46	6.65	0.37			
1948	5,382.1		72.6	77.8	74.7	2,197	15,046.9	2,369		2.45	6.85	0.36	1.08		
1949	5,792.8		81.4	79.0	80.4	2,199	15,237.0	2,532		2.63	6.93	0.38	1.20		
1950	5,598.7	5889.5	73.8	83.1	77.7	2,202	15,634.0	2,410	86.7	2.54	7.10	0.36	1.09	90.8	2323
1951	5,524.6	6084.6	78.6	73.2	76.7	2,216	15,606.4	2,630		2.49	7.04	0.36	1.18	89.2	2101
1952	6,112.0	6446.9	89.7	76.6	84.8	2,215	15,638.6	2,778		2.76	7.06	0.39	1.25	99.8	2200
1953	5,966.4	6421.5	87.6	74.7	82.8	2,215	15,638.6	2,783		2.69	7.06	0.38	1.26	90.8	2145
1954	6,215.6	6568.8	92.3	76.1	86.3	2,237	15,842.7	2,923		2.78	7.08	0.39	1.31	90.0	2126
1955	6,372.0	6664.3	90.3	84.5	88.4	2,263	16,186.4	3,010		2.82	7.15	0.39	1.33	89.6	2117
1956	6,433.1	7018.7	87.1	91.6	89.3	2,288	16,506.4	2,913		2.81	7.21	0.39	1.27	89.8	2208
1957	6,695.0	7480.1	89.7	96.7	92.9	2,313	16,712.7	2,787		2.89	7.23	0.40	1.20	89.9	2402
1958	7,240.0	7667.2	100.0	100.0	100.0	2,340	16,929.7	2,908	100.0	3.09	7.23	0.43	1.24	100.0	2490
1959	7,698.9	8253.3	108.5	102.6	108.0	2,366	17,228.2	3,029		3.25	7.28	0.45	1.28	102.1	2542
1960	7,890.4	8162.5	109.9	107.1	109.5	2,393	17,651.4	3,106		3.30	7.376	0.45	1.30	100.6	2540
1961	7,959.0	8571.7	110.7	108.8	110.5	2,420	18,214.2	3,027		3.29	7.527	0.44	1.25	104.3	2629
1962	8,550.8	8917.4	120.2	114.2	118.7	2,447	18,796.4	3,123		3.49	7.681	0.46	1.28	107.8	2738
1963	8,437.0	8938.3	112.9	122.0	117.1	2,475	19,473.1	3,071		3.41	7,868	0.43	1.24	102.5	2747
1964	8,769.4	9317.8	119.2	123.8	121.7	2,500	20,326.5	3,239		3.51	8,131	0.43	1.30	103.8	2707
1965	8,918.2	9669.8	124.1	125.5	124.7	2,529		3,431		3.53			1.36	103.9	2599
1966	9,245.3	9704.1	126.7	126.0	126.4	2,559		3,431		3.61			1.34	107.6	2766
1967	9,420.4	9866.5	132.2	129.7	131.2	2,589		3,300	108.71	3.64			1.27	109.2	2855
1968	10,098.7		141.3	135.9	139.3	2,617				3.86					
1969	10,483.4		145.6	141.9	143.3	2,644				3.96					

Sources and Methodology

Col. (1) is based, for the years 1950 and after, on unpublished data used by the Banco de la Republica in calculating the Cuentas Nacionales, and on estimates made by Jay Atkinson ("Changes ...", op. cit.). We assumed Atkinson's value of crop and livestock figures were the most accurate,[1] and

[1]There appear , however, to be errors in Atkinson's figures for coffee and milk. In order not to further complicate the number of available series we continue to use his, but present in Col. (1a) a series corrected for underestimation of coffee value added. (Since coffee prices are above equilibrium, the original series could be closer to a measure of social value added.)

summed them with Banco figures on small farm output (rural housing, etc.) and purchased inputs. The pre-1950 figures are based on ECLA data (Annexo Estadistico..., op. cit.) spliced onto the post 1950 series.

Cols. (2), (3), and (4) rely on Atkinson's data for the post 1950 period; note that they are value of product series rather than value added ones, and hence do not accord with Col. (1) precisely. Pre-1950 data are based on ECLA statistics, with some adjustments by the author for the late 40's based on independent data.

There are slight discrepancies between the data presented here and Atkinson's final series (the figures used were not his final revisions) but these differences are minimal. For 1968-9, the growth rates presented in the Banco de la Republica's national accounts are used to extend the series.

Col. (5) (population data) comes from ECLA up to 1953 and the author's[2] estimates based on adjusted 1964 census data since then. ECLA made what seem to be reasonable upward adjustments to the early census figures. The census figure in 1951 was 2,023.3 thousand (including fishing and hunting), about 10% below the figure adduced by ECLA. We have assumed an underestimate of about 4% in 1964 (the census figure was 2,425.1 thousand).[2]

[2]Errors in the population series may result from the use of inappropriate adjustments to the census estimates for the active labor force, and from incorrect interpolations due to lack of information on changes between the census periods. Our estimate of probable underestimation of the male labor force in 1951 is 8.3%, (based primarily on Lemieux's post census check) about equal to ECLA's (9.5% for the male and female labor forces together). Since there has been no census since 1964 it is more difficult to accuracy for this point in time. It is reasonable to assume that this census was more accurate than that of 1951, partly because population in the average region became denser and hence easier to count between the two points, the violence problem reflected in the 1951 estimate was no longer present, and partly because census methodology had improved. Still, it seems hard to believe that the percent missed in 1964 was less than about 3%, and it might well have been more. The assumption of under reporting of 3% along with ECLA's 1951 figure implies an average growth rate between the two years of 0.94%; if under reporting had been 5% in 1964, (and the 1951 figure of Table II-1 accurate) the average growth rate would have been higher by about 0.15

of 1% per year. (In absolute terms about 1.17 per year). Between the same two years the registered non-agricultural labor force grew at 3.5%. If we assume that ECLA's 1951 estimate was for agriculture only--that is, excluding hunting, fishing and forestry--then the figure of 2,500 in the active population in 1964 is not unreasonable (i.e. assuming that figure too excludes fishing, etc.) and implies under reporting of about 4% in 1964.

In all of the years, except those corresponding to censuses, the figures - based mainly on interpolation - are naturally open to great deal of doubt; ECLA concluded that the agricultural population was rising very slowly from 1949 to 1953 (even falling a little in 1952) presumably as a result of the violencia. This may or may not have been true; in any case any factor/output or factor/factor ratio involving labor force would in general be more accurate in census years or nearby years than in the middle of intercensal periods. Changes in average output per person in these years of the early 50's would be especially subject to question.

Recent evidence suggests that the rate of growth of the agricultural population has slowed down in the post 1964 period, but the information is not sufficient to provide an accurate estimate subsequent to the 1964 one; it is thus possible that the figures in the late 1960s are overestimated, but it is not clear.

Col. (6) is based on data from ECLA ("El uso, op. cit. p. 19) and originally estimated by the Planning Commission for the post 1950 period, and ECLA data (An exo, op. cit.) for pre-1950. Apart from other weaknesses, the capital figures in the post 1950 years may include some effects of coffee inventory changes, likely to be irrelevant in much analysis according to Atkinson (Agricultural .... op. cit. p. 26); the source would not lend one to expect this inclusion, however. In estimating the pre-1950 figures, the ECLA Mission made use of a variety of sources. Most items in the capital stock are measured in a somewhat indirect fashion. The estimate of capital stock in plantations was to a large extent deduced from the output figures for various perennial crops such as coffee, cocao, and bananas. That of agricultural machinery was based on imports and length of life assumptions. Although a considerable amount of care was put into the analysis, it clearly has many weaknesses. As estimates of the amount of capital in a given year, the figures are probably fairly reasonable. But for overtime analyses (e.g. change in capital output ratios over short periods of time), their use would be unwise, especially since, to a considerable extent, the capital stock figures were deduced from the output figures.

Col. (7) is from Atkinson, Changes..... op. cit., Table 31. The crops included as "major" are coffee, yuca, beans, platanos, sugar, corn, potatoes, wheat, tobacco, bananas, cocoa, cotton, rice, sesame, barley, soybeans, and sorghum. Col. (7.5) is from USDA, Agricultural Productivity...., op. cit., p. 15. Atkinson does not explain the methodology used to estimate the pasture land. The figure weights crop and pasture land by the relative rental price of each.

If income elasticity was:	Then price elasticity was:
0.7	-1.88
0.6	-1.61
0.5	-1.34
0.4	-1.08
0.3	-0.82

If output growth rates of 1.4 and 3.4 (One percent below and one percent above the ECLA based rate) are assumed, the elasticities are as follows.

For a price change of 19%:

If income elasticity was:	Then price elasticity was: $\frac{ds}{dt} = 1.4$	$\frac{ds}{dt} = 3.4$
0.7	-1.64	-0.41
0.6	-1.48	-0.29
0.5	-1.33	-0.16
0.4	-1.18	-0.03
0.3	-1.03	+

For a Price Change of 10%:

	$\frac{ds}{dt} = 1.4$	$\frac{ds}{dt} = 3.4$
0.7	-3.12	-0.79
0.6	-2.81	-0.54
0.5	-2.53	-0.30
0.4	-2.24	-0.06
0.3	-1.96	+

Richard Weisskoff (Richard Weisskoff "Demand Elasticities for a Developing Economy: An International Comparison of Consumption Patterns", Economic Development Report #125, Project for Quantitative Research in Economic Development, Center for International Affairs, Harvard University, February 1969) from pooled time series data for 15 developing countries arrived at a long run (i.e. 8-15 years) expenditure elasticity for food of 0.64 and a long run price elasticity of -0.64. (pp. 28-30). Income elasticity would presumably be a little lower than expenditure elasticity. His data indicated similar results across countries and the null hypothesis that the data for the different countries was generated by the same universe was accepted. These figures are not inconsistant with the Colombian data, i.e. if we could assume on the basis of international evidence that income elasticity in Colombia were 0.5 in this period, (a little below Weisskoff's estimated expenditure elasticity) then price elasticity must have been -0.70, close to the internationally estimated figure, if the relative price increase was 19%, though high if that increase had been 10%.

Our estimates of income elasticity for 1950-67 range between 0.3 and 0.9 but the arc elasticity calculation, presumably the most relevant, is 0.79. The period 1938-50 might be assumed to have a similar elasticity; though it could also be argued that it would be lower because of a faster income growth, and slower population growth, or higher because average

no9/ The figure for 1937-8 is from the Anuario General de Estadistica of 1939, the crops for which estimates were presented being cotton, beans, corn, potatoes, tobacco, wheat, sugar, bananas, cacao, and coffee; estimates were made by the author for barley, sesame, yuca and plantanos.

Col (12) is based on calculations by the author; it is a constant weight index of major crop yields; Col. (13), on the other hand, is simply Col. (1) divided by Col. (7), i.e. a variable crop weight yield index.

In view of the obvious deficiencies in data on crop and livestock output before 1950, the short time in which ECLA worked up these estimates and the incompletenesses of their stated methodology in various respects, any possible consistency checks on the data for this earlier period seem especially warranted. One discussed here focuses on the 1939-41 to 1949-51 output and price movements. During this period for ECLA based output figures (adjusted for imports and exports) /indicate an increase in domestic supply of 2.4% annually. The relative increase in price of agricultural goods vis a vis other consumption goods was probably 10 to 20%. The index Pa/Po (where Pa is price of agricultural goods in the domestic market, Po is price of other goods and the index equals 1.0 in 1939-1941) was 1.19 and 1.20 when based on the blue collar consumer price indices in Bogota and Medellin respectively. Based on the Bogota white collar index, it was 1.10. The price index of crops (excluding coffee) and livestock divided by the national income price deflator gave 1.30 and divided by the gross national product deflator, 1.18. This latter difference results from the faster increase during the period in question of export prices than of import prices. As imports in general became cheaper, this lowered capital goods prices especially; thus the increase in consumer goods prices was faster than that of all goods. The relevant "other" in this case would seem to be consumer goods. We therefore calculated the implicit price and income elasticities combinations corresponding to $\frac{\Delta P_a}{\Delta P_o} = .10$ and $\frac{\Delta P_a}{\Delta P_o} = .19$.

With the supply increase of 2.4% per year and price change of 19% this gave the following set of possibilities:

If income elasticity was:	Then price elasticity was:
1.0	-1.40
0.9	-1.26
0.8	-1.13
0.7	-0.99
0.6	-0.85
0.5	-0.70
0.4	-0.57
0.3	-0.43
0.2	-0.28
0.1	-0.15

Assuming the relative price increase was only 10% then:

incomes were lower. If the correct value lay between 0.6 and 0.8, then the implicit price elasticities would be rather high, given the assumption that prices rose 10 to 19%. This suggests that the 2.4 output growth rate for the 1938-50 period is more likely to be downward than upward biased. While neither the price change information nor the use of a particular elasticity of demand calculated for 1950-57 in the early period warrents the modification of the ECLA series, we can conclude that the series is not obviously inconsistant with other available information, and that any bias is more likely to be down than up. A supply increase as low as 1.47 would have been virtually impossible unless the change in relative prices lies well outside the range considered here; a growth as fast as 3.4% is not impossible though it is unlikely unless price rose as little as or less than 10%.

TABLE A-9.1

Estimated Cropland by Final Demand 1837-1960 (thousands of hectares)

Year	For Urban Consumption	For Rural Consumption	For Export	Total Cropland	Percent of Total Arable Land
	(1)	(2)	(3)	(4)	(5)
1837	16	318	17	351	2.3
1857	25	338	11	374	2.5
1870	33	350	31	414	2.8
1910	92	689	139	920	6.2
1925	152	925	395	1,471	9.9
1938	244	1,148	403	1,795	12.1
1951	446	1,402	616	2,464	16.6
1960	741	1,712	589	3,042	20.6

Source: McGreevey, op. cit., p. 122; for sources and methodology of calculations see the appendix to his Chapter VI.

Section IIa: Aggregate Figures; Capital Stock, Investment, and Mechanization

Estimates of investment and capital stock are difficult in any sector of the Colombian economy, but especially so in agriculture. Machinery and equipment investment is the easiest to measure, since most of the goods have been imported. Livestock is next best, and most other forms of capital are very difficult to deal with. In most cases capital stock is considerably more difficult to handle than investment, e.g., machinery. The conceptual problems surrounding "capital stock" are many and the empirical difficulties at least as great. Perhaps the major conceptual distinction to be made is that between capital stock measured by productive potential (i.e., implicit rental price) in a given year, and that measured by depreciated value. Where the interest is in an indicator of potential contribution to current production then the difficulty is, in general, to (a) appraise the changing potential of a given item according to its vintage and (b) to estimate the length of life, which could, of course, vary over time on average; there would, in general, be a frequency distribution of length of life for the new capital, of whatever type, put into service in a given year.

The problem of measurement is further complicated by the fact that it is not clear from a conceptual point of view exactly what should be included in the agricultural capital stock. From some theoretical points of view, land and capital may usefully be lumped together, i.e., the value of land may be included in the measure of total capital in the calculation of capital-output ratios, etc. From other points of view, of course, a distinction is useful; land plays a different role in production, and it does not have to be produced, distinct from capital in the narrow sense. But

the distinction creates problems too since certain types of investment are to all intents and purposes perfectly substitutable with differences in land quality, e.g., land of one region without any investment may be the same as land in another region which has received certain types of investment to improve its quality. Those forms of investment which are must substitutable with differences in land quality are usually the most difficult to measure, and often go unmeasured.

These various conceptual difficulties will be mentioned on occasion in the discussion to follow, though it must be noted from the beginning that it is infrequent that the data permit any real choice of series according to sophisticated conceptual concepts.

The most comprehensive investment and capital stock series prior to recent years are those prepared by ECLA (op. cit.) for the years 1925-53. Table A-10 summarizes the ECLA series on capital stock and Table A-11 the series on investment. A more detailed breakdown of ECLA estimates of capital stock by sub-sectors within agriculture is presented in Table A-12. (Comparable estimates giving capital per person are shown in Table A-13.) These ECLA series, while far from precise, are the result of some serious work and the figures are probably good enough to use for some general purposes. The approach used in calculating the investment in the different years and the capital stock at different points in time involved primarily working back from the observed changes in output structure at different points of time. In the case of livestock, a slaughter ratio was assumed for each point of time. I am not aware of the precise assumptions made, but I assume that the output to capital ratio for each crop, such as coffee or cocoa, was assumed to remain unchanged over the period. For most crops this

would be a reasonably accurate assumption over most of this period. It would mean, however, that any analysis of technological change or changing capital output ratios in the production of specific crops would be rendered impossible. And to the extent that such changes occurred, the figures would be inaccurate. Annual changes in capital stock would no doubt be less accurate than changes over longer periods of time.

No effort comparable to ECLA's has been made with respect to total agricultural investment and capitable stock for the post-1950 period. To partially plug this gap, I have constructed time series for some of the major components of investment and capital stock.

Summary results are presented in Table A-15, and figures for the different types of capital in Tables A-16 to A-35.

TABLE A-10

Existing Capital Stock in Agriculture, 1925-1953
(millions of 1950 pesos)

	Machinery & Equipment	Construction & Improvements	Cattle	Total
1925	104	2.574	1.609	4.287
1926	107	2.623	1.649	4.379
1927	114	2.672	1.682	4.468
1928	123	2.727	1.725	4.575
1929	129	2.777	1.760	4.666
1930	131	2.834	1.805	4.770
1931	127	2.890	1.842	4.859
1932	124	3.011	1.968	5.103
1933	119	3.057	2.009	5.185
1934	117	3.103	2.045	5.265
1935	114	3.163	2.086	5.363
1936	113	3.225	2.129	5.467
1937	111	3.288	2.166	5.565
1938	110	3.351	2.205	5.666
1939	110	3.419	2.245	5.774
1940	107	3.502	2.313	5.922
1941	105	3.584	2.402	6.091
1942	99	3.684	2.516	6.299
1943	94	3.796	2.643	6.033
1944	92	3.941	2.744	6.777
1945	92	4.083	2.833	7.008
1946	94	4.227	2.916	7.237
1947	100	4.330	3.014	7.444
1948	105	4.465	3.107	7.677
1949	113	4.453	3.208	7.774
1950	127	4.463	3.346	7.936
1951	135	4.492	3.282	7.909
1952	139	4.545	3.171	7.855
1953	144	4.704	3.076	7.924

SOURCE: ECLA, op. cit., Statistical Appendix, pp. 29-31.

TABLE A-11

Capital Formation in Agriculture, 1925-1953
(gross fixed investment)
(millions of 1950 pesos).

	Machinery & Equipment	Housing	Other Construction and Improvements			Total Without Housing or Cattle	Cattle	Total Non-Housing
			Private	Public	Total			
1925	19.0	0.4	144.0	--	144.0	163.0	--	--
1926	18.0	0.9	145.4	0.6	146.0	164.0	40	204.0
1927	23.0	1.1	148.1	0.9	149.0	172.0	33	205.0
1928	27.0	2.4	156.0	1.0	157.0	184.0	43	227.0
1929	25.0	2.9	152.4	1.6	154.0	179.0	35	214.0
1930	21.0	1.3	162.0	2.0	164.0	185.0	45	230.0
1931	14.0	0.9	163.5	2.5	166.0	180.0	37	217.0
1932	15.0	0.9	234.7	2.3	237.0	252.0	26	278.0
1933	12.0	1.6	160.1	3.9	164.0	176.0	41	217.0
1934	15.0	2.1	163.8	3.2	167.0	182.0	36	218.0
1935	13.0	2.2	179.1	3.9	183.0	196.0	41	237.0
1936	15.0	2.7	186.5	2.5	189.0	204.0	43	247.0
1937	14.0	3.5	178.4	14.6	193.0	207.0	37	244.0
1938	15.0	3.1	167.1	28.9	196.0	211.0	39	250.0
1939	16.0	4.7	177.7	26.3	204.0	220.0	40	260.0
1940	12.0	8.8	154.0	70.0	224.0	236.0	68	304.0
1941	13.0	4.8	138.0	89.0	227.0	240.0	89	329.0
1942	8.0	4.2	133.3	116.7	250.0	258.0	114	372.0
1943	9.0	4.4	179.6	88.4	268.0	277.0	127	404.0
1944	11.0	4.9	275.0	34.0	309.0	320.0	101	421.0
1945	13.0	5.1	297.1	15.9	312.0	325.0	89	414.0
1946	16.0	5.6	290.9	32.1	323.0	339.0	83	422.0
1947	20.0	4.9	237.7	49.3	387.0	407.0	98	505.0
1948	20.0	6.4	281.4	45.6	327.0	347.0	93	440.0
1949	24.0	6.2	147.2	31.8	279.0	303.0	101	404.0
1950	32.0	7.8	173.6	27.4	201.0	233.0	138	371.0
1951	28.0	5.6	164.2	56.8	221.0	249.0	64	185.0
1952	24.0	6.6	187.2	60.8	248.0	272.0	111	161.0
1953	26.0	8.0	302.5	59.5	362.0	338.0	95	293.0

SOURCE: ECLA, op. cit., Statistical Appendix, pp. 27-29.

NOTE: The series for investment without cattle which is implied by the figures in this table does not correspond to that of ECLA. Statistical Appendix, p. 9, whose figures are consistantly about 20 million pesos higher. The source of discrepancy is unknown to me.

TABLE A-12

Distribution of Stock of Capital Among the Main Agricultural Activities, 1953

(millions of pesos)

	Coffee	Other Crops	Total for Crops	Stock Farming	Total for Agriculture
Total capital invested (fixed and working)	1,300	1,798	3,098	6,546	9,644
a. Working capital	208	464	672	736	1,408
b. Fixed capital	1,092	1,334	2,426	5,810	8,236
Soil improvements	166	545	711	1,631	2,342
Plantations and artificial pasturage	312	123	435	252	687
Buildings, installations and fences	609	519	1,128	330	1,458
Livestock	--	--	--	3,585	3,585
Machinery and equipment	5	147	152	12	164

[a]After depreciation and at replacement cost.

SOURCE: ECLA, op. cit., p. 203.

TABLE A-13

Composition of Stock of Capital in Agriculture
As a Whole and in Selected Activities, 1953

	Coffee	Other crops	Total for crops	Stock farming	Total for agriculture
Active population (Thousands)	335.9	822.3	1,158.2	1,056.4	2,214.6
Total stock of capital per active person (Pesos)	3,870.2	2,186.5	2,674.8	6,196.5	4,354.7
Fixed capital, excluding livestock, per active person	3,251.0	1,622.3	2,094.6	2,106.2	2,100.2
Capital in buildings, installations and fences per active person (Pesos)	1,813.0	631.2	973.9	312.4	658.4
Capital in machinery and equipment per active person (Pesos)	14.9	178.8	131.2	11.4	74.1
Capital in soil improvements per active person (Pesos)	494.2	662.8	613.9	1,543.9	1,057.5

SOURCE: ECLA, op. cit., p. 203.

Table A-14

Gross Rural Investment

Year	Thousands of 1958 pesos	Thousands of Current Pesos
1950	326, 834	175, 434
1951	232, 441	137, 336
1952	216, 050	162, 287
1953	232, 025	145, 311
1954	306, 905	203, 502
1955	320, 671	223, 583
1956	297, 157	222, 090
1957	310, 502	267, 258
1958	301, 588	301, 588
1959	305, 281	338, 808

SOURCE: Planning Commission (Planeacion).

Table A-15

Agricultural Capital Stock By Components, 1959-1967
(millions of 1958 pesos)

27

	Thousands of Hectares: Atkinson Estimates																		
	Cultivated Land	Pasture	Cultivated Land Equivalent of All Land	Implicit Value of Land, Based on Atkinson estimates and Assuming Return of: (4)10%[a]	(5)8%	Value of Land and Improvements[d] (Catastro, adjusted) (current prices)	(1958 prices)	Cattle	Other Livestock	Artificial Pasture	Irrigation and Drainage	Buildings,[b] Installations, Fences	Sum of (10),(11), (12)	Plantations	Machinery	Working Capital	Total of Quantified Components	Crop	Livestock	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1950	2651	13,463	4597	22,390	28,000			6,674						768	322			3274	10,276	13,550
1951								6,817						779	386			3364	10,164	13,521
1952						11,072	18,766	6,746						792	322			3453	10,103	13,556
1953						12,467		6,674	1074	50	358[c]	831	1239	915	472	2241.4	16,149[e]	3509	10,048	13,557
1954								6,593						959	567			3662	10,035	13,697
1955								6,532						921	685			3833	10,199	14,032
1956						19,453		6,674						850	754			3973	10,336	14,309
1957						21,215		6,812						903	768			4007	10,480	14,487
1958	3198	14,550	5301	25,817	32,270	21,596	21,959	6,960	1185					942	822			4069	10,607	14,676
1959						21,959		7,103						963	892			4141	10,794	14,935
1960						22,760		7,246		75	360	970	1411	1002	962			4187	11,114	15,301
1961						24,083		7,498						958	1054			4354	11,435	15,784
1962						25,280		7,664						953	1114			4528	11,767	16,295
1963						32,267	23,586	7,807						960	1122			4734	12,146	16,880
1964						35,305		7,950						973	1174			4983	12,568	17,551
1965						41,130		8,095						967	1207					
1966						45,430	21,470	8,237						986	1164					
1967	3630	14,770	5765	28,076	35,100			8,524	1489	100	514	1100	1714	984	1271	3589.5	21,664[f]			
1968								8,953							1421					
1969								9,334[a]												
1970								9,714[a]												

Planeación Estimate

[a] Atkinson, Agric. Prod. op. cit., employed this figure for capital stock. His analysis did not require a specific assumption in the case of land.

[b] excluding rural housing.

[c] Irrigation 220,000 hectares and drainage 30,000 hectares.

[d] ECIA's distribution of capital figures (Table A-27) places a very high value on land clearing, especially the livestock land; this seems somewhat doubtful, although it is true that on the best valley crop land there was probably not much clearing to be done, so costs would be less there than on the pasture lands of the northern plains.

Table A-15 (continued)

Sources and Methodology

Few attempts have been made at careful estimates of any of the various components of the capital stock in Colombian agriculure; the major point of time estimate known to this author is that of ECLA for the year 1953; (they also estimated stock in machinery and equipment, and other types of capital over 1925-1953 with, inevitably, a good number of problems, as already discussed).

Cols. 1, 2, and 3 are based on Atkinson's study, (U.S. Department of Agriculture, Foreign Economic Report 66, Agricultural Productivity in Colombia Washington, U.S. Government Printing Office, 1970). The author does not explain, in presenting these figures, whether they are felt to include none, part, or all of the improvements posterior to the actual clearing. Since no attempt is made to deal with land quality, the implication presumably is that the land is more or less homogeneous, this implying in turn that clearing costs are included in its value. (Special features like the greater inaccessibility which in some cases lead to a lower market value of new land than of settled land are difficult to take into account; note that where output is valued by average national price times quantity regardless where produced, the lower economic productivity of outlying regions is also not taken into account.) Strictly for comparative purpose, cols. (4) - (7) effect a comparison of crude estimates of the value of land based on (a) Atkinson's estimates of the annual rental service of land and (b) the catastro (assessments for tax purposes). Cols. (4) and (5) apply, respectively, assumed rates of return of 10% and 8% to Atkinson's estimated land rental flow (USDA, op.cit., p.15) to derive land stock values. Col. (6) is the author's adjustment to the official catastro figures for rural properties; the upward adjustment, based on discussions with technicians in the catastral office, varied from 100% in 1952 to only 57% in 1965. These values were then converted to 1958 prices (Col. 7) by the gross national income deflator. The figures of Col. (7) are substantially though not dramatically below those of, say, Col. (4); the decrease in the real value of land implicit in the 1962 and 1965 estimates is no doubt due to the invalidity of an assumed improvement in completeness of the catastro between these years.

Col.(8) comes from Table A-16, and is based primarily on information from the 1960 agricultural census, 1967 and 1968 agricultural samples, and ECLA's estimates for 1953.

Col. (9): for all livestock except beasts of burden (horses, mules, and donkeys) the capital estimate is based on an assumed "capital/value of output sold" ratio. In 1960 this was .7 for hogs, 1.5 for sheep (goats were omitted as being too small to matter) and .7 for fowls. The same ratios were assumed for 1967-8, but in 1953, judging from Atkinson's figures which implied a running down of inventory of hogs in the intervening period, a "capital/value of output sold" ratio of .9 is assumed. In the case of fowls a marginally higher capital output ratio is assumed in 1960. For these categories the output series were taken from Banco de la Republica, unpublished output series and Atkinson (USDA, Changes ... op. cit.). The greatest uncertainty appears to lie in the estimate of the number of beasts of burden and in their price. In 1960 the price applied was 333 1968 pesos for horses and 445 for mules and

Table A-15 (continued)

a very low price for donkeys. ECLA estimated 1.86 million horses in 1953; probably it meant to include the other draught animals as well, in which case the figure would be almost the same as that reported in the 1960 agricultural census (after some upward adjustment for assumed under-enumeration) and that appearing both in 1967 and 1968. We assume virtual constancy in the value of these animals throughout the period considered.

Col. (10), artificial pasture, was based on a 1967 estimate and crude approximations for the other two years. Sources are highly conflicting on both the total amount of land under pasture and the amount of it under artificial or improved pasture. It is not clear whether the term artificial and improved are designed to be equivalents or not. There seems to be no convincing evidence that the amount of artificial pasture has been above two million hectares at any time; this is the figure recorded in both 1967 and 1968 sample surveys. Unfortunately the 1960 census did not provide this information. ECLA's estimate of ten million in 1953 is not defended and appears to have no firm basis (see ECLA, op.cit., p. 409 for sources). As noted,

The 1967 DANE encuesta indicated about two million hectares under artificial pasture; if these are valued at 50 pesos per hectare the total value is about 100 million. (ECLA in 1953 estimated a set up cost of 50 pesos and a depreciation of 50% on average; we maintain the same set up cost here (about 80 pesos in 1958, but assume a slightly lower depreciation rate.) There is virtually no serious evidence indicating what the amount of artificial pasture might have been in the early 50's, ECLA's estimate having been way off base; here we crudely estimate that it was 1/2 the 1967 level. As can be seen this does not form a great share of agricultural capital stock so the total figure is not too sensitive to an error here.

Col. (11) has as sources: 1953 ECLA, converted from 1953 to 1958 pesos by the GDP deflator; for most components of the capital stock ECLA's value estimates are above those presented here, but there was no alternative estimate available for this category. ECLA's figure for the value of irrigation works--1,000 pesos per hectare in 1953--is adopted here, pending further evidence; INCORA will probably have higher figures for the more recent irrigation works. The 1960 figure for irrigated hectares is slightly adjusted up from the agricultural census figure of 226,000 hectares. The 1968 figure (323,000 hectares) is from DANE Encuesta Agropecuario Nacional 1968, p. 28.

Col. (12): no information is known to me on buildings, installations and fences since the ECLA study; installations for processing (mainly coffee) constituted 40% of the total figure, other building, 40%, and fences 20%. Installations pertain primarily to coffee and panela, and since these have been relatively stagnant in output since the early 50's, it may be assumed that little increase has occurred. Probably there has been an increase in fences--perhaps a doubling, and some increase in other buildings, though probably not dramatic. The estimates for 1958 and 1967, especially the latter, are very crude.

Col. (14) is from Table A-17.

Col. (15) is from Table A-19, Col. (8).

Col. (16) is based on Table A-26, with conversion to 1958 prices.

Cols. (18) - (20) are from Table A-21.

Table A-16

Cattle Stock
Estimates, Number and Value
1950 - 1970

	Estimates of the Number of Cattle (thousands)					Estimated Value (Millions of 1958 Pesos)
	Henning-Atkinson[1]	Garcia[2]	Ochoa[3] (Andi)	Bowser[4] (Agricultura Tropical)	Banco Ganadero[5]	
	(1)	(2)	(3)	(4)	(5)	(6)
(Stock as of Jan. 1)						
1950	14,016		13,900			66 744
	14,316		13,750			68 173
	14,166		13,600			67 458
	14,016		13,450			66 744
	13,846		13,300			65 935
1955	13,716		13,600		12,482[b]	65 316
	14,016		13,100			66 744
	14,316		14,200			68 173
	14,616		14,500			69 601
	14,916		14,900			71 030
1960	15,216	9,640[c]	15,400			72 459
	15,745		15,900			74 978
	16,095		16,500			76 644
	16,395		17,000			78 073
	16,695	14,115	17,600[d]			79 502
1965	17,000	15,019	18,200			80 954
	17,298			14,994		82 373
	17,900	16,223		15,252		85 240
	18,800			15,758		89 526
	19,600[a]			16,547		93 335
1970	20,400[a]					97 145

[a] Preliminary.

[b] Excluding Meta.

[c] DANE, 1959 Agricultural Census; this figure is recognized by all observers to be a serious underestimate.

[d] Caja Agraria estimate to which rest of series is keyed.

Sources:

1. Robin G. Henning, Ganado y Carne, Colombia, Analisis de la Producion y Prospectos Para Exportacion, Ministerio de Agricultura, Documento 056, Julio 5, 1971. Extrapolated back from 1960 by Atkinson series which seems to be from Latorre. See USDA Changes..., op. cit., p. 83.
2. Alfredo Garcia Samper, Perspectives..., op. cit., p. 9. Original source, DANE, Agricultural Census and Samples.
3. Juan Camilo Ochoa, "La Exportacion y el Formento del Ganado," Revista Trimestral, Associacion Nacional de Industriales, Vol. II, No. 3, Feb. 1967.
4. Max F. Bowser, "Prerequisitos y Potencial Para la Exportacion de Carne en Colombia en la Decada de 1970," Agricultura Tropical, Vol. XXV, No. 11, Nov. 1969.
5. Unpublished estimate of the Banco Ganadero.

Sources and Methodology for Table A-16

Col. (6) is based on the stock series of Col. (1) and a price series which reflects 1958 prices for 10 categories of cattle according to age, sex, and type. Figures on prices are from Garcia, op. cit. From these an average price (476.2 pesos per head was calculated in 1958). Since the objective was to get a quantity or physical series for the cattle stock, it was not desired to take into account relative changes in cattle prices vis a vis other goods in the economy. Changes in relative prices of the different types of cattle could imply that the series would be sensitive to the base year, but these tend not to be significant over the long run, although they may be important over the cycle, a 6 to 8 year phenomenon in Colombia. The resulting series should be interpreted with these reservations in mind.

Table A-17

Area Under Permanent Crops and Value of Plantations, 1950-67

(1958 prices)

Year	Area in Hectares						
	Cafe	Cacao	Platano	Sugar for Panela	Sugar for Refining	Banano	Total Value (Millions of pesos)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1950	656.0	31.7	119.7	214.1	45.4	40.0	767.9
1951	660.0	31.7	119.0	218.0	50.6	44.0	778.9
1952	675.0	32.0	120.0	218.3	51.0	44.0	792.0
1953	831.0	32.4	120.0	214.9	49.5	45.0	915.3
1954	872.5	32.9	142.5	218.6	51.5	45.0	959.2
1955	816.2	33.3	154.7	219.9	53.2	46.0	920.8
1956	725.3	33.6	160.6	219.8	53.1	45.0	849.5
1957	790.4	32.0	168.5	219.8	53.1	47.0	902.9
1958	832.5	32.0	166.6	222.5	56.7	50.0	941.7
1959	858.7	32.0	179.9	221.0	54.7	48.0	963.3
1960	892.5	32.0	185.1	227.1	62.9	50.0	1,001.9
1961	831.5	33.0	187.4	231.0	62.8	51.0	957.7
1962	824.1	34.0	189.2	228.1	65.1	49.0	952.7
1963	810.0	35.0	191.6	252.1	64.9	56.0	959.6
1964	813.1	37.0	196.8	253.6	71.6	58.0	973.0
1965	812.0	37.4	170.5	245.7	80.5	58.0	967.1
1966	811.4	38.0	225.0	235.3	91.6	58.0	986.4
1967	810.6	37.0	230.0	233.7	89.6	58.0	983.7

Sources and Methodology, Table A-17

Columns (1) to (6), with the hectares under crops are from USDA, Changes...op.cit.

The major difficulty in calculating a useful plantation stock series has to do with prices, partly related to the lack of information on price of plantations separate from the land itself, and partly to the fact that since relative plantation prices change substantially over time, no base year gives a perfect picture of changes in productivity of this form of capital over time; in particular, the coffee price is problematic since it fluctuated rather violently over the period in question. The main form of plantations, is, of course, coffee. In 1953 ECLA estimated the value of a new plantation at 750 pesos per hectare and a representative (and therefore partially depreciated) one at 375; in 1958 prices this is 1,200 and 600 respectively. The FAO-ECLA study in 1955-56 estimated the cost of establishing a new plantation (converted to 1958 prices) at about 1055, although their estimated market value was well above this. Since the FAO study was in a period of atypically high prices, we opt here for their establishment cost lowered for depreciation by a little over 20% (ECLA used a 50% depreciation rate which seems unduly high in view of the presumed high discount rate which presumably prevailed in the Colombian agricultural sector (and also if one is more interested in an estimate of current potential services rather than one of present value).

The value of plantation per hectare figures applied were coffee, 8,000; cacao, 1,400; platanos, 300; sugar for panela, 500; sugar for refining, 700; bananas, 6,000. In general, the prices applied in the calculation here correspond rather closely to ECLA's establishment cost prices, although banana is a little higher as are coffee and cacao. There appears to be no evidence to suggest that the relative prices used are out of line.

Capital formation in the form of machinery is of particular interest because of its association with "modernization" of the sector and its increasing weight in the total capital stock. Since tractors tend to dominate the series, major attention must be given to them, though for some purposes it is also of much interest to know what has happened to other types of implements, less characteristic of commercial farms.

With respect to tractors, the number imported is fairly well agreed upon (Col. (1), Table A-18) so the major difficulty centers around (a) estimating length of life, i.e., coming to some sort of stock estimate over time, and (b) ascertaining the productive potential of machines of different vintage. A plausible estimate of stock has been generated by Wayne Thirsk. (This is used as the basis for the estimate of productive potential in tractors, Col. (1), Table A-19). Up to 1963, the series agrees well with one generated by the author--one whose implicit length of life assumption was about 10 years. For the stock to have risen as estimated by Thirsk over the 63-68 period, length of life would have had to increase substantially. This could have been the case and might especially have been predicted had tractor prices risen (especially relative to wages) at this time, but this does not appear to have happened; the average "cost per horsepower/wage" ratio was lower than in the previous balance of payments tightness. Thirsk based his series partly on length of life considerations and partly on the estimates corresponding to 1966, 1967, and 1970 made by Adimagro, Planeacion, and the Ministry of Agriculture respectively; without knowing methodologies of those estimates, it would be difficult to appraise the validity of the resulting series.[1]

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[1]The fact that hectares under the crops requiring specially heavy tractorization, cotton, rice, and sugar, as well as some of the smaller crops were not growing dramatically in acreage during this period might cast some doubt on the rapid increase estimated, but on the other hand the low price per horsepower would be consistent with a substitution in favour of tractors.

Thirsk notes in his methodology that he used the 10 year length of life assumption though this seems inconsistent with his tractor import figures.

With respect to other machinery, a six year length of life assumption implies a possibly plausible near doubling of these implements over 1950-1962 but then a sharp decline in subsequent years which seems totally inconsistent with the tractor series. This discrepancy tends among other things to throw more doubt on that tractor series, but perhaps the most likely implication is that the "other machinery" series implicit here does not fall as fast as indicated while the tractor series probably does not rise as fast as indicated.

In short, it must be admitted that, due to the absence of further sources of information besides (a) quantity and values of imported and domestically produced machines over time and (b) the 1959 agricultural census estimates of the stock of various machines at that time, coupled with ECLA's 1953 stocks and scattered pieces of similar information, the series for predicted productive potential of the machinery stock is very weak. While it is perfectly adequate to indicate a rapid growth of the stock of the machinery from the mid 40's to the late 50's, during the 60's the absence of new benchmark information and the change in the price of machinery, leading to a decline in the imported stocks and therefore an unquestioned slowdown in the rate of growth of the stock, makes it unclear whether the stock actually decreased or not. Mechanical application of rigid length of life assumptions leads, for a wide range of other assumptions--if not for all-- to the conclusion that the value of the services rendered by the capital stock must have increased little or none during a good portion of the 1960's.[1,2]

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[1]Among the alternatives tried included various combinations of an ECLA pre 1950 series for imports of machinery and a series constructed by the author, and different post 1950 series constructed by the author, in one case assuming no price increase for agricultural machinery and in the other assuming a price increase equal to that of the United States exports of agricultural machinery. Since Colombia has gradually shifted from the United States as its main source of machinery, in part for price reasons, the truth presumably lies between these two cases.

With a length of life assumption shorter than 7 or 8 years on average the plateau in the stock would have occurred in the late 50's rather than the 60's.

[2]The Planeacion machinery and equipment stock series indicated a peaking out and substantial fall after 1956, but this series was designed to measure depreciated capital stock, rather than to estimate the potential productive service of the capital stock in a given year. (See Table A-21).

It is logical to assume that during periods of increasing machinery prices, length of life would be increased and vice versa. Part of the effect of this natural reaction to relative prices is already taken into account in that imports and domestic production of machinery parts are in principal included in the series. But probably they are less completely included than new machinery, for statistical reasons. Also the labour involved in repairs is not included.

Our information on length of life comes form comparison of imports of the various machines whose stock was reported in the 1959 agricultural census and the number recorded by that census. Based on that information, it appeared that the length of life for tractors was 8 to 9 years; since tractors and parts have usually been close to half and sometimes up to 70 percent or more of total value of imports, it seems unlikely that length of life could be below 6 years. And as prices rose one might expect it to be 10 instead of 7 to 9.

TABLE A-18

INVESTMENT IN TRACTORS AND OTHER MACHINERY (VALUES EXPRESSED IN THOUSANDS)

Year	TRACTORS			OTHER MACHINERY				ALL MACHINERY		
	Number of Tractors	Value of Tractors Incl. Parts (Current Dollars)	Value of Tractor Parts (Current Dollars)	Current Dollar Imports	Imports in 1950 Dollars	Domestic Production of Machinery: (Current Dollars)	Imports and Domestic Production: Current Dollars = (4) + (6)	Current Dollars = (2) + (7)	Current Pesos	1958 Pesos
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1935										
1936										
1937										
1938		1122								
1939		1280								
1940		726								
1941		753								
1942		193		157	241		190	383	671	5174
1943		315		248	380		290	605	1057	8158
1944		884		306	467	50	356	1240	2166	16653
1945	776	1914		471	715	50	521	1405	2462	18769
1946	616	2007		626	887	100	726	2640	4624	32918
1947	920	3775		1669	2045	200	1869	3876	6801	41793
1948	776	3443		1968	2148	400	2368	5811	10229	55813
1949	1572	5325		3275	3350	600	3875	9200	18027	82814
1950	1590	4673		4500	4500	800	5300	9973	19547	87762
1951	1615	4410	145	3118	2874	850	3968	8378	19921	67957
~~1952~~	~~979~~	~~5123~~		~~2007~~	~~1828~~	~~900~~	~~2907~~	~~8030~~	~~20075~~	~~64362~~
1953	1369	8728		1890	1710	1116	3006	11734	29335	93425
1954	2374	13261		3870	3505	1508	5378	18639	46598	14855
1955	2493	15500[a]		4900[a]	4402	1900	6800	22300	55973	17630
1956	2239	18134		2362	2049	1332	3694	21828	54788	16663
1957	852	7723		3048	2525	1891	4939	12662	75592	92306
1958		5795	1289	4625	3679	1871	6996	12791	89538	89538
1959	1844	7160	1040	5430	4193	2333	7763	14923	104610[a]	101406
1960	2428	9597	1384	5457	4134	2529	7986	17583	127477	117217
1961	1930	9230	1528	5711	4246	2959	8670	17900	134250	116755
1962	1905	8812	1615	6993	5101	3130	10123	18935	170415	121546
1963		9603	2070	2553	1836	3579	6132	15735	141615	99580
1964	2000	10549	1862	3102	2209	5050	8152	18701	168309	117193
1965	1540	9052	1735	2173	1498	4635	6808	15860	214269	96214
1966	1756	8983	1722	2064	1395[c]	-	-	-		
1967	1764	7175	1342	1658	1100	4187	5845	13020	192956	76010
1968	2989	13400[d]		4000	2550	4892	8892	22292	367818	125058

[a] Guess, based on W. Thirsk tables.

Sources and Methodology - Table A-18

Different sources differ with respect even to the number of tractors imported, more so with respect to the value, and even more with respect to the tractor parts. Some of the discrepancies have to do with differences in reporting periods used in the different sources but it appears that this is not the whole story, since total value accumulated over a period of years is sometimes higher for one study than another. In the case of parts the major problem is the difficulty of separating agriculture tractor parts from parts for other tractors before 1958; and this may be the source of differences in the estimates of the value of tractor imports as well, i.e., some of the series may have failed to take out non-agricultural tractors. The one presented here (Cols. 1-3) is from Table A-20 and does appear to have avoided this problem. Value of tractor parts is much lower than in some other estimates; if those sources had more information on correct interpretation of items in the customs records, they may have better figures than this study, but I have no information which would aid in determining which is better. The 1958-1967 series is based on parts items specifically related to agricultural tractors, and the same is true of the 1951 figure. If these figures are accurate, it would appear that the ratio of parts imports to tractor imports was higher for non-agricultural tractors than for others, since an alternative estimate of agricultural tractor imports postulating the same ratio for the two types of tractors arrived at figures usually about twice as high as those presented here.

Cols. (1) - (3) are from Anuario de Comercio Exterior, with peso figures converted to dollars when necessary

Col. (4) is based on the author's calculations of imports of equipment other than tractors (also excluding tractor parts) coming from DANE, Anuario de Comercio Exterior, various years. The figures for 1942-49 are based on Table A-20, Col. (3) converted to dollars at the official exchange rate cited in Kalnins. Arvids Kalnins, Analisis de la Moneda y de la Politica Monetaria Colombiana, Bogota, Ediciones Tercer Mando, 1963, Cuadro No. 11). The figures for 1951-67 are from Table A-20, Col. (4) the figure for 1955 was based on Thirsk's statistics, since we did not have access to the 1955 Comercio Exterior. The figure for 1950 is an average of that derived by the methodology cited for 1942-49 and the figure corresponding to the series of Col. (4) Table A-20. These two series differed by 15 percent or more for this year.

Conversion to a constant price series (Col. (5)) was effected using the US machinery export price series; use of this deflator may be presumed to lead to a downward bias in the constant price imports series over time, as it probably does not take appropriate account of quality improvements,[1] and also since the 60's have seen substantial shifting from the U.S. to cheaper sources. Probably one could conceive of in Col. (5) as giving a downward biased limit, the undeflated imports series as giving an upward biased one.

For conversion into 1958 pesos we chose an implicit exchange rate of 7, implying that the exchange rate of that year undervalued the dollar, at least with respect to purchase of machinery; one might even argue that to effect comparison with other types of capital goods this is too low a rate.

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[1] I am not familiar with the details of that series.

Col. 6 is the current dollar value of domestically produced machinery. For 1953 and 1955 and on domestic production in pesos was estimated by summing the appropriate items from DANE: industrial production statistics as published in the Anuario General de Estadistica. (In some cases there was uncertainty as to whether some, all, or none of a given item constituted a capital item for agriculture, but the likely error seems not too great). This series was converted to dollars at an exchange rate judged to correspond more or less to relative purchasing power, and therefore somewhat above the official rate, especially just before major devaluations.

Column 9 comes from conversion of Column 8 at the official exchange rate corresponding to the various years; up to 1954 the exchange rate published in ECLA's Statistical Appendix was used, and subsequently the International Financial Statistics. In 1959, a rate of 7.01 was used instead of 6.4 on the grounds that it better represented the probable internal price of machinery; rates of 7.25 and 7.50 were used in 1960 and 1961 respectively, and averaging over quarters was performed in 1967 and 1968 to arrive at 14.82 and 16.50 respectively. This series is at best an approximation, since the dollar price times the official exchange rate is certainly not a precise indicator of domestic prices; when the exchange rate is seriously overvalued these prices might be expected, were they free, to be well above those indicated here. However, much of the imported machinery is handled by the Caja Agraria with fixed markups, and much of the rest of it, at least in recent years, is controlled in price. Hence the devaluations probably do affect the price importantly.

Column 10 is based on the conversion of Column 8 by the implicit dollar price series (implicit between Columns 4 and 5) and the assumption of a 7.0 pesos/dollar ratio in 1958, one slightly higher than the exchange rate, on the grounds presented above.

Table A-19

Capital Stock in Machinery
(Millions of 1958 Pesos)

Year	Tractors				Other Machinery		Total	
	Estimate A (10 yr. life)	Estimate B (10 yr. life)	Estimate C (10 yr. life)	Estimate D (12 yr. life)	Estimate A (6 yr. life)	Estimate B (8 yr. life)	(2)+(5)	(2)+(6)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1947	66.77	100.1			47.88		148.0	
1948	77.84	116.8			67.61	(≈85.00)[a]	184.4	201.8
1949	91.75	137.6			98.56	105.14	236.2	242.7
1950	115.40	173.1	242.6	270.8	140.42	149.12	313.5	322.2
1951	139.31	209.0	267.9	288.7	165.64	176.50	374.6	385.5
1952	157.66	236.5	306.4	319.5	179.88	192.83	416.4	429.3
1953	180.24	270.4	371.6	378.5	183.67	201.72	454.1	472.1
1954	224.49	336.7	465.4	481.6	203.78	230.43	540.5	567.1
1955	268.78	403.2	562.4	599.9	222.68	281.61	625.9	684.8
1956	311.48	467.2	675.8	726.4	204.24	287.06	671.4	754.3
1957	319.98	480.0	691.4	757.2	208.07	288.20	688.0	768.2
1958	356.95	535.4	698.9	772.7	230.24	287.02	765.6	822.4
1959	389.59	584.4	699.7	780.6	259.06	307.60	843.5	892.0
1960	416.55	624.8	722.5	811.5	269.44	337.55	894.2	962.4
1961	455.71	683.6	747.1	824.0	272.39	370.33	956.0	1053.9
1962	480.27	720.4	762.6	839.4	309.11	393.45	1032.4	1113.8
1963	496.48	744.7	753.9	864.4	311.96	377.48	1056.7	1122.2
1964	516.01	774.0	714.3	889.5	317.59	400.37	1091.6	1174.4
1965	533.93	800.9	646.6	874.9	306.12	405.65	1107.0	1206.6
1966	512.69	769.0	561.1	822.1	287.88	395.19	1056.9	1164.2
1967	596.68	895.0	545.8	740.5	264.49	375.76	1159.5	1270.8
1968	699.89	1049.8	578.7	675.6	248.30	371.31	1298.1	1421.1

[a] guess.

Sources and Methodology - Table A-19

The tractor series presented here are all designed to reflect current potential service flow; they differ due to changes in the relative price of tractors over time and in particular of the relative price of a tractor horsepower. Column (1) uses the stock of horsepower series developed by Victor M. Espinosa, "Medicion del Cambio Techologico en la Agricultura Comercial Para Colombia", mimeo, 1971, based on Wayne Thirsk's estimates of tractor stock over time (Thirsk, op.cit., p. 319) and average horsepower of the tractors added to the stock in each year (ibid., p. 329). Horsepower price is an average of the two observations cited by Thirsk for 1958, about 500 and about 570. (Thirsk, op.cit., p. 329). The use of the 1958 price is problematic (see below); another problem with the series is the implicit assumption that the value of horsepower is constant over time. (Real price per horsepower changed substantially over time in both dollars and pesos; this does not, of course, necessarily imply that the productive potential of a horsepower changed, though it could well have.) This series does not take into account the expected future life of a tractor; it is essentially a "horsepower in operation" times "1958 price of a new horsepower" series and is a better index of the potential current service flow of the stock than of present value of future discounted benefits; it will be above the commercial value of the tractor stock (if the new horsepower price in 1958 was an equilibrium one.)

Column (2) is Column (1) times 1.5; in preparation to adding a tractor stock series to another machinery stock series, it was felt inappropriate to use 1958 prices for tractors given that the cost per horsepower fell dramatically in 1957 and 1958 relative to the years 1954-1956, during which many or most of the tractors in the 1958 stock were imported. During those years the price per horsepower, converted to dollars of a given year, was almost twice as high as in 1958. While there is no proof that the price of other machines-with quality duly taken into account-did not also fall dramatically in that period, there is less reason to expect it; in the case of tractors an interesting measure of productive potential, the horsepower, is known to have decreased in price, and no such comparable information is available for other machines. The price series for agricultural machinery and equipment of the U.S. would suggest that no such decrease occurred; that price series probably overestimates the increase in price if quality could be held constant, but it is plausible to argue that in Colombia tractor prices have trended up less than have those of other machines partly because imports from other countries (with lower prices) have increased relative to those of the U.S. The objective in using Column (2) when adding the tractor stock series to the "other machinery" series is to use a relative price for tractors (vs. other machines) which better reflects the typical productive potential tradeoff; to the extent that the machines are quite complementary the tradeoff concept may not be too useful anyway (to the extent that they are quite complementary, of course, no relative pricing problem arises since the machines must be used in relatively fixed portions.)

Sources and Methodology for Table A-19 (Continued)

In fact, however, only some of the machines are complementary with tractors and some are not. Use of an implicit 1958 peso price per horsepower of about 750-800 pesos rather than the 535 implicit in Column (1) constitutes a compromise between the very low price per horsepower in 1958 and the much higher one in 1954-1956.

Columns (3) and (4) are based on deflation of the dollar tractor import series by the U.S. Agricultural Machinery and Equipment price series (published in Survey of Current Business); the implicit length of life of Columns (1) and (2) is 10 years, so they are comparable to Column (3) in this respect; the fact that the tractor stock series of Column (3) rises less rapidly than that of Column (1) (they move in parallel fashion until about 1958 after which Column (1) rises much more rapidly) is due to the failure of Column (3) to take due account of the decreasing price per horsepower; Column (3) appears, therefore, to be substantially inferior to Column (1) (or Column (2)) as an indicator of the relevant stock. Column (4) uses a 12 year length of life assumption, probably closer to the norm in Colombia (it might even be above 12 years, although by that time productive potential of a tractor must have fallen substantially even if it is still being used); this series gives the probably more plausible result of a continued stock increase during the early 60's, but it does not show this as dramatically as Column (1). Columns (3) and (4) are designed to give an alternative estimate to Column (1), but less confidence is placed in them than in Column (1).

Columns (5) and (6) present alternative estimates of the stock of "other machinery" expressed in 1958 prices. Here the methodology involved summing (a) current dollar values of imports and (b) domestic production converted usually but not always (see Table A-18) at the official exchange rate to provide a current dollar series of other machinery imports. This was then converted to 1950 dollars by the U.S. Agricultural and Machinery equipment price series and to 1958 pesos by multiplication by 8.8--a factor which implicitly assumed an equilibrium exchange rate of 7 in 1958. (The actual rate was 6.7). Column (5) assumes a 6 year length of life and Column (6) an 8 year length of life. Column (7) is the sum of Column (2) and (5); it is possible that the other machinery length of life is more than 6 years; so Column (8) is used to incorporate an 8 year length of life assumption along with the 10 year tractor length of life. Since it is possible that tractor length of life is also longer than 10 years, even this last series (Column (8)) may underestimate the long run upward trend in machinery stock.

TABLE A-20

Imports of Agricultural Machinery, 1935-1967:
Author's Estimates

Year	Tractors and Parts (c.i.f.) (Thousands of Current Pesos)	Other Machinery Including Dairy (c.i.f.) (Thousands of Current Pesos)	Total (c.i.f.) (Thousands of Current Pesos)	Total (Thousands of 1950 Pesos)	Total Dollars (c.i.f.) (Thousands)	
	(1)	(2)	(3)	(4)	(5)	
1935	[illegible]	844.9				
1936	512.5	353.6	866.1	3160.9		
1937	746.0	884.3	1630.3	5781.2		
1938	1997.9	675.9	2673.8	8434.7		
1939	2239.6	692.5	2932.1	8939.3		
1940	1271.1	549.0	1820.1	5465.8		
1941	1318.0	640.3	1958.3	6119.7		
1942	338.2	275.3	613.5	1752.9		
1943	551.0	431.5	942.5	2276.6		
1944	1547.7	535.6	2083.3	4376.6		
1945	3350.0	823.9	4173.9	7322.6		
1946	3512.0	1093.1	4605.1	7439.6		
1947	6607.0	2920.3	9527.3	13269.2		
1948	6060.0	3464.0	9524.0	11643.0		
1949	10438.0	6419.8	16857.8	19134.8		
1950	9159.0	9507.2	18666.2	18666.2	9146.4	
1951	11069.0	7425.7	18494.7		7841.8	
1952	12858.0	5803.5	18661.5		7427.3	
1953	21907.0	5883.6	27790.6		11060.7	
1954	33286.0	11563.0	44849.0		17849.9	
1955						
1956	45517.0	8127.3	53644.3		21350.4	
1957	34152.0	9505.9	43657.9		11220.1	
1958	42818.0	27140.6	69958.6		10913.5	(10421)
1959	57740.0	29424.1	87164.1		13597.6	(13090)
1960	82160.0	22891.5	105051.5		15757.7	(15053)
1961	86540.0	25634.9	112174.9		16714.1	(14942)
1962	72540.0	42494.7	115034.7		16910.1	(15807)
1963	102073.0	16602.2	118675.2		12.056	
1964					13.651	
1965					11.225	
1966					11.047	
1967					8.658	

[a]Deflation by the GDP price index.

Sources and Methodology for Table A-20

Sources and Methodology:

Columns (1) to (3) are based on figures from the Anuario de Comercio Exterior. The major problems encountered were that (1) parts for tractors were not distinguished by whether for agricultural tractors or non-agricultural ones (caterpillars), and (2) some forms of machinery (e.g., pumps) go both to agriculture and to other sectors and there is no way of deciding what the allocation is. The items included here were plows, rakes, seeders, fertilizer drills, reapers, sprayers, cultivators, and other agricultural machinery, including that used in dairying.

Column (4) is Column (3) converted to 1950 pesos by the Colombian GDP deflator.

Column (5) gives the dollar values of the same bundles. Figures in parenthesis correspond to an original series (1950-62) and those not in parenthesis for the years 1958-1962 to a revised series.

Sporadic attempts have been made by several agencies to estimate the total capital stock at a point of time, and Planeacion constructed a time series for the capital stock and for investment in machinery. This latter is presented as Table A-21. The stock estimates of the early 50's correspond rather well with those of the ECLA study (Table A-11) when converted into pesos of the same year; possibly they are not a fully independent estimate. And they are generally consistent with my estimates (Table A-15) which do not cover all the components of capital.

More estimates have been made of investment than of capital stock. In an earlier effort Planeacion estimated 1950 investment at 175.4 million 1950 pesos,[1] while the ECLA estimate (see Table A-11) was 339 million. I am unfamiliar with the basic figures and methodology used by Planeacion, but it seems possible that the major source of this difference is in the estimates of construction and improvements, which amounted to almost two-thirds of the ECLA estimate in 1950 and a higher proportion in many other years. The ECLA series is no doubt the better of the two.[2] A probably somewhat more serious estimate of investment in 1959 (see Table A-22) was presented in the 10 Year Plan. In 1950 prices (using the deflator used by Planeacion) it is about 338 million pesos, i.e., more or less in line with the ECLA figures for the early 50's.

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[1] Unpublished estimates.

[2] Suggest in part by the internal consistency of its investment figures with the various capital stock estimates.

Table A-21

ESTIMATES OF THE CAPITAL STOCK AND OF INVESTMENT IN MACHINERY AND EQUIPMENT, 1950-1964
(Millions of 1958 pesos)

Year	Stock in Agriculture[a]				Gross Fixed Investment in Machinery and Equipment	
			Machinery and Equipment			
	Total	Crops	Total	Crops	Total	Crops
1950	13 550	3 274	305	244	115	98
1951	13 528	3 364	333	267	111	88
1952	13 556	3 453	328	263	85	68
1953	13 557	3 509	346	277	112	89
1954	13 697	3 662	431	345	189	151
1955	14 032	3 833	523	418	215	172
1956	14 309	3 973	586	469	206	165
1957	14 487	4 007	514	411	72	57
1958	14 676	4 069	476	381	96	77
1959	14 935	4 141	452	362	104	83
1960	15 301	4 187	460	368	125	100
1961	15 789	4 354	494	395	171	137
1962	16 295	4 528	529	423	177	141
1963	16 880	4 734	568	454	182	145
1964	17 551	4 983	610	488	185	148

Source: Departamento Nacional de Planeacion.

[a]Gives the replacement value, deflated to 1958 prices, of reproducible, tangible and durable capital goods, including buildings and other construction, improvements, and cattle; land is excluded.

TABLE A-22

Gross Investment in Agriculture, 1959: Planeacion Estimate
(millions of 1958 pesos)

	Agriculture	Livestock	Total	Per Cent of Total: Agriculture	Livestock	Total
Clearing, Irrigation and Draining	62	25	87	21.6	14.7	19.0
Plantations and Pastures	48	59	107	16.7	34.7	23.4
Constructions	46	4	50	16.0	2.4	10.9
Installations	28	15	43	9.8	8.8	9.4
Fences	3	14	17	1.1	8.2	3.7
Machinery	83	21	104	28.9	12.4	22.8
Draft Animals	17	32	49	5.9	18.8	10.8
Total Gross Investment in Fixed Capital	287	170	457	100.0	100.0	100.0
Stocks of Commercial Livestock	—	172	172			
TOTAL	287	342	629			

SOURCE: Departamento Administrativo de Planeacion y Servicios Tecnicos, Colombia: Plan General de Desarrollo Economico y Social, Part I, Cali, Colombia, 1962, p. 182.

Alternative Estimates of Investment in Machinery and Equipment: Post 1950 Period

The author's estimated machinery investment series was presented in Table A-18, with the import series shown in Table A-20. Other estimates have been made by the Banco de la Republica--figures on installed value in current pesos of imported machinery and equipment, and by Planeacion--figures on the c.i.f. dollar value of imports. In Table A-23 these are compared with the author's estimates; the lack of close correspondence of any two of the three series is disturbing. While all of the series would imply that the imports of the 1950's or the post World War II period were much higher than those of earlier periods, they differ considerably in terms of the post 1950 trends. All indicate high importation in the years 1954 to 1956 but in a comparison between 1962 and 1950, for example, they come out quite differently. A final indicator is the sales of agricultural machinery in a sample of the country's large stores (Table A-23, Col. (9)). While its year to year fluctuations are not too close to those of any of the other series, (nor would one necessarily expect them to be), it is in broad accord with the movements of the Banco and Planeacion series, and somewhat less so with my own series. (Note that since it is an index, the absolute numbers are not relevant.)

TABLE A-23

Alternative Estimates of Installed Value of Imported Agricultural Machinery

(current dollars)

	Banco de la Republica		Planeacion				Author's Series (converted to installed value)	ECLA	Index of Sales of Agricultural Machinery
	C.I.F. Value	Installed Value	C.I.F. Value	Installed Value					
				Estimate A	Estimate B	Estimate B in 1950 Dollars			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1950	14.11	24.3	16.7	25.0	28.6	28.6	15.7	15.9	
1951		26.0	15.0	22.6	25.3	23.3	13.2	14.2	
1952		14.4	15.4	23.1	25.3	23.0	12.2	11.7	31.3
1953		20.0	19.0	28.6	30.7	27.8	17.8	16.7	41.3
1954		29.6	32.3	48.5	51.1	46.3	28.2		52.9
1955		37.2	37.5	56.3	58.0	52.1	36.0		49.5
1956		33.0	31.0	46.6	46.9	40.7	32.2		63.8
1957		12.6	14.8	22.2	21.9	18.1	16.6		41.9
1958		15.7	14.5	21.8	20.9	16.6	15.7		26.9
1959		17.0	17.0	25.5	23.9	18.5	19.1		32.4
1960	15.6	21.5	20.3	30.5	27.9	21.1	21.7		31.6
1961		18.7	22.6	33.9	31.0	23.0	23.0		30.7
1962		19.5	20.9	31.4	28.7	20.9	23.2		30.2
1963			15.2	22.7	20.8	15.0			22.0

Sources and Methodology: Cols.(1)and (2) the BANCO peso import figures converted into dollars. Banco data suggest that the c.i.f. value of the machinery is only 60 to 66% of its value when installed. On this assumption Planeacion c.i.f. figures on the value of imports Col. (3) have also been used to estimate installed value - Cols. (4) and (5); Col. (4) assumes an addition of 50% to the c.i.f. valuation of the machinery, and Col. (5) assumes the addition of a variable percentage, which decreases over time. (In 1950 the Banco "value of goods when installed"/"c.i.f. import value" ratio was higher for agricultural imports than in 1960 because this ratio was higher for replacements than for new equipment and the replacements were relatively more important in 1950 than in 1960 according to Banco figures.)

The discrepancies between Col. (2) and Cols. (4) and (5) were serious enough to suggest the construction of a new series; the only two years in which the two series were close were 1950 and 1951, in both of which the Banco had a high estimate of replacement imports compared to the other years. In later years this estimate was very small. The series constructed by the author was presented in Table A-20. There remains, of course, a classification problem as to which imports are used in agriculture and which in industry. A dollar series corresponding to the estimate shown in Table A-20 is presented as Col. (6) (using the same multipliers to convert from c.i.f. to installed value as used for the Planeacion series.) It is well below the Planeacion based estimates, especially during the early 50's, while tending to be smaller than the Banco estimate during the earlier years and larger during the later years. (It coincides closely with figures based on those of ECLA for the years 1950-1953, and presented in Col. (8). I do not know to what extent the Banco and Planeacion tried to estimate inputs of motors and other items which could go either to agriculture or to some sectors, nor how they determined which actually did go to agriculture. For the Banco figures (designed to be one component of estimates of total investment) there would be no particular need for this sort of detail.

Pre 1950 Machinery Investment

Data are scarcer in the pre 1950 period. Estimates of imports have been made by ECLA (see Table A-11) and myself (Table A-20). Table A-23.5 summarizes these figures. The two deflated series agree reasonably well. Either series, when converted into 1950 dollars, is however, much below those in Table A-22 for the overlapping years. My figures are biased downward through inability to distinguish some forms of machinery going to agriculture which also go to other sectors. Probably the ECLA figures have the same downward bias. Whether the Planeacion figures of Table A-22 were able to handle this difficulty satisfactorily is difficult to guess.

Turning to figures on the specific types of machinery which have been imported, we have ECLA estimates of units of various types shipped to Colombia from the U.S. (Table A-24).

Stocks of the Various Machines

The first point of time estimate disaggregating the machinery stock item by item seems to be that of ECLA, based on figures for 1953 (see Table A-25).

Only in two more recent years have partial surveys of the stock of machinery been made; in Table A-25 the figures from the agricultural census of 1959 and from a Caja Agraria survey of 1962 are compared with ECLA's 1953 estimates of the stock of various implements (which were derived by using import figures along with probable somewhat arbitrary life-expectancy assumptions). Despite uncertainty as to how the categories for the various years match, there is a definite upward trend between these two years, consistent with the high imports during the period. Unfortunately the 1959 and 1962 estimates only overlap in the case of tractors, so only here can one get some idea as to what happened between 1959 and 1962.

TABLE A-23.5

Imports of Agricultural Machinery Before 1950 (All Values C.I.F.), 1929-1953

	ECLA Estimate (thousands of current pesos) (1)	Author's Estimate (thousands of current pesos) (2)	ECLA Estimate (thousands of 1953 pesos) (3)	Author's Estimate (thousands of 1950 pesos) (4)	ECLA Peso Price Index of Imported Agricultural Machinery (5)	Author's Peso Price Index of Imported Agricultural Machinery (6)
1929					22.8	
1930					23.2	
1931					23.2	
1932					23.1	
1933					30.3	
1934					38.2	
1935					38.6	
1936		866		1,496	38.1	57.9
1937		1,630		2,523	39.8	64.6
1938	3,092	2,774	7,469	4,563	41.4	60.8
1939	3,218	2,932	8,085	5,117	39.8	57.3
1940	2,217	1,820	5,515	3,043	40.2	59.8
1941	2,283	1,958	5,595	3,285	40.8	59.6
1942	824	613	1,957	835	42.1	73.4
1943	873	943	2,074	1,403	42.1	67.2
1944	2,235	2,083	5,309	3,095	42.1	67.3
1945	4,818	4,174	11,390	6,809	42.3	61.3
1946	5,412	4,605	12,000	6,369	45.1	72.3
1947	9,133	9,527	17,978	11,382	50.8	83.7
1948	9,715	9,524	16,837	9,900	57.7	96.2
1949	16,047	16,858	23,290	15,353	68.9	109.8
1950	16,896	18,666	23,932	18,666	70.6	100.0
1951	22,364	18,494	23,868		93.7	
1952	20,344	18,661	20,467		99.4	
1953	29,054	27,790	29,054		100.0	

(continued on following page)

TABLE A-23.5 continued

SOURCES AND METHODOLOGY: Column 1 is from ECLA, op. cit., p. 413. Our series (Column 2), is based on figures from the Anuario de Comercio Exterior, and includes the following items: tractors and parts, plows and parts, rakes, fertilizer drills, other cultivating machinery, reapers, fruit collectors, haying equipment, threshing machines, dairying equipment, and seeders. Column 3 is the ECLA series of Column 1 deflated by the price series calculated by ECLA (p. 413) and presented here as Column 5. Column 4 is our series (Column 2) deflated by a price series calculated independently of that of ECLA, based on unit value figures calculated from the Anuario de Comercio Exterior, and presented as Column 6. The two series agree relatively well. ECLA assumed that the installed value of a machine was 43.84 percent above its c.i.f. value.

TABLE A-24

Imports of Agricultural Machinery from the United States
(units)

	Ploughs	Harrows	Cultivators	Planters	Seeders	Binders	Combines	Threshing Machines	Maize-Shelling Machines	Hay Mowers	Hay Rakes	Hay Balers
1938	679	170	158	38	35	10	15	20	39	--	5	--
1939	965	168	112	21	42	111	28	7	279	--	1	--
1940	980	183	186	22	32	2	22	8	303	--	2	--
1941	909	214	109	35	76	11	45	12	2	--	--	--
1942	381	99	20	14	56	--	13	--	23	--	--	--
1943	697	72	79	13	20	7	33	11	32	--	--	--
1944	343	250	113	13	20	2	36	9	54	--	--	--
1945	261	--	--	25	29	--	53	3	342	--	5	--
1946	344	194	39	41	38	2	36	20	118	--	11	--
1947	716	448	595	81	194	--	95	53	137	--	21	--
1948	456	196	111	90	103	--	33	4	439	21	--	2
1949	1,215	3,725	491	3	137	19	83	4	437	40	1	1
1950	1,519	1,185	984	552	78	--	82	24	37	104	23	3
1951	844	1,207	310	354	82	--	71	6	121	60	31	--
1952	753	748	292	189	106	--	74	22	277	39	--	--
1953	567	619	955	273	104	--	57	9	434	8	--	--

SOURCE: ECLA, op. cit, Statistical Annex, p.78; originally from Joint Working Group CEPAL-FAO, Informe preliminar sobre suministros de uso agricola (E/CN.12/83), Appendices A and B (June 1949); Bureau of Census, Department of Commerce, United States Exports of Domestic and Foreign Merchandise, reports corresponding to 1948 and following years.

TABLE A-25

Estimated Stocks of Machines, Various Dates

	1947	1949	1953 (ECLA)[1]	1959 (agricultural census)	1962 (Caja Agraria survey)[6]
Tractors	3,821*	6167*	8,940	15,361	20,000
Plows			13,500[2]		16,721
Rakes (rastrillos)			10,770[3]		16,721
Seeders			2,600		10,033
Cultivators			4,300[4]		6,688
Combines			< 850[5]	1,916	2,000
Internal combustion motors				23,279	
Electric motors				6,488	
Threshing machines (trilladoras de motor)			(2,600)[5]	3,462	
Trapiches (mechanical)				8,228	
Trapiches (animal)				60,338	
Hay mowers			400		

1. See United Nations, Analyses and Projections of Economic Development: The Economic Development of Colombia, United Nations, Geneva, 1957, p. 173.

2. The designation is a little confusing here, so this figure may not be comparable with that of the Caja Agraria Survey in 1962.

3. Of which 10,700 are listed as "rastras a traccion animal" and 70 as "rastrillos de pasto".

4. "Cultivadores a traccion animal."

5. The figure 2,600 is the estimate of "desgranadores de maiz" and 850 for "trilladoras de cereals fijas y moviles". The latter category includes combines, so the sizeable increase of that machine seems definite; but it is not clear whether the 1953 and 1959 "threshing machine" categories are fully comparable or not.

6. Pedro Maria Martinez, Mecanizacion Agricola en Colombia; Caja de Credito Agraria, 1964.

Table A-25 continued.

Sources and Methodology:

The stock estimates made by ECLA in 1953 were based on previous imports and length of life assumptions; they are much more likely to be accurate than would estimates based on the same methodology 10 or more years later; in 1953 most of the machinery which had ever been imported had come in during the preceding 8 years so the capital stock estimate would be insensitive to the assumption made about the length of life; by 1960 the estimate would be quite sensitive to that assumption.

The accuracy of the 1959 Agricultural Census has not been the subject of ex-post analysis, but it is probably relatively good in respect of the machinery stock.

The Caja survey concerned itself basically only with tractors and the estimates made for the other implements were based in part or in whole on necessarily somewhat arbitrary assumptions about the normal ratio of those other implements to tractors. Hence these estimates for the other vehicles must be considered weak.

A more careful attempt has been made to ascertain time trends in the stock of tractors and combines by Wayne Thirsk. (See Table A-26).

Working Capital

The ratio of working capital to fixed capital in agriculture might be assumed to have risen during the last two or three decades, due to the increase in importance of improved seeds, fertilizers, and pesticides. If it is true, however, as indicated in ECLA's 1953 figures (Table A-26) that the vast majority of working capital is related to labour costs, the decreasing labour share could imply that total working capital has in fact not changed much in relation to total capital. The calculation presented for 1967 and the comparison with total value of output and fixed capital stock suggests that a moderate increase has occurred in the working capital/output ratio and a more substantial increase in the working capital/fixed capital ratio.[1]

Miscellaneous

Tables A-27 and A-28 present, respectively ECLA's detailed capital stock valuation for 1953 and a 1958 attempt to estimate capital in livestock (cattle).

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[1] As is shown in Table II-1 of the text, the output/fixed capital ratio rose during this period when both are expressed in constant pesos. The direction of change was almost certainly the same when current prices are used.

TABLE A-26

COLOMBIA: ESTIMATES OF TRACTOR AND COMBINE STOCK

A. Estimates of Annual Tractor Stock, 1947-1970

Year	Thirsk Estimate	Other Estimates	
		Number	Source
1947	3,781	3,821	CEPAL
1948	4,409		
1949	5,197	6,167	CEPAL
1950	6,537		
1951	7,892	7,500	Berry
1952	8,798		
1953	10,057	8,881	CEPAL
1954	12,163		
1955	13,880		
1956	15,403		
1957	15,335		
1958	16,272		
1959	17,338	15,361	1960 Census
1960	18,426	18,000	Berry
1961	19,227		
1962	20,128	20,000	Caja Agraria
1963	20,622	19,500	Berry
1964	20,876	20,000	CEPAL
1965	20,792		
1966	21,294	21,065	Adimagro
1967	23,058	23,000	DAP
1968	25,110		
1969	-		
1970	-	27,800	Ministry of Agriculture

Methodology:

Annual tractor imports are available from DANE, the national statistical center, going back to 1938. We assumed all tractors imported before 1938 (likely a very small number) had worn out before 1938 so, for example, in 1938 the tractor stock increased from zero to 139. We also made the lightbulb assumption that all tractors collapsed completely in their tenth year of life. This may be a reasonable assumption in view of the fact that the sum of annual imports over the period 1954-1963 closely approximates the stock recorded by CEPAL in 1964.

TABLE A-26 continued.

References for Other Estimates:

(1) CEPAL: United Nations Economic and Social Council, Economic Commission for Latin America, "The Use of Agricultural Machinery in Colombia," New York, August 24, 1967.

Caja Agraria: Pedro Martinez, "Mechanizacion Agricola en Colombia," Bogota: The Caja Agraria, 1963.

DAP: "Report on the Availability and Use of Farm Machinery in Colombia," Bogota: DAP Document DNP-202-UEIA, January 28, 1969.

(2) Adimagro is the Colombian Association of Farm Machinery Importers. Their estimate is contained in their document, La Mecanizacion Agricola en Colombia, 1968.

(3) The 1960 Census refers to the Colombian Agricultural Census of that year.

(4) The estimate for 1970 comes from the publication, "Consideraciones sobre el Papel de la Maquinaria en la Agricultura Colombiana," Ministeria de Agricultura, Documento MIN.AGR.-OPSA-051, March 1971.

(5) Berry refers to an earlier draft of this study.

B. Estimates of Combine Stock

Year	Number	Source
1959	1,916	Census
1962	2,407	Caja Agraria
1963	2,000	CEPAL
1968	2,000	Caja Agraria
1969	1,350	Adimagro and DAP

Note:

Considering the variety of different estimates of almost the same years, it would seem that the 1969 estimate is probably in error because a total of 2,404 combines were imported for the period 1953-1965 (see Table AT-2). An educated guess at the current stock of combines would place it at between 2,000 and 2,500. The primary reason for unreliability in the combine numbers is that DANE records annual combine imports by weight rather than by value.

Source: Wayne Thirsk, The Economics of Farm Mechanization in Colombia, Yale Ph.D. dissertation, 1972, pp. 319,320.

TABLE A-26.5

Working Capital in Agriculture, 1953 and 1967
(Millions of pesos)

Item	1953 Total Expenditure	1953 Working Capital	1953 Percentage of Total Expenditure	1953 Break-down: Crops	1953 Break-down: Live-stock	1953 Break-down: Coffee	1967 Total Expenditure	1967 Working Capital
Labour costs	2,137.0	1,068.5	50	542.0	526.5	186.0	9790.0	6853.0
Seed	73.2	54.9	75	54.3	0.6	-	284.4	213.3
Fertilizers and soil amendments	18.5	13.7	75	13.7	-	2.3	490.9	368.2
Pesticides	10.1	5.0	50	5.0	-	0.5	351.7	175.9
Feed concentrates, medicaments and sale for livestock	146.5	50.2	35	-	50.2	-	1436.0	502.6
Fuels and lubricants	18.0	13.4	75	9.9	3.5	2.3	142.1	106.5
Packing and cordage	15.9	4.0	25	3.9	0.1	0.5	47.2	11.8
Conservation	4.14	20.7	50	15.5	5.2	5.0	292.7	146.4
Irrigation and drainage	13.6	5.3	40	4.8	0.5	-	n.a.	n.a.
Interest and commissions on credit	75.5	37.8	50	20.0	17.8	10.0	n.a.	n.a.
Indirect taxation	11.2	5.6	50	2.8	2.8	1.4	n.a.	n.a.
Commercial fattening of cattle		128.5	100	-	128.5	-	n.a.	n.a.
Total working capital		1,407.6		671.9	735.7	208.0		
Sum of items on which information available in 1967		1,230.4						8377.7
Working Capital, items "A" / Value added at factor cost		.329						.368
All Working Capital / Value added at factor cost		.376						.420

TABLE A-26.5 continued

Sources and Methodology:

The figures for 1953 come from ECLA, op. cit. page 414, and those for 1967 are the author's calculation of working capital related to labour cost as explained below, and unpublished figures of the Banco de la Republica for inputs used in 1967.

ECLA's 1953 labour cost figure seems too high; whereas the pure labour share in that year appears to be about 41.9, the figure used (2137.0) is 57.2% of value added at factor cost; if we add 2% for non-agricultural workers (43.9 in total) this implies labour costs of 1640.2; the 50% working capital/total expenditure ratio used by ECLA seems too low, however, and we apply here 70 giving a very similar working capital figure to theirs (1.148.1). In 1968 pure labour share was 35.8, but the labour share might have been say 38--and adding the 2% for non-agricultural workers say 40%--or a value of 10,481.2, of which 70% is 7336.8.

Assuming that interest and commissions on credit, indirect taxation and commercial fattening of cattle bear the same relation to value added in 1967 as in 1953, then a slight increase in the working capital to value added at factor cost ratio appears to have occurred; when those items are excluded the move is from .329 in 1953 to .368 in 1967; when they are included it is from .376 to .420.

Table A-27

Summary of the Valuation of Agricultural Assets, 1953

(millions of pesos)

I.	Real Estate			4,487.5
	1) Land improvements		2,342.1	
	a) through felling and clearing		2,117.1	
	1. crops: 2.9 million hectares	508.4		
	2. livestock: 26.9 million hectares	1,608.7		
	b) other improvements		225.0	
	1. irrigation: 220,000 hectares	220.0		
	2. drainage: 30,000 hectares	5.0		
	3. others (no data available)			
	2) Buildings, installations and fences		1,458.3	
	a) rural housing		936.5	
	b) other building		215.3	
	c) installations		200.7	
	1. for processing coffee	163.2		
	2. for panela	30.0		
	3. others	7.5		
	d) fences		105.8	
	3) Plantations: perennial crops		687.1	
	a) fruit (coffee, cacao, bananas, etc.)	387.3		
	b) industrial crops (sugar-cane, rubber, etc.)	47.8		
	c) artificial forests (no data available)			
	d) artificial pastures	252.0		
II.	Non-Real Estate			3,749.2
	1) Animal stocks		3,585.1	
	a) cattle (12.9 million head)	2,925.6		
	b) horses (1.86 million head)	394.8		
	c) pigs (1.96 million head)	154.0		
	d) sheep and goats	43.7		
	e) poultry and rabbits	67.0		
	2) Agricultural equipment		164.1	
	a) imported	154.3		
	b) domestically produced	9.8		
III.	Working Capital			1,407.6
	TOTAL VALUE OF AGRICULTURAL ASSETS			9,644.3

SOURCE: ECLA, op.cit., p. 407

Note: These estimates of the value of agricultural assets appear to correspond to the total value used and presented in Anexo Estadistico Cuadro 6, page 7; if that 1950 peso value is inflated by the price series (page 38) it comes to 9.239 billion pesos, as opposed to the 9.644 of this Table. The source of the difference is not apparent; it presumably cannot be working capital (greater than the difference) nor could it be rural housing (same reason). Presumably a different implicit deflator was involved; (1950 prices are used in the Table 6 figures); by implication (and quite plausibly) the price of these agricultural assets rose faster than the general price index.

Table A-28

Capital Invested in Livestock in Colombia, 1958

Type of Investment	Capital (Millions of Pesos)	Percent
Land[a]	3,661	26.6
Artificial Pastures	525	3.8
Machinery	48	0.3
Buildings	78	0.6
Installations	73	0.5
Fences	282	2.0
Sub-Total	4,667	33.9
Livestock	9,095	66.1
T o t a l	13,762	100.0

[a]Although not clarified in the source, it appears that this item refers to land itself, not for examples to land improvements only; thus the concept of capital employed basically includes land.

Source: Henry De Meel, "Plan Ganadero", Bogota 1960.

Note: Though conceptually easy enough to estimate, the number of cattle in Colombia remains the topic of a guessing game. The amount of capital involved in the industry is the more open to doubt. Table A-12 included ECLA's guess at the various types of investment in the industry in 1953; Table A-28 gives an estimate for 1958. The two are roughly consistent, judging by the price and quantity series for livestock in Tables A-1 and A-2.

Degree of Mechanization

Several estimates have been attempted with a view to relating the machinery stock to potentially mechanizable area, to the crops in whose production it is used, etc. The first sort of comparison was initiated in the ECLA 1953 study;[1] the results are presented in Table A-30. They must be taken as a "first attempt", since information was scanty at the time the study in question was undertaken. The estimates of numbers of different types of machines are probably reasonably accurate, but it is difficult to put a clear meaning on calculations of the degree of mechanization, since estimating the cultivated area which could be mechanized is difficult in the first place, and defining a line to distinguish mechanized and unmechanized cultivation also requires some degree of arbitrariness. This latter is not so serious a problem here since ECLA treats each implement separately.

[1] ECLA, Analyses and Projections, op. cit.

TABLE A-30

Estimate of Agricultural Machinery and Tractor Stocks and Average Density, 1953

	Number of Units[a] (1)	Cultivated Area Which Could be Mechanized (thousands of hectares) (2)	Density (hectares per unit of machinery) (3)	Estimate of Work Capacity (hectares per unit of machinery) (4)	Mechanized Area (thousands of hectares) (5)	Percentage of (5) over (2) (6)
Tractors (for crops only)	8,881	1,790[b]	202	80	710	40
Tractors (for crops and livestock)	8,881	2,790[c]	314	80	710	25
Ploughs (mechanical and animal traction)	13,500	1,790[b]	133	70	945	53
Ploughs (animal traction)	13,500	2,790[c]	207	70	945	34
Harrows (animal traction)	10,700	1,600[b]	150	90	963	60
Harrows (animal traction)	10,700	2,600[c]	243	90	963	37
Cultivators (animal traction)	4,300	1,500	350	20	86	6
Seeders and Planters	2,600	1,450	560	80	208	14
Stationary and Movable Grain Threshers[d]	850	380	447	150	128	34
Maize-Shelling Machines	2,600	700	269	30	78	11
Mowing Machines	400	10,000	25,000	40	16	--
Hay Rakes	70	10,000	143,000	80	6	--

(continued on following page)

TABLE A-30, continued

[a]Farm machinery stocks were estimated in each case by adjusting the figures for the number of units imported by Colombia from the United States, on the basis of the ratio between the total import tonnage of each type of machinery and the tonnage from the United States. The study of each group of machinery took into account imports for the number of years estimated as the average working life of such machinery in Colombia.

[b]Including only annual crops and sugar cane.

[c]Including annual crops, sugar cane and one million hectares of artificial pastures, estimated as the annual renovation quota for the maintenance of the existing 10 million hectares of artificial pastures. The figures for tractors given in the first and second lines of Column 1 should not be added together, since they are the same in the two different cases under consideration.

[d]Movable threshers include all automatic and combine harvesters.

SOURCE: ECLA, p. 181, originally based on data from the Ministry of Agriculture, yearbooks of foreign trade, and Foreign Commerce and Navigation of the United States.

Table A-31, from Lauchlin Currie's study, estimates the degree of mechanization in the production of different crops in 1960. The line between mechanized and unmechanized production is again not precisely defined. A more recent estimate by Thirsk is presented in Table A-32.

TABLE A-31

Estimates of Area Cultivated and Days Worked in Principal Agricultural Crops, 1960

Type of Crop	Mechanized Area (thousands of hectares)	Non-Mechanized Area[a] (thousands of hectares	Days Worked in Mechanized Crops		Days Worked in Non-Mechanized Crops	
			Per Hectare	Total (millions)	Per Hectare	Total (millions)
Perennial Crops						
Coffee		889.1			100	88.9
Sugar Cane	40.0		40	1.6		
Panela Cane		216.0			118	25.5
Cacao		35.0			54	1.9
Fique (fiber)		30.0			48	1.4
Fruit	5.0	95.0	50	0.3	65	6.2
Platano and Banana		271.7			50	13.6
Banana for Export	19.8		32	0.6		
Subtotal Without Coffee	64.8	647.7		2.5		48.6
Subtotal With Coffee		1,536.8				137.5
Annual Crops						
Hot Climate						
Sesame	4.9	19.6	30	0.1	100	2.0
Cotton	132.4	33.1	76	10.1	76	2.5
Rice	100.0	127.3	25	2.5	57	7.3
Beans	8.6	77.7	50	0.4	78	6.1
Soybeans	10.0		50	0.5	78	
Corn	73.0	656.6	15	1.1	47	34.3
Tobacco		14.0			490	6.9
Tomato		3.0			280	0.8
Yuca		148.0			77	11.4
Arracacha		16.0			77	1.2
Subtotal	328.9	1,095.3		14.7		72.5

(continued on following page)

TABLE A-31 continued

Type of Crop	Mechanized Area (thousands of hectares	Non-Mechanized Area[a] (thousands of hectares)	Days Worked in Mechanized Crops Per Hectare	Days Worked in Mechanized Crops Total (millions)	Days Worked in Non-Mechanized Crops Per Hectare	Days Worked in Non-Mechanized Crops Total (millions)
Annual Crops						
Cold Climate						
Barley	38.2	16.3	10	0.4	33	0.5
Wheat	59.1	59.0	10	0.6	33	1.9
Potato	4.6	41.5	66	0.3	133	5.5
Onions, Garlic		18.0			180	3.2
Vegetables		50.0			360	18.0
Green Peas		40.0			360	14.4
Subtotal	101.9	224.8		1.3		43.5
TOTAL WITHOUT COFFEE	495.6	1,967.8		18.5		164.6
TOTAL WITH COFFEE		2,856.9				253.5

[a]For coffee, the area in cultivation is larger than the area harvested.

SOURCE: Lauchlin Currie, Accelerating Development: The Necessity and the Means, McGraw Hill, New York, 1966, p. 174.

TABLE A-32 (Continued)

Sources and Footnotes:

(1) Hectares under mechanization refers to land where machinery is used to harvest or to perform other major operations, or in the cultivation of permanent or semi-permanent crops. It does not include areas which are double-cropped for either the same or a different crop.

(2) Tractors required are those which theoretically would be necessary in order to cultivate the mechanized area specified per crop, under conditions currently prevailing in the country. In practice, however, machinery is used either simultaneously or alternately to cultivate several crops (cotton and corn; barley and potatoes; rice, bananas and cane) at the same time.

(3) The land planted in African palm is estimated as if it were equivalent to that of an earlier maturing crop, in order to overcome the long period of waiting for the group plants to bear fruit.

(4) For crops like dry rice, potatoes, tobacco, etc., machinery is used especially in land preparation.

(5) ADIMAGRO, La Mecanizacion Agricola en Colombia, Bogota, 1969. A major source for this study was "Actualidad y Perspectivas de los principales Cultivos Agricolas en Colombia," Ministerio de Agricultura, Bogota, 1966.

(6) Data from Federacion de Arroceros, Departamento Tecnico, 1967.

(7) Instituto Nacional de Abastecimientos INA, "Produccion, Consumo y Faltantes de Productos Basicos," 1964.

Section IIb Regional Estimates on Capital Stock, Investment and Mechanization

A few crude estimates are available at the regional level for investment and capital stock, and for degree of mechanization. Table A-33, also coming from ECLA presents mechanization ratios by departments, where the degree of mechanization is based on number of tractors available and on the assumption that each available tractor can work 80 hectares annually. The associated estimates of mechanizable land are based on a survey done by the Caja de Credito Agrario--a study whose degree of precision is unknown to the author.

Table A-34 presents a variety of indicators of the degree of mechanization by department in 1959. Calculations of the value of machinery by department were carried out by the author on the basis of quantities of the different machines reported in the agricultural census of 1959, and estimates of the average value of each machine made by the author. There is a notable tendency for departments which are either poor (as for example Nariño and Boyaca) or which specialize in production of permanent rather than temporary crops (such as Caldas) to have low levels of mechanization per cropped hectare, or per most of the other variables to which mechanization is here related.

An overall capital stock estimate by departments was calculated by the author for 1959--presented in Table A-35.

Table A-33

Cultivated Area, Tractor Density and Area Suitable for Mechanization by Department, Early Fifties

	Cultivated Area (thousands of hectares)	Number of Tractors	Density (hectares per tractor)	Mechanized Area (thousands of hectares)	Area Suitable for Mechanization (thousands of hectares)	Percentage of Mechanized Area Over Area Suitable for Mechanization
	(1)	(2)	(3)	(4)	(5)	(6)
Atlántico	37	191	194	15	140	10.7
Antioquia	370	132	2,803	10	903	1.1
Bolívar y Córdoba	249	789	316	63	2,157	2.9
Boyacá	270	283	954	23	291	7.9
Caldas	290	131	2,214	10	118	8.5
Cauca	92	773	119	62	101	61.4
Chocó	38	--	--	--	605	0.0
Cundinamarca	355	1,445	246	116	299	38.8
Huila	80	511	157	41	173	23.7
Magdalena	97	615	158	49	1,672	2.9
Nariño	198	165	1,200	13	1,756	0.7
Norte de Santander	91	154	591	12	426	2.8
Santander	161	113	1,425	9	708	1.3
Tolima	237	1,372	173	110	380	28.9
Valle del Cauca	285	2,139	133	171	273	62.6
Goajira	--	--	--	--	180	--
Meta	--	107	--	9	--	--
Caquetá	--	20	--	2	--	--
TOTAL	2,900	8,940[a]		715	10,182	7.0

(continued on following page)

TABLE A-33, continued

[a]Total number of tractors used in agriculture.

SOURCES: ECLA, p. 183. Column 1 is from the Ministry of Agriculture. Column 2 is an estimate based on figures presented by Raul Varela Martinez in La Mecanización de la Agricultura en Colombia (1951). The figures for 1953 were adjusted on the basis of tractor sales made during the last four years by the Caja de Crédito Agrario in the various departments. Figures in Column 3 are ECLA estimates. Column 4 is also an ECLA estimate, based on the assumption that each available tractor can work 80 hectares annually. The area suitable for mechanization (Column 5), by departments, was calculated on the basis of a survey made by the Caja de Crédito Agrario in all departments in October 1954. The figures include all land, whether cultivated or not, which is suitable for agricultural purposes and whose topography would permit the use of tractors. Figures in Column 6 are also ECLA estimates.

TABLE A-34

Departmental Differences in the Degree of Mechanization, 1959

	Value of Machinery:					
	Per Peso of Crop and Livestock Output	Per Peso of Crop Output	Per Cropped Hectare	Per Hectare Cropped or Fallow	Per Hectare of Agricultural Land (cropped, fallow, or pasture)	Per Laborer
Antioquia	.0159	.0239	38.6	26.5	.0083	56.2
Atlantico	.1253	.3206	291.5	158.7	.0311	162.9
Bolivar	.0404	.1111	157.3	88.3	.0136	144.5
Boyaca	.0401	.0695	84.1	53.6	.0072	111.7
Caldas	.0186	.0214	46.4	39.5	.0169	69.4
Cauca	.0491	.0745	115.5	88.7	.0327	178.4
Cordoba	.0531	.1467	232.4	106.7	.0170	190.5
Cundinamarca	.1028	.1519	252.3	122.8	.0706	354.0
Huila	.0776	.1257	139.5	166.2	.0220	290.6
Magdalena	.0567	.1178	136.6	74.2	.0157	208.1
Nariño	.0285	.0399	40.8	31.7	.0200	71.9
North Santander	.0416	.0598	58.3	71.4	.0207	138.0
Santander	.0362	.0581	51.4	30.2	.0124	89.8
Tolima	.0714	.0859	159.9	117.1	.0420	367.8
Valle	.0851	.1069	213.1	200.0	.0760	400.0

Source: Calculations by the author on the basis of the 1959 agricultural census, and machinery prices based on the import figures.

TABLE A-35

Capital Stock in Cattle, Hogs and Major Types of Machinery, 1959

(millions of 1959 pesos)

	Cattle (1)	Hogs (2)	Machinery (Caja based estimate) (3)	Machinery (census based estimate) (4)	Plantations (author's price estimate) (5)	Plantations (adjusted price estimates of ECLA) (6)	Total (7)
Antioquia	553.03	27.94	10.00	11.82	301.20	146.64	893.98
Atlantico	75.06	1.88	4.61	5.05	1.61	0.89	83.59
Bolivar	879.70	24.01	24.14	16.38	22.47	8.82	937.56
Boyaca	445.29	20.90	19.71	20.44	52.42	41.82	539.04
Caldas	180.43	8.29	15.34	11.72	519.82	200.14	720.26
Cauca	345.51	8.21	25.32	19.38	167.68	76.08	540.78
Cordoba	576.46	30.44	19.46	17.44	17.96	5.97	642.29
Cundinamarca	269.37	18.60	59.10	71.60	180.01	88.45	539.58
Huila	166.28	5.12	19.60	14.49	119.63	52.62	305.52
Magdalena	767.31	27.30	39.57	27.54	104.26	33.55	426.41
Meta	119.10	4.47	15.19	10.71	32.86	12.78	167.14
Narino	225.53	13.29	11.37	8.69	125.97	58.03	373.48
Norte de Santander	169.58	7.77	11.39	9.41	143.31	62.82	330.06
Santander	229.03	14.00	14.60	12.30	136.39	70.88	391.72
Tolima	238.08	10.79	68.99	47.39	315.26	135.39	611.54
Valle	262.57	19.89	95.19	64.35	264.62	141.14	611.43
TOTAL	5,502.34	242.90	457.51	368.67	2,505.47	1,137.02	8,619.38

Sources and Methodology for Table A-35.

Column 1, the value of a cattle stock, is based on the estimate of the number of cattle in each department given by the Banco Ganadero, the distribution of cattle by age and sex in each department given by the 1959 agricultural census, and average price for each of four age/sex categories (males under two years, females under two years, males over two years, and females over two years), calculated by the author on the basis of price statistics from various fairs in Colombia, as published in the Anuario General de Estadistica. An attempt was made to estimate the likely age distribution of the cattle stock within each of these four categories and to choose a representative price figure. This was not easy, and in any case the representativeness of the prices at the cattle fairs is open to some question. Whatever bias is present is likely to be present for all departments in not too varying degree.

(The estimates of number of cattle were not based on the census figures since both the contemporary judgment of observers such as the Banco Ganadero and the confirming evidence of subsequent samples taken by DANE in 1964 and later indicated that underestimation was particularly severe in some departments (especially Bolivar); under-reporting was much more severe for cattle in some regions than in general for hogs.)

Column 2, the value of stocks of hogs, was based on the estimated number of hogs in each department from the agricultural census of 1959, and average prices calculated on the basis of price figures again published in the Anuario General de Estadistica. No other animals were included, since all others are relatively small in importance. (They are not necessarily small relative to the machinery category, but are relative to the livestock category, and could not change the overall figures substantially.)

Since no direct measures of the value of capital stock in machinery were available, it was necessary to use quantity statistics provided either in the agricultural census or in a study carried out by the Caja Agraria in 1962, to assume a length of life for the equipment, and to depreciate it accordingly. We use here the assumption of a ten-year length of life throughout. This seems to be borne out by a comparison of imports of tractors and the number in existence in 1959. For the other types of implements, no such easy check is in general available; given the shortage of capital in Colombia, one might expect a long length of life, but there is also evidence that machinery is often wasted and allowed to run down through insufficient knowledge as to how to operate it.

Column 3 estimates the value of machinery using the regional distribution of tractors coming from the study of the Caja Agraria in 1962, while Column 4 assumes the regional distribution of tractors coming from the agricultural census of 1959. For other implements the two sources do not overlap; for those implements whose quantity is estimated in the Caja Agraria study, no figures are available in the agricultural census and vice versa. There was sufficient discrepancy between the Caja figures and those of the census for tractors as to suggest that our estimates here are far from precise, even abstracting from all the difficulties of depreciation, correct valuation of the implements in the first place, etc. Columns (5) and (6) give estimates of the total capital in the form of plantations, the first based on the author's estimates of value of different types of plantations, the second based on ECLA's estimates of per hectare value of these plantations in the early 50's converted to 1959 prices, with a couple of adjustments also made. While the value of

plantation estimates involve a methodology similar to that presented here in Table A-17, the figures differ drastically between this table and Table A-15 for both value of machinery and value of plantations; this table was based on early available information on prices, and subsequent adjustments suggest that these were much too low. These should be used, therefore, only to get a feel for the relative importance of these two types of capital stock by departments. For absolute values it is believed that Table A-15 should be much more accurate.

For livestock, the estimates here do correspond quite well with those of Table A-15.

Section III: The Production Function

Several analyses have now been carried out in an attempt to estimate characteristics of the production function of Colombia's agricultural sector as a whole, or of different crops or regions. Some of the more interesting results from these studies are drawn on in the tables which follow.

Several estimates are available for the labour share corresponding to the production of different items, and sometimes also to the use of different technologies. Estimates undertaken by the author are presented in Table A-40, and a summary of calculations prepared by Wayne Thirsk and permitting calculation of the labour share and other interesting characteristics of the production function of small and large farms in different departments is presented as Table A-41. Table A-42 presents a Thirsk resumé of labour share on mechanized (and therefore large) crop farms.

Rates of labour capital substitution have been estimated by several authors. Table A-43 summarizes some crude rates of substitution between machinery and labour, and Tables A-44 and A-45 focus, respectively, on input requirements and trade-offs between mechanized and traditional agriculture and between mechanized and modern non-mechanized agriculture.

Table A-40

Labor Income[1] and Labor Share,[2] by Products

	Value Added Per Hectare		Labor Income Per Hectare		Labor Share			
Perennials	1958 (1)	1966 (2)	1958 (3)	1966 (4)	1958 (5)	1966 (6)	"Future" (7)	Other Estimates (8)
Coffee	1950	3340	475	1380	24.5	40.0		
Cacao	n.a.	n.a.	270	790	n.a.	n.a.		
Bananas (Export)	3700-5500	7300-10900	290	840	≤8.0	≤11.5		
Platanos	n.a.	n.a.	250	730	n.a.	n.a.		
Sugar (for refining)	3100	10000	500	1100	16.1	11.0		
Sugar-Panela	1100	2650	530-810	1540	45-65	55		
Annuals--Relatively Commercialized								
Barley	870	1900	80	240	10	12		
Cotton	1340	2300	380	1100	28	48	15-30	
Rice	960	2425	215	625	22	26	12	
Sesame	550	1980	150	440	27	24	15-18	
Annuals--Less Commercialized								
Beans	600	1700	380	1100	60	60	12	
Corn	425	1030	200	580	47	50	13	
Potatoes	3200	7325	630	1830	20	25		45;54
Tobacco	2890	7630	1960	5700	63	68		
Wheat	510	1350	135	390	26	29		33;44
Yucca	950	3670	385	1120	40	30		
Animal Products								
Cattle					25 (1960 estimate)			

[1]Labor income of various products is calculated as man days times a daily wage rate, i.e., there is no attempt in this context to use a different labor cost for hired and family labor. Some attempt was made to take account of apparent differences among crops in the wages paid to hired labor; differences are based on differences in the type of work, the region in which the crops are grown, etc.

[2]Labor share is likely to be unstable, at least for commercial operations and crops whose yields and/or prices fluctuate considerably. (It is equally likely to be unstable if calculated for non-commercial operations on the assumption of a fixed payment per unit of labor with returns to capital calculated as a residual.) The most appropriat measure is a long run average labor share. Although we did not here take the desirable step of estimating the shares for a number of years, the use of both 1958 and 1966 is a step in this direction. The shares differ between the two years primarily because of changes in the relative price of labor and the products.

Sources and Methodology:

Figures on value added per hectare were based on value of output per hectare figures from U.S.D.A. Foreign Agricultural Report #52, Changes in Agricultural Production and Technology in Colombia, Washington, June 1969, and a variety of sources from which estimates of the share of value of output corresponding to purchased inputs could be drawn.

Major sources of information on labor inputs for various crops were:

(a) The estimates by Lauchlin Currie in his Accelerating Development: the Necessity and the Means, New York, McGraw-Hill, 19, pp. 174-178.

(b) Caja Agraria, Manual de Costos, Bogota 1967;

(c) INCORA, Informacion Sobre Costos de Produccion, August 1968;

(d) ILMA (Instituto Latinoamericano de Mercadeo Agricola), Supply Problems of Basic Agricultural Products in Colombia, Bogota, 1964.

A variety of other sources were used for specific crops.

None of the above sources could be accepted as definitive since most of them present figures referring clearly to commercial production. Currie's estimates are the most meaningful for our purposes but some were adjusted on the basis of more detailed studies than he had available at time of writing.

The data of Col. (7) are based on figures presented in INCORA, op. cit., and correspond to what the study refers to as "future" technologies and cost structures.

The estimates presented in Col. (8) come from crop studies and are of interest due to their differences with my estimates for these products, suggesting that, whether because 1958 and 1966 were atypical or for some other reason, mine may be downward biased.

The estimate for cattle is based on the author's estimate of the number of people engaged in cattle raising (about 380,000 in 1960) and Central Bank based estimates of value added. It is perhaps more likely to be biased up than down, as the Central Bank estimate of milk production appears low. On the other hand Currie estimated a higher number of people engaged in the cattle industry (440,000), so there may be a downward bias on this side.

TABLE A-41

COLOMBIA: AVERAGE CHARACTERISTICS OF SMALL AND LARGE FARM PRODUCTION, 1968

	Small Farms				Large Farms			
Departments:	Valle	Boyaca	Caldas	Meta	Valle		Meta	
					Crops	Cattle	Crops	Cattle
Characteristics								
(1) Number of observations	30	25	25	25	28	20	20	20
(2) Value-added per value of output	.84	.71	.89	.85	.8	.8	.74	.82
(3) Land size (in hectares)	3.1	3.2	8.2	36	377	848	1804	8884
(4) Land rental per hectare	$1753	2051	1521	170	1460	1224.5	354.4	50.4
(5) Value-added per man-day	$ 27.42	14.69	51.5	38.75	90.9	80.2	105.2	82.9
(6) Value-added per hectare	$7160	2836	5260	851.6	5017.4	1551.5	637.7	102
(7) Man-days per hectare	261	193	102	22	55.2	19.3	6.06	1.23
(8) Value of farm machinery per hectare	$ 617	759	809	24	2377.6	374	284	25

TABLE A-41 (continued)

Departments:	Small Farms				Large Farms			
	Valle	Boyaca	Caldas	Meta	Valle		Meta	
					Crops	Cattle	Crops	Cattle
Characteristics:								
(9) Value of farm machinery per man-day	$ 2.36	3.92	7.92	1.09	41.7	20.1	46.8	20.5
(10) Rate of return to capital, including land	------	------	------	------	22.7	13.7	39.8	9.95
(11) Ratio of home consumption to gross output value	.17	.37	.16	.35	-----	-----	-----	-----
(12) Labor income	$10958	-3645	20672	14164	-----	-----	-----	-----
(13) Labor income per family member	$2236	-530	2855	1795	-----	-----	-----	-----
(14) Per cent of observations with off-farm work	43	40	12	4	-----	-----	-----	-----
(15) Average of off-farm income	$6912	4065	3250	5300	-----	-----	-----	-----

TABLE A-41 (continued)

Departments:	Small Farms				Large Farms			
	Valle	Boyaca	Caldas	Meta	Valle		Meta	
					Crops	Cattle	Crops	Cattle
(16) Daily wage rates paid to hired labor	$ 14	8.8	14.2	13.7	22	20	21	20
(17) Per cent of observations hiring labor	66	72	84	88	100	100	100	100

Source: Thirsk, op. cit., pp. 26-28; originally from personal interview data collected by James Grunig, and used in James Grunig, Information, Entrepreneurship and Development, University of Wisconsin, 1969, unpublished Ph.D. dissertation.

Notes: (a) Rates of return to capital on large farms were calculated as the ratio of value-added less labor payments to the value of owned land and farm machinery. It is assumed that land values would reflect the amounts of other reproducible capital on the farm besides farm machinery. Thus, there is some danger of an upward bias to the extent this is not true. Also, because depreciation is included in value-added, these are gross rates of return. Similar rates were not calculated for small farms because of the difficulty of properly valuing the labor factor. Valuing the labor input at market wages results in low, and in some cases negative, rates of return. The basic problem concerns the true opportunity cost of such labor.

(b) Labor income, as a measure of the pure returns to family labor input, was defined as value-added less explicit labor payments, interest and depreciation on capital (12 and 10 per cent respectively), land rents (actually paid or 12 per cent of land values), interest on loans and taxes.

TABLE A-42

INCOME SHARES OF LABOR BY CROP ON MECHANIZED FARMS

Crops	(1) INCORA data, 1968	(2) Grunig's data, 1968 Valle	(3) Grunig's data, 1968 Meta	(4) Farm Interviews, 1969	(5) Berry	(6) Best Estimates, 1968
Rice	.17	.16	.156	.17	.22 to .26	.16
Cotton	.285	.28	.19	.32	.28	.28
Corn	.19	.187	.30	---	.13	.18
Soyabeans	.09	----	----	---	---	.10
Sorghum	.14	.13	----	---	---	.14
Sugarcane	----	.19	----	---	.11 to .16	.15
African palm	----	----	.178	---	---	---
Sesame	.29	----	----	---	---	.28
Wheat	.09	----	----	---	---	.10
Barley	.12	----	----	---	.12	.10
Cattle	----	.257	.267	---	.25	.25

Source: Wayne Thirsk, op. cit., p. 143. He cites as original sources —

(a) Columns (1) to (4) use the data described in Chapter III.

(b) Column (5) is from R. A. Berry, "Land Distribution, Income Distribution and the Productive Efficiency of Colombian Agriculture," Yale University, Economic Growth Center, Discussion Paper No. 108, March 20, 1971.

(c) Column (6) is a guess at the most representative on-average value used to construct an employment series in mechanized agriculture.

TABLE A-43

COLOMBIA: CRUDE RATES OF SUBSTITUTION BETWEEN MACHINERY AND LABOR

Crop	(1)	(2)	(3)	(4)
Rice	34/11 = 3.1		45/11 = 4.09	24/5.4 = 4.44
Beans	43/12 = 3.58		41/13 = 3.15	13/4.66 = 2.8
Wheat and Barley		32/10.5 = 3.05	26/10 = 2.6	32/11 = 2.91
Sugarcane			96.5/26.75 = 3.61	
Corn			31/9.5 = 3.26	16/5.7 = 2.81
Potatoes			43/15.5 = 2.77	
Cotton			55/22.5 = 2.45	
Sesame				25/6.33 = 3.94

Sources: Thirsk, op.cit., p.336. The original sources for each column are:
(1) unpublished data from Agrocredito;
(2) Pedro Martinez, La Mecanizacion Agricola en Colombia, Caja Agraria, 1964;
(3) Manual de Costos, Caja Agraria, 1967;
(4) unpublished information from INCORA patrones for the year 1968.

Note: For each entry the numerator represents the average difference in man-days per hectare covering all operations between non-mechanized and mechanized observations, while the denominator represents the number of machine-hours (tractors and combines) used on the mechanized units.

TABLE A-44

COLOMBIA: INPUT REQUIREMENTS AND TRADEOFFS BETWEEN MECHANIZED AND TRADITIONAL AGRICULTURE FOR VARIOUS CROPS

Operation	Crop	Mechanized Agriculture: Machine-Hours	Mechanized Agriculture: Man-Days	Traditional Agriculture: Man-Days	Per Cent Labor Saved	Implicit Substitution Rate
1	Sesame	4	0	16		
2		2	17	27		
3		0	9.7	8.8		
Total		6	26.7	51.8	48	4.18
1	Cotton	4	0	16		
2		6	11	29		
3		1.5	29	37		
Total		11.5	40	82	51	3.65
1	Irrigated	4	0	15		
2	Rice	1	30	43		
3		2.6	1.8	13		
Total		7.6	31.8	71	55	5.16
1	Dryland	4	0	15		
2	Rice	0	13	13		
3		2.7	2.4	13.6		
Total		6.7	15.4	41.6	63	3.91
1	Barley	4	.1	15		
2		0	0	0		
3		3.6	.4	28.8		
Total		7.6	0.5	43.8	98.8	5.70

TABLE A-44 (Continued)

Operation	Crop	Mechanized Agriculture: Machine-Hours	Mechanized Agriculture: Man-Days	Traditional Agriculture: Man-Days	Per Cent Labor Saved	Implicit Substitution Rate
1	Wheat	4	.1	15		
2		0	0	0		
3		2	.4	17.3		
Total		6	0.5	32.3	89	5.3
1	Beans	4	.1	20		
2		1	15	15		
3		4.2	1.3	16.6		
Total		9.2	16.4	61.6	73	4.91
1	Corn	4	.1	16		
2		0	21.0	21		
3		1.5	7.2	11.8		
Total		5.5	28.3	48.8	42	5.18
1	Potatoes	4	14	28		
2		0	35	35		
3		0	71.4	62.3		
Total		4	120.4	125.3	4	1.22

Source: Wayne Thirsk, op.cit., p. 338; originally from Considerations of the Role of Machinery in Colombian Agriculture, Ministry of Agriculture, Bogota, Colombia, March 18, 1971.

Notes: (a) Under "Operation" the numbers 1, 2 and 3 denote the separate operations of (1) land preparation and seeding; (2) cultivation, weeding and thinning; (3) harvesting.
(b) The distinction between mechanized and traditional agriculture is given on page 72-73.
(c) The implicit substitution rate is the ratio of the difference in man-days between two agricultural systems and the number of machine-hours used in mechanized agriculture.

TABLE A-45

COLOMBIA: INPUT REQUIREMENTS AND TRADEOFFS BETWEEN MECHANIZED AND NONMECHANIZED MODERN AGRICULTURE FOR VARIOUS CROPS

Operations	Crop	Mechanized Agriculture: Machine-Hours	Mechanized Agriculture: Man-Days	Modern Agriculture: Man-Days	Per Cent Labor Saved	Implicit Substitution Rate
1	Sesame	7	1	23		
2		3	21	31		
3		1.1	14.4	14.5		
Total		11.1	36.4	68.5	46	2.89
1	Cotton	7	0	22		
2		8	11	32		
3		1.5	55	66		
Total		16.5	66	120	45	3.27
1	Irrigated	7	3	24		
2	Rice	1	30	43		
3		4.3	3.3	26		
Total		12.3	36.3	93	60	4.61
1	Dryland	7	3	24		
2	Rice	0	13	13		
3		3.1	2.9	16.9		
Total		10.1	18.9	53.9	66	3.47
1	Barley	7	.1	22		
2		0	7.0	7		
3		4	.4	33		
Total		11	7.5	62	82	4.95

TABLE A-45 (Continued)

Operation	Crop	Mechanized Agriculture: Machine-Hours	Mechanized Agriculture: Man-Days	Modern Agriculture: Man-Days	Per Cent Labor Saved	Implicit Substitution Rate
1	Wheat	7	.1	22		
2		0	6	26		
3		4	.4	34.6		
Total		11	6.5	62.6	88	5.1
1	Beans	7	1.1	34		
2		3	15	25		
3		5	1.5	22.8		
Total		15	17.6	81.8	78	4.28
1	Corn	7	11	29		
2		2.5	13	21		
3		2.2	17.2	28		
Total		11.7	30.3	78	61.5	4.08
1	Potatoes	5.5	14	34		
2		10	42	72		
3		0	99.5	87.3		
Total		15.5	155.5	193.3	20	2.44

Source: Thirsk, op.cit., p. 339; originally from Considerations of the Role of Machinery in Colombian Agriculture, Ministry of Agriculture, Bogota, Colombia, March 18, 1971.

Notes: (a) Under "Operation" the numbers 1, 2 and 3 denote the separate operations of (1) land preparation and seeding; (2) cultivation, weeding and thinning; (3) harvesting.

(b) The distinction between mechanized and non-mechanized modern agriculture is given on p. 72-73.

(c) The implicit substitution rate is the ratio of the difference in man-days between the two agricultural systems and the number of machine-hours used in mechanized agriculture.

Section IV: Land Distribution, Tenure, and Use: National and Regional

Much information is now available on land distribution, tenure and use, coming primarily from the agricultural census of 1959, the samples of the sixties, the 1970 agricultural census, INCORA figures and, at a more micro level, from a variety of individual studies for different municipios, regions, or whatever. Since it has not yet been possible to evaluate the results of the 1970 agricultural census, no statistics from it are presented here, although it is referred to on some occasions in the text of this study.

Table A-50 presents the basic information on distribution of farms (defined as operating units) by size and by tenure at the time of the 1959 agricultural census. Table A-51 presents the same information in percentage terms. Table A-52 presents data from the Geographical Institute "Agustin Codazzi" on the distribution of registered plots or properties by size. Here the unit under consideration is defined by ownership; in this case non-contiguous pieces of property farmed as a unit by a farmer will appear as two separate units in the table. The data correspond to Agustin Codazzi records as of early 1963, but the assessments to which those records correspond would have occurred over a substantial period of years leading up to 1963; there is usually a long interval between one assessment and another. The figures would therefore be somewhat out of date, and in particular the assessed values would have slipped well below the levels that an updated national assessment would have indicated. It must also be borne in mind that the concept of "rural" in Agustin Codazzi terminology includes properties in small villages, i.e., some of the small properties are not agricultural at all. On the other hand, no records at all were available for

over 100 of Colombia's municipios at this time. Table A-53 presents a different breakdown by size categories of the same information as presented in Table A-52.

In Table A-54 are presented a summary of different estimates of the land surface and land value distribution by farm and/or plot size. Given that average land value appears to vary extremely widely as a function of farm size, being on average lower for the larger farms, it is inappropriate in analyses of productivity to assume that land is homogeneous, and the calculations made here of the distribution of effective land are designed to normalize for the heterogeneity of land quality.

Unfortunately, information on distribution of land by owner is not available; (the distribution by assessed plots gives some hints, but one owner can have any number of such plots, with these not being aggregated as one-owner units). One of the very few pieces of evidence on the relationship between distribution by operator and distribution of owner comes from a survey of four municipalities in the Sabana de Bogota; the statistics are presented as Table A-55. Concentration by owners is still somewhat underestimated in a table like this, since an individual with land in one of these municipios and also in some municipio elsewhere appears here with an amount of land lower than the total which he in fact owns.

Table A-56 focuses on the minifundia problem, and its relative severity across the departments of Colombia.

The overall relationship between farm size and tenure was presented in Table A-50; one aspect on which that table does not throw any light is the extent of renting on large crop farms; since most large farms specialize primarily in cattle, it is not possible to deduce the importance of this phenomenon. Tables A-57 and A-58 attempt to throw some light on the issue

for Colombia and Tolima, respectively, at the time of the 1959 agricultural census. Column 12 of Table A-57 gives something close to a lower limit estimate of the importance of renting on crop farms. (It would be strictly a lower limit only if no rented farms were used largely for cattle raising or other non-crop products.) Column 13 gives an upper limit. It might be an underestimate of the relative importance of rented farms in modern or commercialized crop farming, but this is another issue. In the largest two or three categories there are so many cattle farms relative to the number of crop farms that if only a very small percent were rented, the "rented/total" ratio for crop farms would remain below 25 percent and perhaps below 20 percent.

Distribution of cultivated land (i.e., land used to produce either perennial crops or annual crops--or in fallow) by departments is presented in Table A-59, for years ranging from 1953 through 1967. But the number of difficulties still plaguing the possible use of these figures for over time comparisons are discussed in some detail in the sources and methodology.

A useful table presenting information on the extent of home consumption as opposed to sales by farms in the different departments is reproduced as Table A-60.

The relationship between farm size and allocation of land among the major uses--temporary crops, permanent crops, pasture--is presented in slightly different format in Tables A-61 and A-62. The classification of Table A-62 reflects CIDA's attempt to group farms by whether family, subfamily, or more than one family.

CIDA (90) notes that the division of farms has been going on for a long time in the miunifundio regions, and accelerating in the last 50 years. The *campesinos* are not easily mobile to unknown regions, though this is less true of the coffee regions. Even with a very small farm, the operator will often produce for the market and have to buy some of that family's food.

In some parts of the country (e.g. Tenza, Boyacá) fragmentation is increased by the tendency for parents not to bequest their land to their children but to sell it in order to sustain themselves in their old age. This is cited as an explaining in part the high degree of out-migration from Tenza, whose population has long been stationary (ibid, 93). In Tenza 95% of families have less than 5 hectares. But many families indicated that they did not need more than 3-4 hectares. A number of farmers are both owners and renters.

TABLE A-50

Land Tenure by Farm Size, 1959*

Farm Size in Hectares	Total		Under One Form of Tenure								More Than One Form	
			Owned		Rented		Occupied Without Title		Other Forms			
	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area
less than 1/2	165,652	38,344	110,452	25,114	46,519	10,754	2,277	523	3,358	748	3,046	1,205
1/2 - 1	132,419	93,649	77,425	55,737	42,106	28,610	2,179	1,378	2,813	1,721	7,896	6,203
1 - 2	191,347	270,308	106,154	154,816	59,000	79,052	4,321	5,504	4,116	4,840	17,756	26,096
2 - 3	117,005	275,656	63,500	153,029	33,815	76,939	3,157	7,062	2,324	4,417	14,209	34,209
3 - 4	92,001	309,165	54,315	185,007	22,929	76,060	2,489	8,124	2,002	5,067	10,266	34,907
4 - 5	58,181	251,854	34,293	149,455	13,751	59,325	1,779	7,443	1,179	4,095	7,179	31,536
5 - 10	169,145	1,164,749	108,442	752,590	32,682	226,928	5,787	39,352	3,917	19,160	18,317	126,719
10 - 20	114,231	1,572,076	77,819	1,077,072	17,305	244,382	6,007	79,817	2,652	26,937	10,448	143,868
20 - 30	44,049	1,043,554	31,196	740,724	5,196	129,199	3,367	75,565	958	18,163	3,332	79,903
30 - 40	26,500	890,100	19,071	643,014	2,588	92,466	2,496	79,017	546	14,216	1,799	61,387
40 - 50	16,240	705,047	11,732	512,155	1,376	62,086	1,764	72,903	355	13,233	1,013	44,670
50 - 100	39,990	2,680,471	28,542	1,933,862	2,831	202,008	5,802	362,999	706	39,006	2,109	142,596
100 - 200	22,317	2,996,152	16,445	2,234,387	1,313	188,891	3,119	385,406	348	39,749	1,092	147,719
200 - 500	13,693	3,994,319	10,456	3,099,805	688	205,874	1,713	451,661	262	67,188	574	169,791
500 -1000	4,141	2,730,764	3,349	2,234,139	162	107,730	356	214,601	88	50,993	186	123,301
1000 -2500	1,975	2,808,210	1,585	2,256,366	66	95,043	194	279,457	47	60,959	83	116,385
2500 or more	786	5,513,409	542	3,572,313	20	123,927	154	1,243,263	19	186,924	51	386,982
TOTAL	1,209,672	27,337,827	755,318	19,779,585	282,347	2,009,274	46,961	3,314,075	25,690	557,416	99,356	1,677,477

SOURCE: Agricultural Census of 1960 (Directorio de Explotaciones.., Segunda Parte, p. 42).

*: A farm ("explotacion") is defined as land farmed as a unit by one operator and all located in the same municipio. The concept is therefore related to the operating and management unit, not to ownership.

TABLE A-51

Percent Distribution of Land by Size of Plot and Tenure Arrangement, *1959*

Farm Size in Hectares	Total		Owned		Rented	
	% of Total Number of Farms	% of Total Area	% of Total Number of Farms	% of Total Area	% of Total Number of Farms	% of Total Area
less than 1/2	13.69	0.14	14.62	0.13	16.48	0.54
less than 1	10.95	0.34	10.25	0.28	14.91	1.42
1 - 2	15.82	0.99	14.05	0.78	20.90	3.93
2 - 3	9.67	1.01	8.41	0.77	11.98	3.83
3 - 4	7.61	1.13	7.19	0.94	8.12	3.79
4 - 5	4.81	0.92	4.54	0.76	4.87	2.95
5 - 10	13.98	4.26	14.36	3.80	11.58	11.29
10 - 20	9.44	5.75	10.30	5.45	6.13	12.16
20 - 30	3.64	3.82	4.13	3.74	1.84	6.43
30 - 40	2.19	3.26	2.52	3.25	0.92	4.60
40 - 50	1.34	2.58	1.55	2.59	0.49	3.09
50 - 100	3.31	9.80	3.78	9.78	1.00	10.05
100 - 200	1.84	10.96	2.18	11.30	0.47	9.40
200 - 500	1.13	14.61	1.38	15.67	0.24	10.25
500 -1000	0.34	9.99	0.44	11.30	0.06	5.36
1000 -2500	0.16	10.27	20.21	11.41	0.02	4.73
2500 or more	0.06	20.17	0.07	18.06	0.01	6.17

(continued on following page)

TABLE A-51, continued

Farm Size in Hectares	Occupied Without Title		Other		Mixed Arrangement	
	% of Total Number of Farms	% of Total Area	% of Total Number of Farms	% of Total Area	% of Total Number of Farms	% of Total Area
less than 1/2	4.85	0.02	13.07	0.13	3.07	0.07
less than 1	4.64	0.04	10.95	0.31	7.95	0.37
1 - 2	9.20	0.17	16.02	0.89	17.87	1.56
2 - 3	6.72	0.21	9.05	0.79	14.30	2.04
3 - 4	5.30	0.25	7.79	0.91	10.33	2.08
4 - 5	3.79	0.22	4.59	0.73	7.23	1.88
5 - 10	12.32	1.12	15.25	3.44	18.44	7.55
10 - 20	12.79	2.41	10.32	4.83	10.52	8.58
20 - 30	7.17	2.28	3.73	3.26	3.35	4.76
30 - 40	5.32	2.38	2.13	2.55	1.81	3.66
40 - 50	3.76	2.20	1.38	2.37	1.02	2.66
50 - 100	12.35	10.95	2.75	7.00	2.12	8.50
100 - 200	6.64	11.63	1.35	7.13	1.10	8.81
200 - 500	3.65	13.63	1.02	12.05	0.58	10.12
500 -1000	0.76	6.47	0.34	9.15	0.19	7.35
1000 -2500	0.41	8.43	0.18	10.94	0.08	6.94
2500 or more	0.33	37.54	0.07	33.53	0.05	23.07

SOURCE: Same as for Table A-50.

TABLE A-52

Number, Area and Assessed Value of the Assessed Plots by Size Groups,[a] About 1962

Plot Size in Hectares[b]	Assessed Plots		Assessed Area		Assessed Value			
					Total		Averages	
	Number	Per Cent	Hectares	Per Cent	Thousands of Pesos	Per Cent	Per Plot (in pesos)	Per Hectares (in pesos)
less than 0.5	292,679	20.40	51,894	0.24	435,855	3.35	1,500	8,400
0.5 - 1	186,513	13.00	120,405	0.55	317,083	2.44	1,700	2,600
1 - 2	254,935	17.73	324.338	1.48	610,938	4.70	2,400	1,900
2 - 3	135,327	9.40	297,811	1.34	460,791	3.55	3,400	1,500
3 - 4	93,291	6.50	299,555	1.36	428,186	3.30	4,600	1,400
4 - 5	57,828	4.00	239,030	1.10	294,782	2.27	5,100	1,200
5 - 10	148,312	10.30	976,876	4.46	1,140,877	8.78	7,700	1,200
10 - 20	101,831	7.08	1,350,382	6.16	1,277,025	9.83	12,500	950
20 - 30	43,545	3.03	1,001,089	4.57	769,804	5.92	17,700	800
30 - 40	26,439	1.84	867,662	3.96	579,427	4.46	21,900	700
40 - 50	17,245	1.20	734,425	3.35	470,509	3.62	27,300	650
50 - 100	39,598	2.75	2,623,309	12.00	1,426,106	10.98	36,000	550
100 - 200	21,670	1.50	2,860,004	13.05	1,382,581	10.64	63,800	500
200 - 300	7,665	0.53	1,777,606	8.11	777,461	6.00	101,400	450
300 - 400	3,582	0.25	1,173,325	5.36	530,536	4.10	148,100	450
400 - 500	2,009	0.14	854,896	3.90	348,652	2.67	173,500	400
500 -1000	3,217	0.22	2,155,092	9.84	899,932	6.92	279,700	400
1000 -2500	1,322	0.10	1,859,999	8.50	552,184	4.25	417,800	300
2500 -5000	334	0.02	1,677,715	7.65	273,197	2.10	817,900	160
more than 5000	68	0.005	662,562	3.02	15,891	0.12	233,700	20
TOTAL	1,437,410	100.00	21,907,975	100.00	12,991,817	100.00	9,040	600

[a] *Data for 723 municipios out of a total of 837 in the departments.*

[b] "Plot" is used here to represent the taxable unit or parcel of land. It is an ownership unit or piece of property.

SOURCE: INCORA, based on data from the Instituto Geografico, "Agustin Codazzi," February 1963.

TABLE A-53

Distribution of Rural Assessed Plots by Size Groups, According to Tax Breakdown, cerca 1962

Plot Size (Hectares)	Plot		Area		
			Total		
	Number	Percent	Thousands of Hectares	Percent	Average Hectares
Up to 0.5	292,679	20.4	51.9	0.2	0.2
0.5 - 5	727,894	50.6	1,281.1	5.9	1.8
5 - 50	337,372	23.5	4,930.4	22.5	14.6
50 - 200	61,268	4.2	5,483.3	25.0	89.5
200 or more	18,197	1.3	10,161.2	46.4	558.4
T O T A L	1,437,410	100.0	21,907.9	100.0	15.2

SOURCE: CIDA, op. cit., and originally from INCORA based on data from the Agustin Codazzi Institute, February, 1963.

TABLE A-54

Distribution of Land and "Effective Land" by Farm Size

Farm (or Plot) in Hectares	Per Hectare Assessed Value of Plots (thousands of pesos)			Percent Distribution Among Plots, by Size, of the Assessed Land Surface		Percent Distribution Among Farms (Operating Units) of Investigated Land Surface	Percent Distribution of Assessed Land, by Quality Normalized Land Units			Percent Distribution of *Investigated Land*, by Quality Normalized Land Units	
	Berry	CIDA	CIDA Adjusted	Berry	CIDA	Agricultural Census	Berry	CIDA	CIDA Adjusted	Agricultural Census	Agricultural Census Adjusted
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
less than 1/2	4.97	8.40	8.40	0.19	0.24	0.14	2.44	3.35	2.50	2.26	1.65
1/2-1	1.95	2.60	2.60	0.49	0.55	0.34	2.46	2.44	1.83	1.68	1.23
1-2	1.70	1.90	1.90	1.50	1.48	0.99	6.56	4.70	3.52	3.60	2.63
2-3	1.11	1.50	1.50	1.49	1.34	1.01	4.20	3.55	2.66	2.91	2.13
3-4	1.01	1.40	1.40	1.43	1.36	1.13	3.69	3.30	2.47	3.02	2.21
4-5	0.90	1.20	1.20	1.22	1.10	0.92	2.81	2.27	1.70	2.12	1.54
5-10	0.82	1.20	1.20	4.51	4.46	4.26	9.39	8.78	6.57	9.78	7.15
10-20	0.64	0.95	1.05	6.24	6.16	5.75	10.23	9.83	8.12	10.45	8.46
20-30	0.50	0.80	0.95	4.71	4.57	3.82	5.99	5.92	5.26	5.86	5.08
30-40	0.43	0.70	0.88	4.00	3.96	3.26	4.36	4.46	4.18	4.36	4.02
40-50	0.45	0.65	0.85	3.46	3.35	2.58	3.98	3.62	3.52	3.22	3.07
50-100	0.32	0.55	0.79	11.69	12.00	9.80	9.51	10.98	11.80	10.32	10.83
100-200	0.29	0.50	0.75	13.16	13.05	10.96	9.80	10.64	11.94	10.49	11.51
200-500	0.26	0.42	0.70	17.51	17.46	14.61	11.63	12.77	15.92	11.75	14.32
500-1000	0.24	0.40	0.65	9.75	9.84	9.99	6.07	6.92	8.42	7.66	9.09
1000-2500	0.19	0.30	0.60	9.26	8.50	10.27	4.45	4.25	6.36	5.90	8.62
2500 and over	0.10	0.12	0.24	9.40	10.67	20.17	2.39	2.22	3.32	4.63	6.78

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Farm Size in Hectares	Land Per Farm (Agricultural Census) (12)	Estimated Effective Land Per Farm (Agricultural Census)			Number of Farms (16)
		Berry (13)	CIDA (14)	CIDA Adjusted (15)	
less than 1/2	0.23	1.28	1.61	1.61	165,652
1/2-1	0.71	1.54	1.54	1.54	132,419
1-2	1.41	2.66	2.23	2.23	191,347
2-3	2.36	2.92	2.95	2.95	117,005
3-4	3.37	3.81	3.93	3.93	92,001
4-5	4.33	4.33	4.33	4.33	58,181
5-10	9.99	9.19	9.99	9.99	169,145
10-20	13.76	9.77	10.90	12.06	114,231
20-30	23.69	13.27	15.79	18.79	44,049
30-40	33.56	16.11	19.58	24.66	26,500
40-50	43.43	21.72	23.53	30.82	16,240
50-100	67.01	24.12	30.71	44.20	39,990
100-200	134.2	42.94	55.92	84.04	22,317
200-500	291.6	84.56	102.05	170.44	13,693
500-1000	658.1	177.7	219.4	357.18	4,141
1000-2500	1,421.0	298.4	355.3	711.9	1,975
2500 and over	7,002.0	770.2	700.2	1,403.2	786

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Col. (1) is my calculation based on tables supplied directly by the Geographical Institute. The catastral values were, for the most part, but perhaps not uniformly, those on record in 1960. This means, of course, that many of them dated back to the early fifties or more.

Col. (2) is from CIDA, op. cit., p. 404, based on data also from the Geographical Institute, but prepared in February, 1963. Col. (3) is my adjustment of Col. (2) to allow for relative underassessment at large farm sizes. (This adjustment is discussed in the text, Chapter IV.) For both Col. (1) and Col. (2) the size breakdown from the Geographical Institute was by predios or parcels, not by farmed units. Since Col. (3) is based on Col. (2), the same is true for it.

Cols. (4) and (5) give the percent distribution of assessed land surface based respectively on my 1960 compilation from the Geographical Institute and CIDA's 1963 compilation. Col. (6) gives the percent distribution of land surveyed in the Agricultural Census of 1960, by size of producing unit.

Col. (7) gives the percent distribution of effective land (area normalized for quality) which was on the assessment records as of 1960, using the assessment values of that year (i.e., Col. (1)) as the measure of land quality. Col. (8) gives the same distribution for assessed land as of 1963 and using the assessment values of 1963 (Col. (2)) as the measure of land quality. Col. (9) uses the adjusted assessment values of Col. (3) along with the land distribution figures of Col. (5). It thus represents an attempt to allow for bias towards lower assessed values on larger farm sizes for a given land quality. But since the land distribution is that of the catastral surveys it still underestimates the amount of effective land in the larger categories, given that many large scale operations do not have legal title and their land therefore goes unreported in the assessment figures.

Col. (10) deflates the Agricultural Census land distribution breakdown--Col. (6)--with the unadjusted 1963 assessment values--Col. (2); Col. (11) repeats the procedure using instead the adjusted assessment values of Col. (3). Thus these two columns apply land prices by size of unit owned-based on the catastral survey-to agricultural census categories of farms by size of producing unit. This is an inappropriate procedure but for want of an alternative the exercise is carried out anyway.

Col. (12) gives average hectares per farm in each category, according to the Agricultural Census. Cols. (13), (14) and (15) show the effective hectares per farm for farms of different sizes (defined by number of hectares); an "effective hectare" is arbitrarily defined as having the same value as does the average hectare in the 4-5 hectares category; it is thus simply a measure of land value, hopefully a reasonably good proxy for potential productivity or quality of the land. Col. (13) uses the assessment values of Col. (1) while Col. (14) uses those of Col. (2) and Col. (15) uses those of Col. (3).

Col. (16), for reference purposes, presents the number of farms in each size category according to the Agricultural Census.

TABLE A-55

Sabana de Bogota: Distribution of Land By Plots (Separately Taxed Units) and by Total Area Owned By One Man, in Four Adjacent Municipalities[a], 1962

Size in Hectares	Number of Units by:		Area by:	
	Taxed Units[a]	Owners[b]	Taxed Units[a]	Owners[b]
less than 1/2	36.8	46.1	0.4	0.3
1/2 - 3	25.1	22.5	2.6	1.8
3 - 10	16.5	12.7	6.7	4.1
10 - 50	15.1	10.9	24.7	14.2
50 - 100	3.5	3.6	18.4	15.1
100 - 500	2.8	3.8	36.4	45.1
500 -1000	0.2	0.3	10.8	12.4
1000 -2500	-	0.1	-	7.0

[a]The municipios of Bojacá, Funza, Madrid and Mosquera.

[b]Municipios cited in (a), plus the municipio of Facatativá.

SOURCE: See CIDA, op. cit., p. 82. Compiled and calculated using tabulations of the Instituto Geográfico Agustin Codazzi, Departamento de Catastro, on the basis of the "Catastro Técnico," taken in 1961-1962.

NOTE: The taxed unit is the predio. When one man owns several predios these are aggregated to give the size of his holdings and he appears in that larger size category. But when the owner has plots scattered around the municipio these are not (for want of information) aggregated in the same way.

TABLE A-56

The Minifundio Problem, By Departments, Cerca 1960

	% of All Farms With Less Than		% of Farms (excluding those of less than one hectare), Less Than	% of Total Value of Land Which is in Tax Par of Greater Than
	3 Hectares (1)	5 Hectares (2)	5 Hectares (3)	200 Hectares (4)
Antioquia	61.0	70.5	31.9	n.a.
Atlantico	58.6	66.5	45.4	20.4
Bolivar	52.8	62.5	34.7	43.0
Boyaca	60.5	73.7	44.1	4.5
Caldas	48.3	62.8	40.6	19.0
Cauca	48.5	63.1	42.4	30.0
Cordoba	51.1	59.2	27.4	37.9
Cundinamarca	56.1	69.4	41.5	13.8
Huila	34.8	47.0	33.7	25.6
Magdalena	46.2	54.5	28.3	54.9
Meta	28.9	39.5	26.1	n.a.
Nariño	51.2	67.3	48.6	5.1
Norte de Santander	24.9	38.5	30.9	12.8
Santander	35.9	51.3	39.5	30.1
Tolima	38.8	51.9	36.4	29.0
Valle del Cauca	34.1	48.7	37.7	30.0
TOTAL	50.1	62.5	37.9	

SOURCES: Columns 1, 2, and 3 all come from the agricultural census of 1959, and use the "operating unit" definition of a farm. Column 4 comes from unpublished assessment records of Agustin Codazzi as of about 1960; this is the same source cited as the base for column 1 in Table A-54.

Table A-57

Importance of Renting in Large Crop Farms (40 hectares and up): Colombia, 1959

Farm Size in Hectares	Number of Farms									
								Rented		
	Total (1)	Crop Growing[1] (2)	Mixed[1] (3)	Crop and Mixed (4)	Rented (5)	More than One Form of Tenure (6)	Rented and More than One Form (7) = (5) + (6)	Payment in Cash (8)	Share-Cropping (9)	Cash and Share-Cropping (10)
40-50	16,240	8,323	2,046	10,369	1,376	1,013	2,389	326	728	1,054
50-100	39,990	17,870	4,919	22,789	2,831	2,109	4,940	831	1,287	2,118
100-200	22,317	7,603	2,640	10,243	1,313	1,092	2,405	467	489	956
200-500	13,693	3,165	1,489	4,654	688	574	1,262	292	202	494
500-1,000	4,141	555	394	949	162	186	348	90	39	129
1,000-2,500	1,975	145	171	316	66	83	149	32	7	39
2,500 and up	785	34	40	74	20	51	71	10	2	12

Table A-57 (continued)

Farm Size in Hectares	Rented Farms/Crop Farms (11)	Rented Farms/Crop and Mixed Farms (12)	Rented and More than One Farm/Crop Farms (13)
40-50	16.53	13.27	28.70
50-100	19.16	12.42	27.64
100-200	17.27	12.82	31.59
200-500	21.74	14.78	39.87
500-1,000	29.18	17.07	62.70
1,000-2,500	45.52	20.89	71.00
2,500 and up	59.82	27.03	>100.0

SOURCE: Departmento Administrativo Nacional de Estadistica, Directorio de Explotaciones Agropecarias (Censo Agropecuria), 1960 Resumen Nacional (segunda parte).

[1]A farm is defined as a crop farm when more than one half of the income it produces comes from crops.

When neither crops nor livestock produce more than half the income the farm is classified as "mixed." (Note however, that the definitions as presented in the Agricultural Census (Segunda Parte, p. 11), are a little vaguer than this, so a margin of error must be allowed for.)

Table A-58

Importance of Renting in Large Crop Farms (40 hectares and up): Tolima, 1959.

Farm Size in Hectares	Number of Farms by Type of Product: Total Farms (1)	Crop (2)	Mixed (3)	Crop and Mixed (4) = (2)+(3)	Number of Farms by Rental Arrangement: Rented (5)	More than one Form (6)	Rented and more than one Form (7) = (5)+(6)	Rented: Payment in Cash (8)	Rented: Share-Cropping (9)	Rented: Cash and Share-Cropping (10)
40-50	1,344	827	82	909	239	97	336	93	103	196
50-100	3,070	1,559	206	1,765	425	197	622	164	176	340
100-200	1,595	641	124	765	213	84	297	94	85	179
200-500	997	278	86	364	111	66	177	57	34	91
500-1,000	295	54	24	78	31	16	47	19	7	26
1,000-2,500	122	13	16	29	7	3	10	6	-	6
2,500 and up	21	2	3	5	-	1	1	-	-	-

Farm Size in Hectares	Rented Farms/ Crop Farms (11)	Rented Farms/ Crop and Mixed Farms (12)	Rented and More Than One Form/ Crop Farms (13)
40-50	28.9	26.0	40.6
50-100	27.3	24.1	39.90
100-200	34.4	27.84	46.33
200-500	39.9	30.49	63.67
500-1,000	57.4	39.74	87.04
1,000-2,500	53.8	24.14	77.0

SOURCE: Departamento Administrativo Nacional de Estadistica, Directorio de Explotaciones Agropecurias (Censo Agropecurian), 1960, Resumen Nacional (Segunda Parte).

Table A-59

Cultivated Area, by Departments, Selected Years

	1953[1]	1960[2]	1966[3]	1967[4]
Antioquia	370	375 (547)	498.1	477.0
Atlantico	37	19 (35)	15.95	14.1
Bolivar	159	113 (202)	233.8	225.4
Boyaca	270	270 (433)	320.5	322.7
Caldas	290	323 (379)	335.9	378.8
Cauca	92	187 (243)	176.5	180.7
Cordoba	90	81 (177)	199.0	177.3
Cundinamarca	355	315 (478)	377.1	347.6
Choco	38			
Huila	80	116 (158)	126.1	143.9
Magdalena	97	219 (404)	320.4	342.9
Nariño	198	232 (299)	185.4	207.6
Norte de Santander	91	184 (250)	162.2	153.7
Santander	161	285 (485)	370.1	382.0
Tolima	237	325 (443)	503.4	458.1
Valle	285	321 (343)	286.2	272.3
Total: Departments, Excluding Meta and Choco				
Annuals	1550	1873 (3385)		2362.0
Perennials	1262	1492		1790.0
Total	2812	3365 (4877)	4110.0	4152.0
Total, (Including Meta)				
Annuals	1610*	1921 (3531)	2384.0	2444.0
Perennials+	1290*	1515	1841.0	1413.0
Total	2900*	3436 (5045)	4225.0	4266.0

+Excluding sugar cane
*Also includes Choco

Table A-60

Some Concomitants of Inter-Departmental Agricultural Differences

	Number of Separate Plots Per Farm	% of Farms Rented	% With Animal and No Mechanical Power	% With Mechanical But Not Animal Power	Human Only	% With Tractors	Inorganic Fertilizer Only	Organic Fertilizer Only	Any Fertilizer	% With Mechanical Power
Antioquia	1.18	28.3		0.798	80.5	0.13	3.2	26.6	4.9	35.7
Atlantico	1.17	36.3		2.64	95.8	1.41	0.0	7.8	0.3	8.1
Bolivar	1.15	23.7		0.608	96.9	0.82	0.3	5.8	0.8	6.9
Boyaca	1.69	16.9		0.355	28.0	0.34	12.1	25.3	15.3	52.7
Caldas	1.20	32.3		0.601	85.2	0.21	2.7	32.2	3.5	38.4
Cauca	1.75	15.2		0.407	58.0	0.34	0.4	13.8	1.7	15.9
Cordoba	1.19	19.1		0.888	87.2	1.00	0.2	2.4	0.3	2.9
Cundinamarca	1.56	19.4		4.20	50.6	1.14	24.2	24.9	1.9	51.0
Huila	1.40	19.6		2.14	47.0	0.79	0.3	19.3	1.4	21.0
Magdalena	1.23	22.5		1.10	94.5	1.11	0.1	3.7	1.2	5.0
Meta	1.23	28.4		2.17	57.3	2.17	0.3	2.1	1.0	3.4
Narino	1.65	14.5		0.863	61.6	0.23	9.0	16.5	5.1	30.6
Norte Santander	1.20	38.6		1.14	61.9	0.25	0.5	15.7	6.5	22.7
Santander	1.39	29.0		0.590	49.3	0.21	1.4	11.7	6.8	19.9
Tolima	1.22	31.3		10.3	71.8	1.80	0.7	9.3	2.6	12.6
Valle	1.23	21.9		9.31	88.8	1.99	n.a	n.a.	n.a	n.a
TOTAL	1.39	23.34		2.47	64.62	0.67	n.a			

Source: Agricultural Census of 1960.

SECTION VI: Technological Change: Research, Extension and Modern Inputs

Few compilations have been made of the inputs into agricultural research and, naturally, there is even less statistical base for judgments with respect to the results of that research. Some information was presented in Chapter 3 of this study. Table A-90a reproduces CIDA's calculations with respect to the budgets of the various organizations working in agricultural research, and the distribution of their budgets among crops. Presumably to some extent these estimates are arbitrary, since there must be some general research which is not allocable in such a detailed fashion.

CIDA presented an estimate of the professional personnel in agriculture as of 1961--shown here as Table A-90b.

Tables A-95a and A-95b present in constant and in current prices, respectively, the Banco de la Republica estimates of inputs into crop and livestock agriculture. While probably not very accurate for a number of items, the estimates are of interest since so little information has been systematically available in this area.

Considerable information is available on changes in the utilization of modern inputs over time. In the case of fertilizers, Table A-96 presents ECLA information related to the period 1935-1953; as is apparent in these figures, importation prior to 1935 was so low as to be almost neglected. Table A-97 presents a composite index calculated by the author for the three major fertilizer ingredients--nitrogen, phosphorus, and potash--it is compared with an alternative estimate made by Peter Hildebrand; finally, Table A-98 shows a series presented by Atkinson for the period of 1950-1967 . Atkinson also presents a breakdown of the imports according to whether imported or domestic, over the period 1963-67--Table A-99.

Two more tables of some interest with respect to fertilizers are Hildebrand's calculations of the supply of fertilizers and insecticides per hectare of commercial crops (Table A-100) and some estimates of the profitability of fertilizer use for selected crops, undertaken by FAO/CEPAL, presented as Table A-101.

Table A-101a presents relatively complete information on fertilizer use as reported in DANE's agricultural sample corresponding to the second semester 1967 and first semester 1968.

Less information is available on pesticides, whose use tends to be quite concentrated on a few products. The Instituto de Investigaciones Tecnologicas estimated use of the various pesticides by crop in 1967--see Table A-102. They also estimated imports of pesticides over the period 1951-67--see Table A-103.

The distribution of improved seeds by crop has been tabulated by Planeacion from the year 1953 on; this is presented in Table A-104. Table A-105 shows the implicit percentage of total area under a given crop which is planted to improved seeds over the same period. Table A-106 indicates, as of the late sixties, how many new varieties had been distributed within Colombia and of these, how many were domestic and how many were imported. Table A-107 presents, for the same set of crops, information on the price of improved seeds and its relation to the price of the product.

Table A-108 presents an interesting compilation of results on a departmental basis with respect to the use of modern inputs, as reported in the 1968 agricultural sample survey.

TABLE A-90a

Agricultural Research in 1962: Budget (in thousands of pesos) and Organizations

Branches of Investigation	Research Organizations										Total per Branch
	DIA	FNC	IFA	IFT	IGAC	IIT	PC	IZ	FNA	CVC	
Natural Resources											
Soils	-	-	-	-	4,910	-	-	-	-	600	5,510
Fertilizers and Plant Nutrition	480	-	-	-	-	-	-	-	-	-	480
Crops											
Rice	22	-	-	-	-	-	-	-	169	-	190
Wheat	336	-	-	-	-	-	-	-	-	-	336
Corn	668	-	-	-	-	-	-	-	-	-	668
Barley	-	-	-	-	-	-	280	-	-	-	280
Beans	335	-	-	-	-	-	-	-	-	-	335
Potatoes	353	-	-	-	-	-	-	-	-	-	353
Pasture and Hay	413	-	-	-	-	-	-	-	-	-	413
Platano	68	-	-	-	-	80	-	-	-	-	148
Sugar Cane	97	-	-	-	-	136	-	-	-	-	233
Vegetable Oil	63	-	3,216	-	-	-	-	-	-	-	3,279
Cotton	-	-	4,111	-	-	-	-	-	-	-	4,111
Other Fibers	-	-	-	-	-	106	-	-	-	-	106
Fruit	142	-	-	-	-	175	-	-	-	-	317
Vegetables	179	-	-	-	-	-	-	-	-	-	179
Coffee	-	6,348	-	-	-	-	-	-	-	-	6,348
Tobacco	-	-	-	1,069	-	-	-	-	-	-	1,069
Biometry	96	-	-	-	-	-	-	-	-	-	96
Entemology and Wheat Control	378	-	-	-	-	124	-	-	-	-	502
Phytopathology	373	-	-	-	-	-	-	-	-	-	373

(continued on following page)

TABLE A-90a, continued

Branches of Investigation	Research Organizations										Total per Branch
	DIA	FNC	IFA	IFT	IGAC	IIT	PC	IZ	FNA	CVC	
Livestock	515	-	-	-	-	125	-	-	-	-	640
Dairy	649	-	-	-	-	-	-	-	-	-	649
Pigs	160	-	-	-	-	-	-	-	-	-	160
Sheep	61	-	-	-	-	-	-	-	-	-	61
Birds	279	-	-	-	-	-	-	-	-	-	279
Pathology and Animal Health	505	-	-	-	-	-	-	8,337	-	-	8,842
Artificial Insemination	81	-	-	-	-	-	-	-	-	-	81
Laboratories	426	-	-	-	-	-	-	-	-	-	426
Bulls for Breeding	16	-	-	-	-	-	-	-	-	-	16
TOTAL	6,725	6,348	7,328	1,069	4,910	746	280	8,337	169	600	

NOTE: DIA: Department of Agricultural Research, Ministry of Agriculture; FNC: Coffee Growers Federation; IFA: Cotton Development Institute; IFT: Tobacco Development Institute; IGAC: Geographic Institute, "Agustin Codazzi"; IIT: Institute for Technological Research; PC: Procebada (Barley Growers Organization); IZ: Zoological Institute; FNA: Rice Growers Association; CVC: Cauca Valley Corporation.

SOURCE: Comité Interamericano de Desarrollo Agricola, Inventario de la Informacion Basica Para la Programacion del Desarrollo Agricola en la America Latina: Colombia (first draft), November 1962, p. 45.

TABLE A-90b

Professional Agricultural Personnel in the Major Agricultural Agencies, 1961

	Agricultural Technicians	Forestry Technicians	Veterinarians
Ministerio de Agricultura:			
Central office	18	6	20
Field	121	18	90
DIA (Investigaciones)	89	--	46
Instituto de Fomento Algodonero	91	--	--
Instituto de Fomento Tabacalero	20	--	--
Procebada (Fomento de la Cebada)	14	--	--
Instituto Geográfico	58	--	--
Instituto de Investigaciones Tecnológicas	1	--	--
Instituto Zooprofiláctico	--	--	45
Federación de Cafeteros	100	--	16
Federación de Arroceros	12	--	--
Federación de Cultivadores de Cereales	3	--	--
Servicio Técnico Colombiano-Americano	10	--	7
Caja Agraria	40	--	3
Banco Ganadero	--	--	1
Instituto Nacional de Abastecimientos	3	--	--
Corporación Regional del Cauca	17	--	3
Corporación Regional del Valle del Magdalena	1	--	--
Corporación Autónoma de la Sabana	2	--	--
Planeación	2	--	1
Secretarias Departamentales de Agricultura	57	3	50
Total	659	27	282

SOURCE: Comité Interamericano de Desarrollo Agricola, Inventario de la Informacion Basica Para la Programacion del Desarrollo Agricola en la America Latina: Colombia (first draft), November 1962, p. 45.

TABLE A-95a

Structure of Inputs to Agriculture, as Estimated by the Banco de la Republica, 1950-1959
(Millions of current pesos)

			1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Fuels and Lubricants	Crops	85%	8.967	10.696	11.267	12.737	16.055	19.256	24.279	34.604	43.908	47.150
	Cattle	15%	1.582	1.887	1.988	2.248	2.833	3.398	4.284	6.107	7.749	8.321
	Total	100%	10.549	12.583	13.255	14.985	18.888	22.654	28,563	40.711	51.657	55.471
Professional Services	Crops	30%	248	433	456	524	637	713	831	1.069	1.404	1.709
	Cattle	70%	579	1.011	1.064	1.223	1.487	1.664	1.940	2.496	3.276	3.988
	Total	100%	827	1.444	1.520	1.747	2.124	2.377	2.771	3.565	4.6°0	5.697
Drugs	Cattle	100%	2.470	4.744	9.100	12.592	15.982	18.821	19.340	27.455	32.918	33.338
Insecticides, fungicides and weed-killers	Crops	80%	8.253	10.670	14.275	8.753	13.143	14.456	19.026	38.052	34.655	33.203
	Cattle	20%	2.063	3.667	3.569	2.188	3.286	3.614	4.756	9.513	8.664	8.301
	Total	100%	10.313	13.337	17.844	10.941	16.429	18.070	23.782	47.565	43.310	41.504
Mineral Salts	Cattle	100%	876	809	905	1.283	1.580	1.668	1.762	2.004	1.805	1.748
Water for Irrigation	Crops	85%	125	142	245	387	527	595	779	1.072	1.239	1.057
	Cattle	15%	23	25	43	68	93	105	138	189	219	186
	Total	100%	148	167	288	455	620	700	917	1.261	1.458	1.243
Fiber Packing Material and Cord	Crops	85%	17.236	19.255	22,168	22.514	23.760	23.955	22.771	23.374	34.562	42,533
	Cattle	15%	3.042	3.398	3.912	3.973	4.193	4.227	4.018	4.125	6.099	7.506
	Total	100%	20.278	22.653	26,080	26,487	27.953	28.182	26.789	27.499	40.661	50,039
Wooden Packing Material	Crops	100%	2.0488	2.288	2.634	2.675	2.823	2.846	2.706	2.777	4.107	5,054
Leather Cordage	Crops	5%	439	443	447	584	586	582	549	654	801	912
	Cattle	95%	8.340	8.422	8.500	11.096	11.139	11.050	10.425	12.425	15 225	17 321
	Total	100%	8.779	8.865	8.947	11.680	11.725	11.632	10.974	13.079	16.026	18.233

Table 9A-95a (continued)

Seeds	Crops	85%	56.105	69.699	73.386	77.707	78.762	82.746	71.643	70.833	95.874	93.874
	Cattle	15%	9.901	12.300	12.951	13.713	13.899	14.602	12.643	12.500	16.919	16.566
	Total	100%	66.006	81.999	86.337	91.420	92.661	97.348	84.286	83.333	112.793	110.440
Fertilizers	Crops	95%	10.741	31.385	20.794	28.052	56.448	81.064	80.229	105.271	95.705	58.126
	Cattle	5%	565	1.652	1.094	1.476	2.791	4.267	4.223	5.541	5.037	3.059
	Total	100%	11.306	33.037	21.888	29.528	59.419	85.331	84.452	110.812	100.742	61.185
Correctors	Crops	100%	392	392	412	412	412	431	431	633	732	835
Animal food (directly from crops)	Cattle	100%	124.800	157.200	170.200	165.500	161.200	153.600	157.400	158.800	168.100	157.700
Prepared Animal Food	Cattle	100%	18.312	19.620	20.928	22.672	24.416	26.160	27.904	30.084	32.526	34.967
Animal food based on Industrial By-products	Cattle	100%	9.769	11.234	12.066	12,724	13.948	13.737	13.665	12.449	17.103	16.217
Maintenance and Repairs	Crops	31%	20.080	20.060	21.773	22.865	26.520	28.843	29.380	29.500	28.457	27.259
	Cattle	69%	44.694	44.650	48.461	50.893	59.027	64.199	65.400	65.662	63.340	60.674
	Total	100%	64.774	64.710	70.234	73.758	85.547	93.042	94.782	95.162	91.797	87.933
Total			430.777	519.998	560.428	562.694	655.703	682.501	708.064	730.651	720.424	670.808
Total Crops			182.807	222.761	231.037	223.895	285.548	312.606	320.500	355.514	341.444	301.178
Total Livestock			247.970	297.237	329.291	338.799	370.155	360.895	387.564	375.137	378.980	369.630

SOURCE: *Unpublished* data of the Banco de la Republica used in the elaboration of the national accounts. No great accuracy would be claimed by the Banco for these figures, and undoubtedly better estimates of a number of the items now exist. But for some items I have seen no other estimates.

TABLE A-95b

Structure of Inputs to Agriculture, as Estimated by the Banco de la Republica, 1950-1959
(Millions of 1958 pesos)

			1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Fuels and Lubricants	Crops	85%	21.049	23.455	24.493	27.275	32.303	37.462	43.744	43.473	43.908	44.650
	Cattle	15%	3.714	4.139	4.322	4.813	5.701	6.611	7.720	7.672	7.749	7.879
	Total	100%	24.763	27.594	28.815	32.088	38.004	44.073	51.464	51.145	51.657	52.529
Professional Services	Crops	30%	648	702	756	810	918	1.026	1.134	1.242	1.404	1.620
	Cattle	70%	1.512	1.638	1,764	1.890	2,142	2.394	2.646	2.898	3.276	3.780
	Total	100%	2.160	2.340	2.520	2.700	3.060	3.420	3.780	4.140	4.680	5.400
Drugs	Cattle	100%	3.450	13.446	23.393	36.277	52.417	51.349	59.238	39.796	32.918	26.588
Insecticides, fungicides and week-killers	Crops	80%	44.648	42.678	52.961	30.372	48.910	44.235	58.218	68.113	34.655	32.539
	Cattle	20%	11.162	10.670	13.240	7.593	12.227	11.059	14.555	17.028	8.664	8,135
	Total	100%	55.810	53.348	66.201	37.965	61.137	55.294	72.773	85.141	43.319	40,674
Mineral Salts	Cattle	100%	1.016	938	1.050	1.488	1.833	1.935	2.044	2.153	1.805	1.855
Water for Irrigation	Crops	85%	237	390	570	698	777	849	921	1.057	1.239	1.430
	Cattle	15%	42	69	100	123	137	150	163	186	219	252
	Crops	100%	279	459	670	921	914	999	1.048	1.243	1.458	1.682
Fiber Packing Material and Cord	Crops	85%	25.151	29.710	31.408	31.248	35.540	31.460	30.416	30.932	34.562	35,772
	Cattle	15%	4.438	5.243	5.542	5.514	6.272	5.552	5.368	5.458	6.099	6.313
	Total	100%	29.589	34.953	36.950	36.762	41.812	37.012	35.784	36.390	40.661	42.085
Wooden Packing Material	Crops	100%	2.988	3.530	3.732	3.713	4.223	3.738	3.614	3.675	4.107	4.250
Leather Cordage	Crops	5%	768	760	752	748	735	752	768	785	801	823
	Cattle	95%	14.595	14.438	14.280	14.123	13.965	14,280	14.595	14.910	15.225	15.645
		100%	15.363	15.198	15,032	14.866	14.700	15.032	15.363	15.695	16.026	16.468

TABLE A-96

Imports of Fertilizers Expressed in Units of the Pure Elements to be Assimilated

(1953 = 100)

	Nitrogen		Phosphorous		Potash	
	Tons	Index	Tons	Index	Tons	Index
1935 - 1939[a]	798	17	362	5	90	2
1940 - 1944[a]	824	18	480	6	131	13
1945 - 1949[a]	2,699	60	3,167	41	1,477	35
1950 - 1953[a]	4,041	90	6,806	88	4,393	105
1950	4,634	104	4,288	55	1,768	42
1951	4,242	95	9,322	120	7,025	168
1952	2,819	63	5,849	75	4,607	110
1953	4,466	100	7,765	100	4,173	105

[a]Annual averages.

SOURCE: ECLA, op. cit., p. 174.

TABLE A-97

Use of Fertilizer in Colombia, Imported and Domestically Produced

(in tons)

	(1) Nitrogen (ECLA estimate)	(2) Nitrogen	(3) Phosphorous (P_2O_5)	(4) Potash (K_2O)	(5) Overall Index, Imports and Domestic Production (millions of 1958 pesos)	(6) Imports and Domestic Production $ 000s
1947		1,982	2,460	1,112	7.31	
1948		2,006	970	1,583	5.89	1,011
1949		3,051	3,685	874	10.42	1,671
1950		3,429	1,786	889	8.70	1,310
1951		6,471	7,405	6,413	25.41	4,733
1952		4,449	5,062	3,697	16.84	3,253
1953		6,459	6,901	3,970	22.71	4,112
1954		10,471	14,256	12,466	45.71	6,851
1955		13,957	23,331	15,814	65.64	9,711
1956		14,684	15,628	10,160	64.96	9,222
1957	10,758	20,699	33,802	10,226	85.24	12,025
1958	10,071	17,682	24,916	20,173	77.49	11,301
1959	7,157	11,139	15,143	11,440	49.92	7,183
1960	10,881		24,580	13,907	74.91	9,280
1961	15,019		31,900	18,584	100.36	13,350
1962	15,267		29,350	20,110	99.21	13,808
1963	22,456		30,500	24,612	126.00	11,280
1964						16,774
1965						9,775
1966						18,067
1967						12,463

SOURCES: Figures for 1947 to 1959 come from working sheets of Planeacion. The 1960 through 1963 figures for potash come from "La Industria de Fertilizantes en America Latina," UN, ECLA, ST/ECLA/COMF.15/L.7/Rev.1, March 1965. Those for phosphorous are derived from the same source. The nitrogen figures of Planeacion and the ECLA source did not coincide so the ECLA figures have been presented separately in Column (1). Column (5) comes directly from a Central Bank Series on fertilizer inputs to agriculture but is very similar to a series based on the figures for the individual fertilizers weighted by their 1958 prices as derived from Planeacion figures. The splice at 1959-1960 assumes the ECLA nitrogen series is accurate. Col. (6) comes from Peter E. Hildebrand, Fertilizer Imports, Colombia, Agricultural Division, USAID, Bogota, April, 1969.

TABLE A-98

Fertilizer available for consumption

Fertilizer imports and domestic production, 1950-67

Year	Total available: Physical volume	Total available: Nutrients (N + P + K)	Total available: Nutrients as a percentage of physical volume	Imports: Physical volume	Imports: Nutrients N + P + K	Imports: Percent	Domestic production: Physical volume	Domestic production: Nutrients N + P + K	Domestic production: Percent	Total available: Physical volume	Total available: Nutrients N + P + K	Percent
	Metric tons	Metric tons	Percent	Tons	Tons		Tons	Tons		Tons	Tons	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1950	16,137	6,128	38.00	16,137	6,128	38.00				16,137	6,128	38.00
1951	52,537	23,277	44.30	52,537	23,277	44.30				52,537	23,277	44.30
1952	34,383	14,887	43.30	34,383	14,887	43.30				34,383	14,887	43.30
1953	40,304	18,411	45.68	40,304	18,411	45.68				40,304	18,411	45.68
1954	76,878	38,332	49.86	76,878	38,332	49.86				76,878	38,332	49.86
1955	106,902	52,059	48.70	106,902	52,059	48.70				106,902	52,059	48.70
1956	100,216	49,976	49.87	100,216	49,976	49.87				100,216	49,976	49.87
1957	132,496	62,023	46.81	132,496	62,023	46.81				132,496	62,023	46.81
1958	127,070	60,219	47.39	127,070	60,219	47.39				127,070	60,219	47.39
1959	78,669	39,647	50.40	78,669	39,647	50.40				78,669	39,647	50.40
1960	119,288	54,487	45.68	119,288	54,487	45.68				119,288	54,487	45.68
1961	166,164	74,297	44.71	166,164	74,297	44.71				166,164	74,297	44.71
1962	169,509	82,198	48.49	169,509	82,198	48.49				169,509	82,198	48.49
1963	151,000	48,000	31.79	33,747	12,930	38.31	207,768	79,020	38.03	241,515	91,950	38.07
1964	268,000	97,000	36.19	55,739	23,263	41.74	340,132	109,067	32.07	395,871	132,330	33.43
1965 1/	236,000	92,000	38.98	1,745	840	48.14	290,779	89,458	30.76	280,624	84,840	30.23
1966	298,000	116,000	38.93	25,729	11,255	43.74	291,716	112,221	38.47	317,445	123,476	38.90
1967	311,000	119,000	38.26	6,947	2,772	39.90	325,060	115,987	35.68	332,007	118,759	35.77
1968	309,000	122,000	39.48									

1/ In 1965, exports were 11,900 tns, containing 5,458 tons of nutrients.

SOURCE: USDA, Agricultural Productivity..., op.cit., p. 66. For Cols. (1), (2), and (3). Original sources were: for 1950-62, Instituto de Investigaciones Tecnologicos, Estudio Sobre el Mercado de Fertilizantes en Colombia, 1966; for 1963-68, Ministerio de Agricultura. The rest of the columns are from an earlier draft of this same study and cite the same sources. The totals for 1963 on do not correspond to those published in the final study, and no methodology is presented in the final study. Presumably the author had new information over and above that available when the original figures were circulated. It is worth noting that the earlier series, from the first draft of this study, matches the fluctuations shown in the index column 6 of Table A-97 better than does the revised version. There may well have been interdependence between the two similar series.

Table A-99

Sources of raw materials utilized in domestic fertilizer production in Colombia, 1963-67

Year	Imported raw materials			Domestic raw materials		
	Physical volume	Nutrients N + P + K	Percent	Physical volume	Nutrients N + P + K	Percent
	Tons			Tons		
1963	116,490	59,235	50.85	91,278	19,785	21.67
1964	129,848	67,331	51.85	210,284	41,736	19.85
1965	91,642	48,866	53.32	199,137	40,592	20.38
1966	168,075	88,089	52.41	123,641	24,132	19.52
1967	139,223	73,086	52.49	185,837	42,901	23.09

SOURCE: USDA, Agricultural Productivity,...op.cit., p. 69; originally from Ministerio de Agricultura, Oficina de Planeamiento, Coordinación y Evaluacion de Proyectos, 1968.

Table A-100

Supply of Fertilizers and Insecticides and Yield of Commercial Crops, Colombia, by Year 1949-1967. 1/

Year	Supply Per Hectare in U.S. Dollars 1/			Yield Per Hectare Commercial Crops 1958 Pesos
	Fertilizers	Pesticides	Total	
1949	5.25	9.10	14.35	1327
1950	5.50	11.50	17.00	1388
1951	10.25	14.70	24.95	1490
1952	12.35	17.15	29.50	1490
1953	10.50	15.30	25.80	1475
1954	15.45	15.90	31.35	1550
1955	21.50	19.90	41.40	1544
1956	24.75	23.90	48.65	1608
1957	28.50	31.25	59.75	1605
1958	27.25	28.40	55.65	1622
1959	18.75	24.15	42.90	1910
1960	14.75	24.25	39.00	1818
1961	20.20	27.25	47.45	1965
1962	21.35	25.70	47.05	1980
1963	20.35	28.45	48.80	1932
1964	19.80	27.85	46.65	1792
1965	16.45	19.70	36.15	1725
1966	16.50	20.35	36.85	1677
1967	17.85	19.30	37.15	1895

1/ The total supply divided by hectares of commercial crops does not mean that all these products were used on these crops. This figure is used for analytical convenience.

SOURCE: Hildebrand, op. cit., p. 7.

Table A-101

Profitability of the use of fertilizer for selected crops in Colombia, 1964

Crop	Yield of check plot without fertilizer	Yield with fertilizer	Value of increased yield	Cost of fertilizer	Returns over cost of fertilizer
	-------Metric tons-----		----------Pesos----------		
Potatoes	15.0	25.0	2,400	731	1,669
Wheat	1.0	2.0	830	402	428
Barley	1.6	2.5	792	402	390
Corn	1.0	3.0	1,180	402	778
Irrigated rice	2.2	3.7	1,097	252	845
Alfalfa	7.0	17.5	7,350	845	6,505
Seeded pasture	6.0	18.0	4,200	497	3,703

SOURCE: FAO/CEPAL "El Uso de Fertilizantes en Colombia", 1964.

Table A-101a

Area Planted, Percentage of Area Fertilized And Average Yields of Selected Crops, 1967-68 a/

Crop	Area Planted in Hectares	Area Fertilized	Percentage of Planted Area	Average Yield Kg/Ha
		(Second Half 1967)		
Annual Crops				
Sesame	91,109	1,938	2.1	497
Cotton	127,408	21,672	17.0	1,507
Broad Beans	41,905	4,295	10.2	382
Rice	118,634	43,011	36.2	2,255
Barley	24,953	16,015	64.2	1,062
Beans	71,023	2,503	3.5	362
Corn	629,162	34,851	5.5	918
Sorghum	27,389	10,554	38.5	1,805
Potatoes	63,989	59,917	93.6	6,648
Tobacco	11,047	6,949	62.9	1,110
Wheat	25,419	10,478	41.2	1,005
Yucca	121,656	6,178	5.1	6,575
TOTAL	1,353,694	218,361	16.1	
		(First Half 1968)		
Sesame	21,184	542	2.1	601
Cotton	75,935	45,161	59.4	1,970
Broad Beans	31,687	3,944	12.4	403
Rice	277,838	58,322	21.0	2,050
Barley	36,167	24,324	67.2	1,211
Beans	83,474	2,439	2.9	346
Corn	691,023	41,466	6.0	984
Sorghum	16,274	4,059	24.9	1,307
Potatoes	98,170	86,302	87.9	6,218
Tobacco	26,326	15,370	58.3	1,020
Wheat	97,556	69,768	71.5	988
Yucca	175,127	4,958	2.8	8,960
Subtotals	1,630,761	356,725	21.8	
Perennial Crops				
Bananas	82,080	5,389	6.6	825 Stems
Cacao	49,441	2,420	4.9	300
Coffee	946,332	109,912	11.6	442
Sugar Cane	408,872	60,624	14.8	48,332
Platano	374,983	3,798	1.0	810 Stems
Subtotals	1,861,708	182,143	9.8	
TOTAL	3,492,469	538,868	15.4	

a/ One full crop year consisting of second half of 1967 and first half of 1968. This is the most recent full year available. Data are presented separately here for the two semesters to point up the differences in rates of fertilization and yields for the two seasons. The data for perennial crops are given on a yearly basis and published in the first semester report.

Table A-102

Consumption of pesticides (active ingredients) in Colombia, by crops, 1967

Crops	Insecticides	Fungicides	Herbicides	Total pesticides
	Metric tons			
Corn	59	--	91	150
Potatoes	18	1,424	--	1,442
Wheat	54	--	62	116
Tobacco	59	42	--	101
Bananas	--	3,580	--	3,580
Cotton	2,536	--	99	2,635
Rice	790	81	396	1,267
Sugarcane	12	--	390	402
Barley	81	--	55	136
Others	280	476	599	1,355
Total	3,889	5,603	1,692	11,184

Source: Instituto de Investigaciones Technológicas, Colombia.

Table A-103

Colombia's imports of pesticides, 1951-67

Year	Total	Excluding copper sulfate
	Metric tons	
1951	10,194	2,250
1952	12,379	3,418
1953	6,770	2,525
1954	12,095	5,741
1955	10,361	5,616
1956	13,789	5,975
1957	16,565	8,475
1958	9,459	7,055
1959	10,830	10,819
1960	12,594	11,900
1961	15,322	15,217
1962	10,792	10,789
1963	12,238	12,187
1964	14,697	14,690
1965	9,512	9,512
1966	17,054	17,008
1967	8,586	8,583

SOURCE: USDA, Agricultural Productivity, op. cit., p. 62; originally from the Instituto de Investigaciones Technológicas.

Table A-104

Distribution of improved seeds in Colombia, by crop, 1953-67

Year	Wheat	Corn	Beans	Irrigated rice	Barley	Cocoa	Soybeans	Grain sorghum	Cotton	Tobacco	Potatoes
	1,000 metric tons										
1953	147.0	65.0									
1954	1,039.0	161.0									
1955	113.0	370.0									
1956	639.0	595.0	3.5								
1957	599.0	744.0	21.5								
1958	1,610.0	531.0	--								
1959	3,050.0	685.0	17.6								910.0
1960	2,149.0	766.0	67.1		3,751.0	2,120.0	950.0				173.0
1961	2,830.0	1,023.0	38.4	400.0	3,223.1	500.0	1,260.0				68.0
1962	2,470.0	1,230.0	106.0	3,551.0	2,848.1	500.0	1,540.0				36.0
1963	2,100.0	1,147.0	161.0	4,348.0	3,871.2	300.0	1,720.0	120.0	4,597.9	.130	
1964	1,868.0	1,881.0	103.0	7,179.0	3,096.0	1,097.2	2,300.0	609.0	4,915.3	.230	
1965	2,784.0	2,087.0	463.0	9,904.0	2,737.0	758.4	2,780.0	461.1	4,429.0	.225	
1966	3,114.0	2,164.0	309.0	9,300.0	3,495.0	988.7	3,270.0	308.8	5,654.7	.250	
1967	3,677.0	3,062.0	548.0	9,890.0	3,300.0	1,345.0	3,120.0	501.6	5,423.8	.330	244.9

Year	Wheat	Corn	Beans	Irrigated rice	Barley	Cocoa	Soybeans	Grain sorghum	Cotton	Tobacco	Potatoes
	Area Planted to improved seeds: 1,000 hectares										
1953	1.2	3.8									
1954	8.7	9.5									
1955	0.9	21.8									
1956	5.3	35.0	0.1								
1957	4.9	43.8	0.3								
1958	13.4	31.2									
1959	25.4	40.3	0.3								1.2
1960	17.9	45.1	1.0		50.0	3.0	12.7				0.2
1961	23.6	46.2	0.6	2.7	42.9	0.7	16.8				0.1
1962	20.6	72.4	1.6	23.7	37.9	0.7	20.5				0.1
1963	17.5	67.5	2.5	28.9	51.6	0.4	22.9	8.0	139.3	37.1	0
1964	15.6	110.6	1.6	47.9	41.3	1.6	30.7	40.6	148.9	65.7	0
1965	23.2	122.8	7.1	66.0	36.5	1.1	37.1	30.7	134.2	64.3	0
1966	25.9	127.3	4.8	62.0	46.6	1.4	43.6	20.6	171.4	71.4	0
1967	30.6	180.1	8.4	65.9	44.0	1.9	41.6	33.4	164.4	94.3	0.3

Source: Eduardo Restrepo, "Semillas Mejoradas," Departamento Nacional de Planeacion, 1968.

Table A-105

Percentage of total area planted to improved seeds in Colombia, by crops, 1953-67

Year	Wheat	Corn	Beans	Irrigated rice	Barley	Cocoa	Soybeans	Grain sorghum	Cotton	Tobacco	Potatoes
	Percent										
1953	0.7	0.5									
1954	4.4	1.4									
1955	0.5	2.6									
1956	3.1	4.2	0.04								
1957	2.8	7.0	0.3								
1958	8.4	4.5									
1959	15.3	5.6	0.3								1.9
1960	11.2	6.2	1.2		88.8		100.0				0.4
1961	14.7	6.5	0.7	2.5	89.3		100.0				0.2
1962	13.7	10.4	1.9	18.9	77.5		100.0				0.1
1963	15.5	9.8	3.3	25.1	89.0		100.0	100.0	98.7	100.0	0
1964	15.6	14.3	2.1	38.5	71.2		100.0	100.0	99.3	100.0	0
1965	19.3	14.1	9.4	50.8	79.2		100.0	100.0	90.7	100.0	0
1966	23.6	15.1	7.4	54.4	84.7		100.0	68.6	100.0	100.0	0
1967	45.1	22.8	12.2	54.9	72.1	29.3	86.7	83.6	94.2	100.0	0.4

Source: Based on Table A-104.

TABLE A-106

--Origin and percentage distribution of improved seed stock in Colombia, by crop

Crop	Number of types distributed			Percentage distribution	
	Domestic	Imported	Total	Domestic	Imported
Beans	7		7	100	
Corn	17		17	100	
Potatoes	1		1	100	
Wheat	7		7	100	
Tobacco	6		6	100	
Cotton		4	4		100
Rice		6	6		100
Barley	3		3	100	
Soybeans	2	3	5	40	60
Grain sorghum	2	2	4	50	50

SOURCE: USDA, Agricultural..., p. 74; originally from Departamento Nacional de Planeacion, 1969.

TABLE A-107

Prices of Improved Seeds Related to Prices of the Product, 1953-1968

Year	Wheat				Corn				Beans			
	Price of Improved Seed (Per Ton) (A)	Index of Improved Seed Price: 1953=100 (B)	Index of Market Price of Product: 1953=100 (C)	B/C	Price of Improved Seed (Per Ton) (A)	Index of Improved Seed Price: 1953=100 (B)	Index of Market Price of Product: 1953=100 (C)	B/C	Price of Improved Seed (Per Ton) (A)	Index of Improved Seed Price: 1953=100 (B)	Index of Market Price of Product: 1953=100 (C)	B/C
1953	1.125	100.0	100.0	100.0	1.000	100.0	100.0	100.0	2.000	100.0	100.0	100.0
1954	1.125	100.0	112.7	88.7	1.200	120.0	137.5	87.3	2.000	100.0	116.3	86.0
1955	1.000	88.9	103.2	86.1	1.200	120.0	125.0	96.0	2.000	100.0	109.2	91.6
1956	1.143	101.6	107.9	94.2	1.200	120.0	145.8	82.3	2.000	100.0	138.8	72.0
1957	857	76.2	120.6	63.2	1.400	140.0	179.2	78.1	2.500	125.0	146.9	85.1
1958	1.536	136.6	138.1	98.9	2.000	200.0	160.4	124.7	2.500	125.0	146.9	85.1
1959	1.036	92.1	149.2	61.7	2.000	200.0	187.5	106.7	2.500	125.0	142.9	87.5
1960	1.155	102.7	139.7	73.5	2.500	250.0	197.5	126.6	2.750	137.5	204.1	67.4
1961	1.286	114.4	154.8	73.9	2.700	270.0	262.1	103.0	4.500	225.0	232.2	96.9
1962	1.286	114.4	152.9	74.8	3.000	300.0	219.2	136.9	6.000	300.0	204.7	146.6
1963	1.550	137.9	167.0	82.6	3.000	300.0	330.0	96.7	6.000	300.0	246.8	121.6
1964	2.025	180.2	221.3	81.4	3.500	350.0	444.2	78.8	6.000	300.0	423.6	70.8
1965	2.500	222.5	242.7	91.7	4.000	400.0	376.3	106.3	6.000	300.0	354.8	84.6
1966	2.500	222.5	278.6	79.9	4.000	400.0	460.0	87.0	6.000	300.0	373.7	80.3
1967	2.500	222.5	282.5	78.8	4.500	450.0	462.5	97.3	6.000	300.0	375.5	80.0
1968	3.500	—	—	—	—	—	—	—	10.000	—	—	—

TABLE A-108

Estimates of the Number and Percent of All Farms Using Selected Modern Inputs in the Production of Crops Investigated in the 1968 Agricultural Sample, By Departments

Departments	Total Farms	Farms Using Machinery		Farms Using Irrigation	
		Number	% of All Farms	Number	%
Antioquia	197.789	436	0.2	135	0.1
Atántico	6.254	235	3.8	15	0.2
Bolívar	75.000	1.017	1.4	126	0.2
Boyacá	230.820	5.871	2.5	23.164	10.0
Caldas	91.541	104	0.1	5	0.0
Cauca	89.941	1.131	1.3	432	0.5
Córdoba	76.854	1.771	2.3	120	0.2
Cundinamarca	166.916	11.212	6.7	5.519	3.3
Huila	48.747	637	1.3	766	1.6
Magdalena	73.284	2.053	2.8	344	0.5
Meta	29.707	4.147	14.0	350	1.2
Nariño	107.958	1.909	1.8	1.379	1.3
Norte de Santander	43.690	47	0.1	345	0.8
Santander	105.524	91	0.1	662	0.6
Tolima	89.307	15.196	17.0	463	0.5
Valle del Cauca	71.130	8.042	11.3	1.434	2.0
TOTAL	1.504.462	53.899	3.6	35.259	2.3

	Farms Using Weed Killers		Farms Using Insecticides		Farms Using Fungicides	
	Number	%	Number	%	Number	%
Antioquia	1.042	0.5	8.477	4.3	7.639	3.9
Atlántico	74	1.2	108	1.7	18	0.3
Bolívar	10.772	14.4	5.806	7.7	1.824	2.4
Boyacá	13.238	5.7	60.030	26.0	62.715	27.2
Caldas	591	0.6	10.586	11.6	883	1.0
Cauca	704	0.8	1.943	2.2	1.082	1.2
Córdoba	4.036	5.3	1.529	2.0	671	0.9
Cundinamarca	11.746	7.0	29.342	17.6	23.310	14.0
Huila	637	1.3	2.652	5.4	2.098	4.3
Magdalena	5.197	7.1	960	1.3	411	0.6
Meta	2.923	9.8	2.622	8.8	1.519	5.1
Nariño	15.266	14.1	17.817	16.5	16.606	15.4
Norte de Santander	556	1.3	1.620	3.7	1.610	3.7
Santander	2.407	2.3	9.867	9.4	6.122	5.8
Tolima	1.292	1.4	8.225	9.2	9.851	11.0
Valle del Cauca	1.476	2.1	9.106	12.8	3.834	5.4
TOTAL	71.957	4.8	170.690	11.3	140.193	9.3

Source: DANE, Encuesta Agropecuaria Nacional, 1968, p. 29.

Section VII: Differential Input Use and Other Characteristics of Different Farm Sizes

As discussed at length in the text, a major determinant of technology, factor proportions, and other economic characteristics of farms in Colombia is their size. The following tables summarize some of these differences.

In respect of land use, Table A-110 shows the tight relationship between size and the relative importance of crops as opposed to cattle farms, while Table A-110.5 reveals the high share of the large farms which are managed by an administrator. Table A-111 shows the relationship within the crop category between farm size and the crop. Table A-112 shows the percent breakdown of cropped acreage by crop for the different farm sizes. Table A-112.5 presents estimates of the output composition by farm size in 1959-60, and of the relative output by the different farm sizes of the different products.

Most of our information on the relationship between farm size and crop composition is based on the 1960 agricultural Census--at least pending further publication of the 1970 Census results. For a few crops tabulations have been made in earlier years, and Table A-113 summarizes information for 1937, 1959, and 1966 for wheat, rice, and cotton. It should also be noted that the 1966 agricultural sample was tabulated, at the request of J. Atkinson, to permit comparisons of productivity by farm size; this information is available in USDA, Agricultural Productivity,...op.cit., page 24.

Input utilization patterns differ at least as much as output composition across farm size. Especially is this true with respect to labour.

Only scattered information is available on this, but it points to a rather clear picture. An attempt to allocate the labour input across farm sizes was made by the author, and is presented as Table A-114. These estimates were used as the basis for calculations of the man/land ratio by farm size--presented in Table A-115. Finally, estimates of output per man by farm size are presented in Table A-116.

A number of individual municipio or regional studies have presented detailed information on the relationship between farm size and labour use. One such study is that of Montoya, undertaken in the Cauca valley municipios of Roldanillo-La Union-Toro; it is presented here as Table A-117. CIDA also put together information on labour use by size in the various municipios for which it had information; Tables A-118 through A-121 present this information.

Estimates of the capital stock by farm size are, like those of the labour force, subject to many problems, but at least for some components of that stock, they are probably reasonably accurate. Alternative estimates developed by the author are presented in Table A-122. The implicit "output/value of land and capital" ratios are presented in Table A-123; output/capital ratios are much more difficult to calculate than the "output/value of land and capital" ratio, due to the difficulty of separating information on land and on improvements of one sort or another. Value added per unit of land is presented in Table A-124.

The tendency to use modern inputs is frequently alleged to vary substantially by farm size. A summary table of information presented in the 1960 agricultural census is presented in Table A-125. A more detailed

indicator of the extent of tractor utilization is presented in Table A-126.

Data on fertilizer use at the national level are presented in the text of Chapter 3. Figures for two departments of particular interest (because of their relatively heavy use, and also because of the importance of small farms) -Boyaca and Cundinimarca-are presented in Tables A-126 and A-127 respectively.

Information on capital stock by plot size (the Agustin Codazzi land assessment unit) has been compiled for two Cundinamarca municipios by Carlos Ossa. These data are of interest in that they constitute almost the only information available giving some indication of the relative capital/land ratios by farm size. It is presented as Table A-127.5

Table A-128 indicates the relationship between farm size and percent of farm area under irrigation in a sample of farms studied by CIDA in Saldaña, one of Colombia's earlier irrigation projects, dating back to the late forties and the early fifties.

A division of considerable relevance is that between mechanized and nonmechanized crops. Wayne Thirsk has made an interesting calculation of the difference in factor proportions between these two, and the average labour productivity trend between 1951 and 1964. This is shown as Table A-129. As noted in the text, the conclusion that average labour productivity decreased in nonmechanized crops does not mean that average real income decreased since a relative price increase characterized the period in question.

Very little information, unfortunately, is available on the variance of input ratios and factor productivities at a given farm size, and hence there is a corresponding lack of feel as to how much of the total variance in these ratios across all farms is due to size and how much is due to other factors. Some interesting information was picked up by Eduardo Montero (op.cit.) for a sample of four municipios in Tolima. Some feel for the closeness of the relationship between farm size and number of families shows up in Table A-129(a). Table A-129(b) indicates the relative importance of family help and hired help on the different classes of farms, as defined by Montero. Table A-129(c) shows the non-farm occupations of the producers by class of farm. Table A-129(d) shows where the producers live by farm class. Consumption behavior, and the amount of and channels of purchases and sales appear to vary substantially--perhaps even dramatically--with farm size. A limited amount of information is available on the relative extent of home consumption (consumption of items produced on the farm) by farm size, and related characteristics. Table A-129(f) presents the home consumption ratios (home consumption / total income, whether that income comes from the farm or not) along with the share of income paid in kind in several municipios of the Chiquinquira region. Table A-129(g) presents a more detailed breakdown of sources of income for the same region as a whole.

In Table A-III we present the crop structure by size of farm, based on the results of the agricultural census for 1959. Although the differences as represented here between different farm sizes are certainly not all due to the differences in the farm size (since, for example, the average farm size differs as between different departments and so do the typical crops grown), this is perhaps an interesting first way of looking at the way in which farm sizes do differ in this respect. One of the more striking phenomena is the importance of corn on almost all farm sizes, including even the largest. It accounts for almost 30 per cent of the land on farms up to 3 hectares in size, and gradually decreases to about 20 per cent for farms in the 10 to 40 hectare range, then gradually increasing again, apparently as a result of the existence of large-scale commercial growing of corn, probably largely centralized in the Cauca valley region. But corn is, in any case, as these figures clearly illustrate, the major staple crop of the Colombian peasant. The other crop which is perhaps most clearly a staple, and whose relative importance decreases very rapidly with farm size, is beans, which account for about 10 per cent of the total land for farms under 1 hectare, but drop off quickly to about 2 per cent by the 10 to 20 hectare size. Potatoes, yuca, and platinos are the other crops one would think of a staples; the potato acreage does indeed follow the pattern one would expect, gradually decreasing from about 10 per cent on the smallest size farms down to about 5 per cent in the 30 to 40 hectare range, and moving on down from there; yuca, on the other hand, maintains a more or less constant 10 per cent of acreage up to the 50 to 100 hectare size farms, in fact increasing between the 1/2 hectare and 3 hectare ranges. This is rather surprising as one would have thought that yuca was just as much of a staple as potatoes. This may not be true, however, and it is true that yuca does form an important ingredient in the diets of the urban lower class, and may therefore be a fairly commercialized crop. Platinos similarly do not

demonstrate the expected decrease in relative importance until we have reached the 50 to 100 hectare size. This indicates that they are also a relatively commercialized crop, and although they form a staple for the peasant, they also form an important commercial crop for larger sized farms. The typically commercial crops (i.e., sesame, rice, sugar, barley, bananas, cacao, and coffee) all show increasing relative importance with increasing farm size, at least over certain fairly significant ranges of farm size. This trend is really pronounced for sugar only at very large farm sizes, where it completely dominates the use of arable land; for example, on farms greater than 2,500 hectares, it accounts for 50 per cent of the total cropped land.

The overall totals for all farm sizes indicate that about 60 per cent of the area is taken up by temporary crops, and about 40 per cent by permanent crops. Coffee takes up a little over one quarter of all the land, and corn a little less than one quarter; no other single crop is close to being this important, with platinos and sugar coming third and fourth respectively, each with about 10 per cent of the land.

TABLE A-110.5

Size of Farm and the Tendency to Operation
By an Administrator Rather Than the Producer

Farm Size (Hectares)	All Farms		Farms Managed by the Producer	
	Number	Area Covered	Number	Area
Less than 1/2	165,652	38,344	165,108	38,192
1/2 to less than 1	132,419	93,649	131,583	93,023
1 to less than 2	191,347	270,308	189,781	267,869
2 to less than 3	117,005	275,656	115,976	273,087
3 to less than 4	92,001	309,165	90,609	304,295
4 to less than 5	58,181	251,854	57,442	248,540
5 to less than 10	169,145	1,164,749	164,204	1,129,083
10 to less than 20	114,231	1,572,076	108,769	1,493,553
20 to less than 30	44,049	1,043,554	41,080	971,906
30 to less than 40	26,500	890,100	23,976	803,875
40 to less than 50	16,240	705,047	14,596	633,020
50 to less than 100	39,990	2,680,471	34,147	2,274,923
100 to less than 200	22,317	2,996,152	17,387	2,308,229
200 to less than 500	13,693	3,994,319	9,210	2,618,450
500 to less than 1,000	4,141	2,730,764	2,193	1,425,985
1,000 to less than 2,500	1,975	2,808,210	851	1,211,286
2,500 and up	786	5,513,409	290	1,797,398
TOTAL.....	1,209,672	27,337.827	1,167,202	17,892.714

Farm Size (Hectares)	Farms Managed by an Administrator		Percent Under an Administrator	
	Number	Area	Of Farms	of Area
Less than 1/2	544	152	0.33	0.40
1/2 to less than 1	836	626	0.63	0.67
1 to less than 2	1,566	2,439	0.82	0.90
2 to less than 3	1,029	2,569	0.88	0.93
3 to less than 4	1,392	4,870	1.51	1.58
4 to less than 5	739	3,314	1.27	1.32
5 to less than 10	4,941	35,666	2.92	3.06
10 to less than 20	5,462	78,523	4.78	5.00
20 to less than 30	2,969	71,648	6.74	6.87
30 to less than 40	2,524	86,225	9.52	9.69
40 to less than 50	1,644	72,027	10.12	10.22
50 to less than 100	5,843	405,548	14.61	15.13
100 to less than 200	4,930	687,923	22.09	22.96
200 to less than 500	4,483	1,375,869	32.74	34.45
500 to less than 1,000	1,948	1,304.779	47.04	47.78
1,000 to less than 2,500	1,124	1,596,924	56.91	58.87
2,500 and up	496	3,716,011	63.00	67.40
TOTAL.....	42,470	9,445,113	3.51	34.55

TABLE A-111

Area Planted to Different Crops According to Farm Size, 1959

	Number of Farms and Farm Size (in hectares)									
	0-5		5-50		50-200		200 and up		Total	
Crop	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area
Cotton[a]	3,270	3,462	2,622	16,809	920	25,548	520	43,481	7,332	89,300
Sesame	8,079	11,264	4,853	21,054	1,400	10,432	519	7,969	14,851	50,719
Peas	18,186	9,896	13,051	17,990	876	2,774	153	983	32,266	31,643
Rice	15,588	16,108	23,388	59,424	10,639	63,856	3,668	87,404	53,283	226,792
Sugar Cane	113,188	63,358	95,610	143,066	11,442	54,344	2,836	83,374	223,076	344,142
Barley	21,158	12,337	11,126	23,194	914	13,184	216	9,589	33,414	58,304
Beans	43,216	28,078	37,250	53,914	5,124	22,229	1,072	11,706	86,662	115,927
Corn	301,578	231,301	196,152	368,409	32,452	156,933	9,063	114,535	539,245	871,178
Potatoes	68,841	39,291	36,075	59,737	2,864	16,066	624	8,558	108,404	123,652
Sorghum & Millet	4,853	3,071	2,788	3,594	438	1,241	123	788	8,202	8,694
Tobacco	11,718	9,561	6,989	11,370	599	1,275	167	1,101	19,473	23,307
Tomatoes	3,274	1,488	1,237	1,365	140	274	45	149	4,696	3,276
Wheat	31,080	39,679	28,171	68,031	1,418	15,954	250	6,011	60,919	129,675
Yucca	112,702	53,586	115,421	111,099	21,117	35,151	5,981	17,509	255,221	217,345
Bananas	30,585	7,747	27,204	23,722	4,674	15,032	1,177	9,225	63,640	55,726
Cocoa	21,092	8,829	22,245	27,699	4,869	9,576	1,384	5,403	49,590	51,506
Coffee	238,852	209,642	169,109	557,562	17,799	145,510	3,281	55,926	429,041	968,641
Platanos	227,691	90,127	182,047	220,864	29,241	66,172	9,188	33,002	448,167	410,165

[a]Data supplied by Cotton Development Institute.

SOURCE: CIDA, op. cit., p. 426, originally from the Agricultural Census of 1960.

Table A-112

Distribution of Area by Crop for Different Farm Size, 1959

	0-5 has.	5-50 has.	50-200 has.	200 has.& up	Total
Cotton	0.41	0.94	3.90	10.69	2.36
Sesame	1.24	1.18	1.59	1.96	1.34
Peas	1.18	1.01	0.42	0.24	0.87
Rice	1.92	3.32	9.74	21.49	6.00
Sugar Cane	7.55	8.00	8.29	20.50	9.10
Barley	1.47	1.30	2.01	2.36	1.54
Beans	3.35	3.01	3.39	2.88	3.07
Corn	27.57	20.59	23.94	28.16	23.05
Potatoes	4.68	3.34	2.45	2.10	3.27
Sorghum & Millet	0.37	0.20	0.19	0.19	0.23
Tobacco	1.14	0.64	0.19	0.27	0.62
Tomatoes	0.18	0.08	0.04	0.04	0.09
Wheat	4.73	3.80	2.43	1.48	3.43
Yucca	6.39	6.21	6.36	4.31	5.75
Bananas	0.92	1.33	2.29	2.27	1.47
Cocoa	1.05	1.55	1.46	1.33	1.36
Coffee	24.99	31.17	22.20	13.75	25.63
Platanos	10.74	12.35	10.09	8.11	10.85
Total Area	838,825	1,788,903	655,551	496,713	3,779,992

Source: Based on Table -11 ..

IV-11

Table A-112.5

Value of Crop and Livestock Production by Size of Farm, 1960

(Millions of 1960 pesos)

Size of Farm	Major Crops	Minor Crops	All Crops	Live-stock (cattle, hogs, sheep, goats)	Other Animal Products (Mostly Eggs & birds)	All Livestock	Draft Animals	All Animal Produc-tion	Total Crops & Animals	Total Value Added
< 1/2	24.6	4.7	29.3	44.9	86.8	131.8	0.7	132.4	161.7	148.8
1/2-1	60.2	11.6	71.7	28.3	57.6	85.9	0.8	86.7	158.4	145.8
1-2	191.4	26.3	217.7	54.7	96.2	150.9	2.1	153.0	370.7	337.4
2-3	189.8	21.9	211.7	44.4	70.4	114.8	2.0	116.8	328.5	295.7
3-4	195.1	20.6	215.7	43.2	64.4	107.6	2.1	109.7	325.5	286.4
4-5	146.5	14.2	160.9	32.5	44.8	77.3	1.6	78.9	228.3	198.6
5-10	624.6	54.2	678.9	135.1	161.3	296.4	6.9	303.2	982.0	844.5
10-20	680.8	51.4	732.1	159.0	155.4	314.4	7.2	321.6	1053.7	895.7
20-30	298.9	26.0	324.9	98.4	87.7	186.0	3.7	189.8	514.7	432.3
30-40	211.8	18.4	230.2	82.1	67.6	149.7	2.6	152.3	382.5	313.6
40-50	150.3	13.9	164.2	65.4	51.5	116.9	1.8	118.7	282.9	226.3
50-100	464.8	32.9	497.6	235.3	181.6	417.0	5.2	422.2	919.8	735.8
100-200	381.4	22.1	403.5	264.4	189.0	453.4	4.2	457.6	861.1	706.1
200-500	393.6	17.5	411.1	366.2	245.7	611.9	4.0	616.0	1027.1	821.7
500-1000	202.6	4.9	207.5	256.1	154.3	410.4	2.2	412.6	620.1	533.3
1000-2500	139.2	4.2	143.4	226.4	130.5	356.9	1.6	358.5	501.9	441.6
≥ 2500	109.0	1.2	110.3	231.8	131.0	362.8	1.5	364.4	474.7	427.2
Total	4464.9	345.9	4810.8	2368.2	2047.8	4416.0	50.4	4466.4	9265.6	7790.9

Source: Detailed calculations presented in Albert Berry and Alfonso Padilla, The Distribution of Agriculturally Based Income in Colombia, mimeo, 1969, Statistical Appendix.

Table A-113

Distribution of Production By Size of Plot, Selected Crops, 1937 and 1959

Plot Size (Hectares)	1937	1959		1966 (1st semester)	
	Output	Area	Output	Output	Area
WHEAT					
<5	36.47	64.86	62.31	26.61	33.66
5-10	15.90	14.11	13.05	14.20	18.14
10-20	13.04	8.01	7.97	12.70	14.94
20-50	13.10	7.32	6.74	6.72	8.55
50-100	9.61	4.08	6.68	39.78	24.72
≥100	11.88	1.62	3.25		
RICE					
<5	21.06	29.12	28.60	6.40	6.88
5-10	14.42	12.76	11.07	4.05	4.99
10-20	13.52	12.61	12.21	5.35	5.91
20-50	17.00	13.19	12.03	12.17	14.27
50-100	9.92	9.54	9.72	72.03	67.96
≥100	24.08	22.77	26.38		
COTTON					
<5	14.17			1.61	2.18
5-10	15.09			2.52	2.36
10-20	16.64			2.82	4.09
20-50	22.10			4.34	6.07
50-100	19.99			88.70	85.29
≥100	12.01				

Sources and Methodology.

The 1937 figures come from a survey taken at that time, whose results were published in the Anuario General de Estadistica of either 1938 or 1939; the 1959 data are from the agricultural census of that year, and the 1966 data from the information acquired by Atkinson from the Ministry of Agriculture (USDA, Agricultural Productivity...op.cit., p. 24). (This corresponded only to the first semester of 1966.)

Table A-114

Basic Estimate (A) and Alternative (B)
of the Distribution of Labor by Farm Size and Type of Labor, 1959
(Man-Years)

	Estimate A					Estimate B
Farm Size (hectares)	Hired Blue Collar	Hired White Collar	Producer (operator)	Family Helpers	Total	Total
<1/2	10,000	0	84,108	9847	103,955	326.4
1/2-1	15,000	0	73,600	6338	94,938	
1-2	50,000	0	149,781	9765	209,546	217.3
2-3	45,000	0	95,976	6620	147,596	155.6
3-4	44,820	0	90,609	5586	141,015	82.9
4-5	31,595	0	57,442	3712	92,749	57.1
5-10	136,061	0	164,204	11,773	312,038	235.2
10-20	147,154	2400	108,769	8767	267,090	258.8
20-30	79,343	1200	41,080	3612	125,235	128.9
30-40	58,433	2400	23,976	2233	87,042	138.1
40-50	41,776	1800	14,596	1397	59,569	
50-100	115,503	6000	34,147	3628	159,278	143.6
100-200	87,397	4800	17,387	2288	111,872	111.2
200-500	76,092	8400	9,210	1720	95,422	115.3
500-1000	37,198	7200	2,193	683	47,274	95.7
1000-2500	26,167	4200	851	411	31,629	34.3
> 2500	11,835	1800	290	225	14,850	
Total	1,013,374	40200	968,219	78605	2,100,398	2100.4

Sources and Methodology:

Since there are no good countrywide data on labor applied by farm size, we use two separate estimates here. One (Estimate A) was developed by the author using agricultural census information (the 1960 census) on distribution of population by the size of farm on which people lived, comparisons between the number of people in various occupational statuses (from the 1964 population census) and the number of producers reported in the agricultural census, and other available pieces of information. This estimate had the advantage of referring to the country as a whole, but the disadvantage of involving a good deal of guesswork as to how many people lived on one farm and worked on another. The second estimate (B) is based on the CIDA study (op. cit.) which, for those municipios in which depth surveys were done, presented data on the number of permanent and temporary laborers; these were then converted to permanent and temporary workers per hectare. This data was taken with little modification from tables presented in the CIDA study, and no attempt was made to evaluate the representativeness of the municipios and the farms and sizes sampled in those municipios; it thus has the advantage of being based on direct study of labor application on farms, and the disadvantage of

(Sources and Methodology for Table A-114)

corresponding to a rather small number of municipios (about 10 in total scattered around the country) whose degree of representativity is unknown. The second problem in the use of CIDA data is the difficulty in converting figures on occasional workers to figures on man-year equivalents. In the more detailed data given for a small number of farms in the statistical appendices to this study, it could be seen that on some farms temporary workers were employed only say 10 days a year and on other farms they worked more than half the year. While the profile of total man days by farm size is not very sensitive to this assumption, as long as the average number of days worked by temporary workers is not itself a function of farm size, it is affected to some extent. The ratio of temporary workers employed at some time or other to permanent workers appears to rise with farm size--that is, it appears that large farms get a greater share of their total from part-time workers. One would expect this relationship to depend on the nature of the crop, but highly fragmentary CIDA data does not give much information along these lines, though it does suggest that the relation varies widely even for farmers specializing in a given crop. There is evidence that for cattle farms the majority of labor is not necessarily permanent, and that such farms as those specializing in cotton, where sometimes almost all the labor is temporary, are not always that way, especially if in rotation with cattle.

If one includes owner-operators as permanent labor, there seems little doubt that the majority of workers are permanent, in the sense of having one job which provides say over 2/3 of all working days. (It would be less clear that the majority of workers were permanent if this group were defined to include only people who worked 80 percent of the year at one job; this would exclude many owner-operators who do part time work elsewhere.) But including the perhaps 1/2 of all man years which seem to correspond to people who either earn most of their income off land they operate or are white collar workers and administrators, with the perhaps up to half of blue collar hired workers who are permanent, one might have 3/4 of all labor classified as permanent. But the ratio might go as low as 60 percent and as high as say 80, depending on how the lines are drawn. In any case, judging from the CIDA figures, if in fact 3/4 of all the man years applied to agriculture corresponded to people whom they categorized as permanent then the average time worked per temporary worker would probably only be on the order of 1/10 of a year. Since this seems a little low given some of the other direct evidence from the CIDA study, we have used as a base estimate the assumption that the average temporary worker works 1/4 of a full year. As noted above, the profile of man years per hectare is not highly sensitive to this assumption. But in another sense the temporary/permanent ratio has an important bearing on the "social" performance of different farm sizes, since the security of occasional workers is notoriously bad, and farms characterized by this sort of operation make smaller contributions to overall welfare than would otherwise be the case.

Table A-115

Estimates of the Man/Land Ratio, by Farm Size, 1959

Farm Size (Hectares)	Man Years Applied (thousands) Esti-mate A	Esti-mate B	Man Years Per Hectare Esti-mate A	Esti-mate B	Man Years per Effective Hectare Esti-mate A	Esti-mate B	Estimate E
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
< 1/2	103,955	326.4	2.71	2.47	.390	.686	Same as Esti-mate A
1/2-1	94,938		1.01		.466		
1-2	209,546	217.3	.78	.803	.491	.509	
2-3	147,596	155.6	.54	.564	.428	.451	
3-4	141,015	82.9	.46	.268	.390	.229	
4-5	92,749	57.1	.37	.226	.368	.227	
5-10	312,038	235.2	.27	.201	.268	.202	
10-20	267,090	258.8	.17	.164	.194	.188	.215
20-30	125,235	128.9	.12	.123	.151	.156	.180
30-40	87,042	138.1	.098	.087	.133	.120	.168
40-50	59,569		.084		.119		.156
50-100	159,278	143.6	.059	.053	.090	.081	.130
100-200	111,872	111.2	.037	.037	.060	.059	.090
200-500	94,422	115.3	.024	.029	.041	.049	.068
500-1000	47,274	95.7	.017		.032	.065	.052
1000-2500	31,629	34.3	.011	.0041	.022	.014	.045
> 2500	14,150		.0025		.013		.026
Total	2,100,398	2,100.4	.077	.077	.128	.128	.169
Farm Size By Broader Categories							
0-3	556,035	699.3	.820	1.031	.448	.563	
3-5	233,764	140.0	.417	.250	.381	.228	
0-5	789,799	839.3	.637	.677	.426	.452	
5-10	312,038	235.2	.275	.201	.268	.202	
10-50	538,936	525.8	.128	.125	.160	.157	.190
50-500	366,572	370.1	.038	.038	.061	.062	.095
> 500	93,053	130.0	.0084	.012	.023	.035	.043

Sources and Methodology:

Cols. (1) and (2) are from Table A-114. Cols. (3) and (4) are based on (1) and (2) and on the distribution of hectares presented in the Agricultural Census of 1960. Cols. (5) and (6) are based on (1) and (2) along with an estimate of land distribution by value based on adjusted assessment valuations (from the

(Sources and Methodology for Table A-115 continued)

Geographical Institute "Agustin Codazzi") by farm size. (The adjustment was based partly on the conclusions of the CIDA study as to the relative underassessment by farm size--they observed that it was greater for larger farms--and on a known bias in the methodology of the Institute itself, which operates in the same direction.

Col. (7), estimate "E", uses the unadjusted assessment values by farm size to estimate the value of land by size category; assessment per hectare is more than 20 times as high for farms of 1/2-1 hectare as for those of 2,500 and over; this series clearly leads to a downward bias of the share of all land value in the large farms, both for the above reasons and because assessment figures include some forms of investment (including housing) which bear a higher ratio to the value of land on small farms than on large ones.

Table A-116

Estimates of Output Per Man, by Farm Size,[a] 1959

Farm Size (Hectares)	Value Added Per Man		Value of Output Per Man
	Estimate A (1)	Estimate B (2)	Estimate A (3)
< 1/2	1.431	.902	1.555
1/2-1	1.535		1.668
1-2	1.610	1,553	1,769
2-3	2.003	1.900	2.226
3-4	2.031	3.455	2.308
4-5	2.141	3.478	2.461
5-10	2.707	3.591	3.147
10-20	2.982	3.461	3.945
20-30	3.452	3.354	4.110
30-40	3.603	3.910	4.394
40-50	3.800		4.749
50-100	4.620	5.124	5.775
100-200	6.312	6.350	7.697
200-500	8.611	7.126	1.076
500-1000	11.280	5.572	13.117
1000-2500	13.964	25.331	15.868
> 2500	30.191		33.548
Total	3.709	3.709	4.441
Farm Size by Broader Categories			
0-3	1.668	1.326	1.833
3-5	2.075	3.464	2.369
0-5	1.789	1.683	1.992
5-10	2.707	3.591	3.147
10-50	3.466	3.553	4.145
50-500	6.175	6.116	7.660
> 500	15.068	10.785	17.159

Source: A. Berry, "Land Distribution,..." op. cit.. The methodology is explained in that study.

[a] Estimates A and B correspond, respectively, to the estimates of labour inputs so designated in Table A-114.

TABLE A-117

Annual Employment of the Labor Force According to Farm Size Groups in Roldanillo-La Union-Toro, 1962

Farm Size in Plazas[a]	Labor Force Effectively Employed (in man-days)						Family Labor Effectively Employed per Farm		
	Per Farm		Per Plaza				Total Available Man-Days	Total Man-Days	Per Cent of Available Man-Days
			Total		Cropped				
	Total	Salaried	Total	Salaried	Total	Salaried			
less than 1.5	42	13	52	16	60	19	191	29	15.2
1.6 - 7.5	175	76	45	19	65	23	376	103	27.4
7.6 - 15	381	274	37	26	51	37	248	104	42.0
15.1 - 30	813	596	37	27	84	61	506	217	42.9
30.1 - 75	1,789	1,642	38	35	78	71	317	140	44.2
75.1 -150	1,883	1,744	17	16	58	54	-	-	-
150 and over	13,606	13,606	40	40	55	55	-	-	-

[a] 1 plaza = 0.64 hectares.

SOURCE: CIDA, op. cit., p. 156, originally based on Montoya, Análisis Económico de 109 fincas en el área del Proyecto Roldanillo-La Unión-Toro C.V.C. 1961-1962, 1963.

TABLE A-118

Labor Force by Farm Size in Three Primarily Minifundie Municipios,[a] 1960

Farm Size in Hectares	Labor Force		
	Permanent		Seasonal
	Per Hectare	Per Farm	Persons Per Farm
less than 1	2.8[c]	1.6	0.7[c]
less than 3	1.2[d]- 1.4[e]	1.3[d]- 2.1[e]	1.3[d]
2 - 4[b]	0.5	1.4	0.3
4 - 10[b]	0.3	1.6	0.8
10 - 20[b]	0.1	1.7	2.3

[a]Pupiales, Iles and Tenza.

[b]Only Pupiales and Iles.

[c]Only Tenza.

[d]Only Tenza (1 - 3 hectares).

[e]Only Pupiales and Iles (less than 2 hectares).

SOURCE: CIDA, op. cit., p. 147, based on original data from DANE.

Table A-119

Labor Force by Farm Size in Two Municipios: Subachoque and Fredonia, 1960

Farm Size in Hectares	Labor Force		
	Permanent		Seasonal
	Per Hectare	Per Farm	Persons Per Farm
Subachoque (Sabana de Bogota)			
less than 1	4.3	2.0	1.0
1 - 4	1.2	2.8	7.7
10 - 50	0.2	2.5	45.5
50 - 200	0.03	3.0	101.0
Fredonia (coffee zone)			
less than 1	2.8	1.2	0.05
1 - 4	0.8	1.8	1.1
4 - 20	0.3	2.6	3.9
20 - 50	0.2	5.5	8.0
50 - 500	0.08	12.6	24.1

SOURCE: CIDA, op. cit., p. 150, based on original data from DANE.

Table A-120

Use of Labor by Farm Size in Livestock Zones of the Coast[a], 1960

Farm Size in Hectares	Labor Force: Permanent (Persons) Per Hectare	Labor Force: Permanent (Persons) Per Farm	Labor Force: Temporary Persons per Farm[b]
Less than 3	1.2 - 1.7	1.3	0.1 - 0.7
3 - 10	0.3	1.6	0.5 - 2.1
10 - 50	0.1	2.2	1.0 - 4.9
50 - 100[c]	0.03 - 0.04	2.5	2.8 - 9.2
100 - 500[d]	0.02	2.8	6.1
500 - 2,500[d]	0.006	5.5	11.4

[a]Cerete and Valledupar.

[b]Minimum in Valledupar and maximum in Cerete.

[c]In Cerete, from 50 to 200 hectares.

[d]Only Valledupar.

SOURCE: op. cit., p. 152, originally based on partial information from DANE.

Table A-121

Labor Force on 368 Farms Interviewed in Four Zones,[a] by Farm Size, 1962

Farm Size in Hectares	Number of Farms	Labor Force			
		Family Labor per Farm	Permanent Hired Labor per Farm	Permanent Labor per Hectare	Maximum Number of Seasonal Workers per Farm
Less than 3	34	2.0	-	1.5	1.3
3 - 5	13	1.7	-	0.4	3.0[b]
5 - 10	24	2.1	-	0.4	3.3[b]
10 - 25	53	2.5	0.6	0.2	12
25 - 50	39	2.2	1.2	0.1	7[b]
50 - 100	59	1.5	2.5	0.05	17[b]
100 - 250	74	1.5	3.1	0.03	35[b]
250 - 500	35	1.4	7.0	0.02	31[b]
500 or more	37	0.8	12.0	0.02	10 - 377[c]

[a]Armero, Campoalegre, Saldaña, Valledupar.

[b]Excluding Armero, where the cotton crop leads to much higher labor utilization.

[c]Minimum in Valledupar, maximum in Armero; Campoalegre, 36; Saldaña, 312.

SOURCE: CIDA, op. cit., p. 153.

Table A-122

Estimates of the Value of Land and Capital by Farm Sizes

(Millions of 1960 pesos)

Farm Size (Hectares)	Estimate A	Estimate F	Estimate F'	Estimate F''
< 1/2	548.5	851.2	495.2	907.2
1/2-1	417.3	627.3	503.5	796.8
1-2	912.9	1,232.8	1,198.8	1,700.9
2-3	749.6	944.4	1,035.3	1,380.0
3-4	780.5	889.7	1,126.1	1,391.2
4-5	552.3	619.2	825.3	1,002.8
5-10	2,560.8	2,447.8	3,726.3	4,125.6
10-20	3,058.9	2,785.0	4,260.1	4,597.6
20-30	1,860.8	1,696.0	2,364.5	2,571.4
30-40	1,492.3	1,303.3	1,798.2	1,907.6
40-50	1,147.8	1,053.8	1,289.8	1,425.1
50-100	4,093.1	3,319.3	4,217.1	4,261.7
100-200	4,422.2	3,336.3	4,125.4	3,924.0
200-500	5,658.4	4,162.9	4,957.8	4,594.3
500-1000	3,684.9	2,430.8	3,128.1	2,610.9
1000-2500	3,448.9	1,709.9	2,868.2	1,819.0
> 2500	2,893.3	1,218.0	2,385.3	1,288.9
Total	(39,282.2)	30,627.8	40,304.9	40,304.9

Sources and Methodology:

Since the calculation of the ratio of the "value added / value of land and capital" is probably the most important single proxy for efficiency we have, special care must be taken to perform adequate sensitivity analysis, especially in view of the fact that perhaps the weakest data we have is that relating to the distribution of effective land by farm size and the distribution of capital.

There is substantial difficulty in getting valid estimates either of the absolute value of land and capital on a given farm size, or of its relative value compared to other farm sizes. Both are important for efficiency calculations, although the closer the appropriate shadow price for labor (or more precisely, for other factors) is to zero, the less important is the absolute valuation and the more important the relative one.[1]

[1] There is, in any case, the problem of different length of life of various forms of capital, and the natural difference in the life of capital as opposed to land, which suggests that present value will bear different relations to the current service flow according to the form of capital. Our information does not easily permit us to do more than suggest the direction of the bias of this conceptual problem.

(Sources and Methodology for Table A-122 continued)

The first land and capital series used here (Estimate A) uses the author's estimate of value of land by farm size, based on the CIDA data on relative assessment per hectare on different farm sizes, but adjusted according to their observation and other independent information to the effect that underassessment is more severe on large farms than small. The capital value includes only capital in the form of machinery and cattle, on the grounds that the assessment figures are supposed to include other forms of capital and a summation of the two series would involve double counting if such things as plantations, construction, improvements, etc., were included separately as forms of capital.

Estimate F uses a distribution of effective land which assumes the same degree of underassessment for all farm sizes (specifically about 45 percent), and the same "unassessed capital" series as the first measure. In both cases working capital is assumed to be 20 percent of the total capital stock, and is assumed to be proportional therefore to the combined value of land and capital. Estimate F implies a better performance for the larger farms than Estimate A, and it appears to give a fairly safe limit (i.e., a definitely upward biased measure) to the relative efficiency performance of the large farms, since the assumption of a constant working capital/total capital share probably favors the large farm, as does the assumption about distribution of land by value. While it is true that our distribution of cattle by size of farm varies substantially from that of the agricultural census (we assume many more on the large farms) there seems to be no other way to interpret the difference between the census information and other probably more reliable evidence; in any case if we were to assume less capital stock in the form of cattle on the large farms, our estimate of their output would also fall, a partially compensating error.

Even assuming that the distribution of both land and improvements, and other forms of capital used in Estimate A is reasonably accurate, if over or underestimation of their absolute values is substantial, this can affect our calculations. Our estimate of the value of capital stock is well below that of the Planning Commission (17.6 millions of 1958 pesos) for 1960.
Since our total estimate for 1960 at 1960 prices was 30.6 billion pesos, probably equivalent to about 25 billion in 1958 prices and a little less allowing for the real growth of both between those two years, if Planeacion's capital stock figure is correct, this would imply a very high capital/land ratio, possibly suggesting we have underestimated capital. According to our estimates in Estimate A the ratio of capital to land plus improvements rises with farm size, so if an underestimate had occurred in these forms of capital, it s correction would increase the share of all capital in the larger farms and make their performance look worse. (Parenthetically it would also decrease the value added to value of land and capital ratio, which according to our estimates of Estimate A was .20.) An underestimate of a type of capital good included in our assessed land value figures (such as plantations) would bias the results in the opposite direction.
The third series (Estimate F') uses the same land series as Estimate A, but capital is assumed to be more important relative to land and the additional capital (not included in Estimate A) to have a distribution like that of

(Sources and Methodology for Table A-122 continued)

plantations, i.e., substantially oriented toward the medium size farms, where coffee predominates. (There is in fact no possibility that plantation capital itself could be this important, since our assumption makes it 60 percent more important than cattle and machinery put together; but there is some suggestion that other forms of capital may be heavily concentrated on small farms from the fact that the ratio of the value of buildings, improvements, and so on to land is greater on small farms than on large farms according to the Geographic Institute data.

Estimate F'' uses the land value figures used in Estimate F and the capital values of F'. It shows the highest share of total value of land and capital on the small farms. The object of its use was to give a series almost certainly biasing down (and probably strongly) the share of scarce resources assumed to be found on large farms. Conceptually, as we have seen above, all this should have been included in the land-price figure itself.

Table A-123

Alternative Estimates of "Output/Value of Land and Capital," 1969

Farm Size (Hectares)	Estimate A (1)	Estimate F (2)	Estimate F' (3)	Estimate F'' (4)
< 1/2	.2712	.1748	.3005	.1640
1/2-1	.3493	.2323	.2895	.1829
1-2	.3695	.2737	.2814	.1983
2-3	.3944	.3131	.2856	.2143
3-4	.3669	.3219	.2544	.2059
4-5	.3595	.3207	.2406	.1980
5-10	.3297	.3450	.2266	.2047
10-20	.2928	.3216	.2102	.1948
20-30	.2323	.2549	.1828	.1681
30-40	.2101	.2406	.1744	.1644
40-50	.1971	.2148	.1755	.1588
50-100	.1797	.2217	.1745	.1727
100-200	.1596	.2116	.1712	.1799
200-500	.1452	.1974	.1657	.1788
500-1000	.1447	.2194	.1705	.2043
1000-2500	.1280	.2583	.1540	.2428
> 2500	.1476	.3507	.1791	.3315
Total	.2035	.2547	.1933	.1933
0-3	.3530	.2537	.2869	.1938
3-5	.3639	.3214	.2486	.2026
0-5	.3566	.2735	.2725	.1968
5-10	.3297	.3450	.2266	.2047
10-50	.2471	.2732	.1923	.1779
50-500	.1597	.2092	.1702	.1771
> 500	.1398	.2617	.1673	.2452

Sources and Methodology:

All the series are based on the value added figures of Table A-112.5; each is based on one of the value of land and capital series of Table A-122 (the one designated by the same symbol).

Table A-124

Value Added Per Unit of Land, by Farm Size, 1959

Farm Size	Value Added Per Hectare	Value Added per Effective Hectare		Value of Output of Crops/ Cropped Hectare
		Estimate A	Estimate E	
	(1)	(2)	(3)	(4)
< 1/2	3.8807	.5579	Same as Estimate A	1.225
1/2-1	1.5569	.7150		.979
1-2	1.2402	.7907		1.055
2-3	1.0727	.8566		1.056
3-4	.9264	.7920		1.034
4-5	.7886	.7884		.993
5-10	.7250	.7246		1.043
10-20	.5698	.6501	.7194	1.051
20-30	.4143	.5222	.6215	.879
30-40	.3523	.4798	.6044	.866
40-50	.3210	.4521	.5922	.883
50-100	.2745	.4162	.5991	.888
100-200	.2357	.3764	.5658	.858
200-500	.2057	.3520	.5880	.903
500-1000	.1953	.3605	.5870	.886
1000-2500	.1573	.3140	.6293	.835
>2 500	.0775	.3873	.7762	.990
Total	.2850	.4766	.6272	.953

Sources and Methodology:

Value added figures are from Table A-112.5. Land figures are from the sources cited in Table A-115, with Estimates A and E here using the same assumptions about the distribution of effective land as do Estimates A and E in Table A-115.

Col. (4) uses the same value of output figures with data from the agricultural census on cropped land by farm size.

TABLE A-124a

Average Number of Hectares for Various Uses, by Size of Farm, 1959

Farm Size in Hectares	Total Amount of Land per Farm	Arable Land			Permanent Crops	Meadows & Permanent Pasture	Mountains & Forests	Other
		Total	Temporary Crops	Fallow				
less than 1/2	.23	.09	.70	.02	.05	.01	.001	.08
1/2 - 1	.71	.37	.29	.08	.18	.06	.01	.08
1 - 2	1.41	.72	.56	.16	.36	.19	.03	.11
2 - 3	2.36	1.17	.91	.26	.55	.40	.08	.16
3 - 4	3.37	1.47	1.11	.36	.81	.72	.16	.21
4 - 5	4.33	1.82	1.36	.46	.97	1.01	.26	.27
5 - 10	9.99	3.45	2.45	1.00	2.13	2.87	.93	.61
10 - 20	13.76	3.73	2.42	1.31	2.37	4.78	2.03	.84
20 - 30	23.69	5.37	3.10	2.27	3.02	9.13	4.78	1.39
30 - 40	33.56	6.58	3.52	3.06	3.44	13.75	7.89	1.90
40 - 50	43.43	7.90	4.03	3.87	3.56	18.13	11.62	2.22
50 - 100	67.01	10.29	4.87	5.42	3.72	29.13	20.64	3.23
100 - 200	134.2	16.64	7.16	9.48	4.42	64.74	42.46	5.96
200 - 500	291.6	27.48	10.99	16.49	5.74	155.8	90.20	12.34
500 - 1,000	658.1	47.66	17.16	30.50	8.80	387.9	185.6	28.04
1,000 - 2,500	142.1	74.83	24.75	50.08	12.10	904.5	371.2	58.25
2,500 +	7,002.	102.4	31.68	70.76	39.15	5,465.	1,114.	281.0
Totals	2,260.	292.1	161.5	130.6	125.3	1,208.	528.2	107.3

Source: Agricultural Census, pp. 42, 43 and 45.

TABLE-124B

Colombia: Land Use by Size of Farm and by Region, 1959

(Percentages)

Regions and Size Categories	Total Area	Non-Agricultural Area[a]	Agricultural Area						
			Total	Area Cultivated			Fallow	Natural Pasture	Mountains & Forests
				Total	Temporary Crops	Permanent Crops			
Andean Region:									
Sub-family	100.0	7.1	92.9	60.0	35.3	24.7	10.2	18.9	3.8
Family	100.0	6.3	93.7	33.1	16.9	16.2	9.4	35.9	15.3
Medium multifamily	100.0	5.8	94.2	12.1	6.9	5.2	8.3	45.7	28.1
Large multifamily	100.0	4.8	95.2	4.0	2.3	1.7	4.0	63.6	23.6
Total	100.0	5.6	94.4	16.8	9.2	7.6	6.7	49.7	21.2
Caribbean Region:									
Sub-family	100.0	9.4	90.6	48.5	40.1	8.4	16.6	15.6	9.9
Family	100.0	2.7	97.3	10.9	7.4	3.5	8.0	42.4	36.0
Medium multifamily	100.0	2.1	97.9	4.1	2.8	1.3	5.1	53.4	35.3
Large multifamily	100.0	2.8	97.2	2.3	1.6	0.7	3.8	61.0	30.1
Total	100.0	2.8	97.2	6.3	4.6	1.7	5.5	53.0	32.4
Colombia:									
Sub-family	100.0	7.5	92.5	57.9	36.2	21.7	11.3	18.3	5.0
Family	100.0	5.4	94.6	27.5	14.5	13.0	9.0	37.6	20.5
Medium multifamily	100.0	4.4	95.6	9.0	5.3	3.7	7.0	48.7	30.9
Large multifamily	100.0	4.3	95.7	3.5	2.1	1.4	4.0	62.9	25.3
TOTAL	100.00	4.8	95.2	13.7	7.8	5.9	6.4	50.7	24.4

Source: Centro Interamericano de Desarrollo Agricola (CIDA), Tenencia de la Tierra y Desarrollo Socio-Economico: Colombia, p. 140. The calculations were based on figures from the 1960 Agricultural Census.

[a] Includes waste land, land with buildings, ponds, rivers, etc.

TABLE A-125

Characteristics of Different Farm Sizes in Colombia: Per Cent Using Various Inputs, 1959

Farm Size in Hectares	Mechanical Power[a] (1)	Mechanical Power Only (2)	Animal Power (3)	Animal Power Only (4)	Animal and Mechanical Power (5)	Total Non-Human Power (6)	Internal Combustion Motors Owned (7)	Internal Combustion Motors Used (8)
less than 1/2	1.09	.60	12.32	11.83	.49	12.92	.091	.13
1/2 - 1	3.09	1.18	26.28	24.37	1.91	27.46	.15	.37
1 - 2	4.74	1.59	28.56	26.77	3.15	31.51	.34	.71
2 - 3	5.99	1.84	31.21	29.37	4.15	35.36	.53	1.03
3 - 4	6.52	2.01	34.39	32.38	4.51	38.90	.98	1.55
4 - 5	6.79	2.02	35.53	33.51	4.77	40.30	1.10	1.71
5 - 10	7.87	2.80	39.01	36.21	5.07	44.08	2.10	2.77
10 - 20	8.80	3.86	41.78	37.92	4.94	46.72	3.60	4.22
20 - 30	9.53	4.54	42.97	37.43	4.99	46.96	4.41	4.86
30 - 40	10.01	5.09	41.49	36.40	4.92	46.41	4.83	5.05
40 - 50	9.88	4.94	40.92	35.98	4.94	45.86	4.77	5.00
50 - 100	10.53	5.56	40.35	34.79	4.97	45.32	4.75	4.73
100 - 200	12.97	6.74	41.28	34.54	6.23	47.51	5.51	5.19
200 - 500	17.52	8.84	45.81	36.97	8.68	54.49	6.94	6.71
500 -1000	25.80	12.20	49.32	37.12	13.60	62.92	10.87	10.38
1000 -2500	32.15	14.13	54.08	39.95	18.02	72.10	14.08	12.81
2500 and over	36.50	13.10	64.74	51.64	23.40	88.14	12.08	11.83
TOTAL	6.22	2.47	33.92	29.17	3.75	35.35	1.63	2.00

(continued on following page)

TABLE A-125 continued

Farm Size in Hectares	Electric Motors		Tractors		Reapers		Irrigation			
	Owned	Used	Owned	Used	Owned	Used	% of Farms	% of Area	Related to Area in Temporary Crops	Related to Temporary Crop Land Including Fallow
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
less than 1/2	.039	.034	.025	.79	.0006	.024	2.47	2.44	8.06	6.25
1/2 - 1	.039	.040	.070	1.27	.023	.030	3.85	2.74	6.72	5.25
1 - 2	.075	.077	.13	1.53	.043	.075	3.68	2.15	5.38	4.21
2 - 3	.085	.092	.14	1.58	.079	.081	3.65	1.73	4.51	3.50
3 - 4	.13	.14	.20	1.58	.12	.10	3.80	1.62	4.92	3.73
4 - 5	.12	.13	.18	1.61	.12	.12	3.90	1.43	4.56	3.41
5 - 10	.29	.29	.31	1.80	.19	.18	3.71	1.16	4.73	3.36
10 - 20	.57	.55	.67	2.11	.13	.28	3.29	0.86	4.91	3.19
20 - 30	.88	.81	1.16	2.51	.22	.39	3.03	0.74	5.68	3.28
30 - 40	1.20	1.18	1.45	2.88	.21	.43	2.77	0.70	6.65	3.56
40 - 50	1.29	1.20	1.93	3.13	.36	.59	2.56	0.68	7.31	3.73
50 - 100	1.55	1.46	2.78	3.93	.41	.73	2.61	0.69	9.53	4.51
100 - 200	2.39	2.20	4.66	5.35	.86	1.12	3.04	0.83	15.51	6.67
200 - 500	3.79	3.50	8.35	9.11	1.54	1.75	3.56	0.95	25.08	10.03
500 -1000	6.25	5.94	17.70	18.35	2.66	2.70	4.71	0.98	37.49	13.50
1000 -2500	9.97	9.42	26.38	26.58	3.14	3.24	4.61	0.77	44.40	14.68
2500 and over	8.52	7.76	30.40	31.16	3.94	3.68	4.32	0.51	113.19	35.00
TOTAL	0.40	0.38	0.67	1.95	0.12	0.21	3.42	0.83	11.59	6.41

[a]Mechanical power is defined as that developed by a moving machine or any machine which uses gas, oil, water, wind, etc.

SOURCE: Agricultural Census of 1960, second part, pp. 56-58.

Table A-125 (cont'd)

[b]Includes processing equipment.

[a]The assessment records consulted to make these calculations corresponded to the late sixties, but I am not sure whether these municipios had been recently assessed at the time of the study, in which case the values might be fairly well updated--though probably still with a downward bias--or whether, in fact, those figures were substantially outdated, in which case the downward bias could be quite large.

Source: Carlos Ossa, "Municipios de Fusugasuga y Ospina Perez: Relacion Entre Inversiones de Varios Tipos y El Tamaño de las Fincas," paper in Los Andes University course on Colombian Agriculture, mimeo, 1969.

TABLE A-126

Use of Tractors, 1959

Farm Size in Hectares	Arable Land on the Farm	Tractors Owned Per 100 Hectares of Arable Land
less than 1/2	.09	0.467
1/2 - 1	.37	0.305
1 - 2	.72	0.256
2 - 3	1.16	0.153
3 - 4	1.47	0.158
4 - 5	1.82	0.139
5 - 10	3.45	0.131
10 - 20	3.73	0.247
20 - 30	5.37	0.307
30 - 40	6.58	0.344
40 - 50	7.89	0.372
50 - 100	10.29	0.469
100 - 200	16.64	0.603
200 - 500	27.48	0.675
500 -1000	47.66	0.864
1000 -2500	74.83	0.934
2500 and over	102.40	0.993

SOURCE: Agricultural Census of 1960, p. 56.

TABLE A-127

Farm Size and Fertilizer Use in Cundinamarca, 1959

	Percent of Farms Using:				
	Organic Only (1)	Inorganic Only (2)	Both (3)	Inorganic (4) (2) + (3)	Organic (5) =(1) + (3)
< ½	31.17	11.40	4.59	15.99	35.76
½-1	20.45	14.77	7.95	22.72	28.40
1-2	27.68	14.08	9.82	23.90	37.50
2-3	26.46	15.66	12.38	28.04	38.84
3-4	24.43	16.07	12.71	28.78	37.14
4-5	25.01	16.92	13.78	30.70	38.80
5-10	21.81	18.16	14.06	32.22	35.87
10-20	17.10	18.92	12.98	31.90	30.08
20-30	15.08	22.16	11.70	33.86	26.78
30-40	11.43	22.92	8.06	30.98	19.49
40-50	10.80	20.96	7.66	28.62	18.46
50-100	8.97	22.20	7.18	29.38	16.15
100-200	7.09	23.25	5.67	28.92	12.76
200-500	6.13	24.09	4.96	29.05	11.09
500-2,500	2.64	17.99	3.70	21.69	6.34
1,000-2,500	12.16	13.51	0	13.51	12.16
> 2,500	0	26.67	6.67	33.34	6.67

Source: DANE, Directorio Nacional de Explotaciones Agropecuarios, (Censo Agropecuario), 1960, Volume I, Departamento de Cundinamarca, Bogota, Cerca 1965.

TABLE A-127.5

Capital Per Hectare, by Farm Size,
2 Colombian Municipios, late sixties[a]
(Values in pesos)

Size of Plot (hectares)	No. of Plots	Plantations, Artificial Pastures, etc. (1)	Machinery and Equipment[b] (2)	Construction (excluding housing) (3)	Total (excluding housing) (4) = (1)+(2)+(3)	Housing (5)	Total (including housing) (6) = (4) + (5)
Ospina Perez							
< 1	39	1.726	0	0	1.726	.841	2.567
1 - 5	66	.880	0	.018	.898	.192	1.020
5 - 15	15	.384	0	.037	.421	.125	.546
15 - 30	7	.101	.231	0	.101	.036	.368
> 30	7	.023	0	0	.023	.002	.025
Total	134	1.708	.0219	.005	.198	.045	.242
Fusugasuga							
< 1	62	1.297	0	0	1.297	5.842	7.139
1 - 5	62	.922	.122	.013	1.057	1.561	2.618
5 - 15	29	.581	.083	.021	.685	1.940	2.625
15 - 30	9	.183	.002	.031	.216	.579	.795
≥ 30	9	.090	.051	0	.141	.334	.475
Both Municipios							
< 1	101	1.458	0	0	1.458	3.962	5.421
1 - 5	138	.899	.056	.016	.972	.825	1.759
5 - 15	44	.509	.053	.027	.589	1.277	1.866
15 - 30	16	.143	.113	.016	.160	.317	.589
> 30	16	.043	.015	0	.058	.099	.157

TABLE A-128

Farm Size and Extent of Irrigation in Saldaña, Tolima

Farm Size in Hectares	Number of Farms Studied	Per Cent of Area Under Irrigation
less than 3	20	10
3 - 5	5	15
5 - 100	43	35 - 50
100 - 500	14	65
500 or more	5	35 - 50

SOURCE: CIDA, op. cit., p. 181.

TABLE A-129

COLOMBIA: AVERAGE LABOR PRODUCTIVITY IN MECHANIZED AND NONMECHANIZED CROPS, 1951 AND 1964

Gross Output Value (1000's of 1958 pesos)		1951	1964	Per Cent Change 1951-1964
(1)	Mechanized crops	552,593	1,363,811	147
(2)	Nonmechanized crop output including coffee and minor crops	2,925,199	3,897,446	33.2
(3)	Coffee	1,026,377	1,671,228	54.8
(4)	Nonmechanized crop output excluding coffee	1,845,842	2,226,218	20.6
Labor Force				
(5)	Nonmechanized crops excluding coffee	747,143	993,469	33
(6)	Mechanized crops	70,651	160,871	127.7
(7)	Alternative estimate of (5) assuming census underreporting	821,857	1,053,077	28
Land (hectares)				
(8)	Mechanized crops	465,787	835,727	79.2
(9)	Nonmechanized crops excluding coffee and minor crops	1,428,634	1,485,872	4
Average Labor Productivity in Nonmechanized Crops				
(10)	(4) ÷ (5)	2,471	2,224	-10.0
(11)	(4) ÷ (7)	2,225	2,114	-5.0
Man to Land Ratios				
(12)	Mechanized crops, (6) ÷ (8) × 250	38	45	18
(13)	Nonmechanized crops, (5) ÷ (9) × 250	131	167	27.5
	(7) ÷ (9) × 250	144	177	23

Source: Thirsk, op. cit., p. 359.

TABLE A-129a

DISTRIBUTION OF THE FARM UNITS BY SIZE IN HECTARES AND CLASS OF FARM UNIT[a]

(Sample in Four Tolima Municipios, 1965)

Size	All Farm Units	Farm Unit Classification					
		Sub Family	Family		Multi-family		
			Small	Medium	Small	Medium	Large
		(number of survey observations)					
Less than 1.0 hectare	6	4	2	---	---	---	---
1.0 to 3.0 hectares	19	11	5	---	3	---	---
3.1 to 5.0 hectares	21	13	5	---	3	---	---
5.1 to 10.0 hectares	34	4	11	---	19	---	---
10.1 to 50.0 hectares	89	8	20	---	61	---	---
50.1 to 100.0 hectares	31	---	---	6	---	25	---
100.1 to 500.0 hectares	27	---	---	1	---	24	2
500.1 or more hectares	12	---	---	---	---	5	7
All observations	239	40	43	7	86	54	9
Median farm size		*< 4 ha.*	*≈ 9.5 ha.*	*≈ 80 ha.*	*≈ 20 ha.*	*≈ 125 ha.*	*> 500 ha.*

[a]One hectare equals 2.47 acres.

Source: Montero, op. cit., p. 23. Median sizes of the various classes of farms were estimated by the author.

TABLE A-129b

DISTRIBUTION OF THE FARM UNITS BY FULL TIME FAMILY HELP, FULL TIME HIRED HELP, AND CLASS OF EACH UNIT

(Sample in Four Tolima municipios, 1965)

	All Farm Units	Farm Unit Classification					
		Sub Family	Family		Multi-family		
A. Family Help[a]			Small	Medium	Small	Medium	Large
	(number of survey observations)						
No relatives	99	9	-	-	37	44	9
1 relative	42	11	10	2	15	4	-
2 relatives	40	5	17	2	14	2	-
3 relatives	21	10	4	1	6	-	-
4 relatives	11	1	8	-	2	-	-
5 relatives	8	-	2	1	2	-	-
6 or more relatives	8	3	2	1	2	-	-
No information	10	1	-	-	8	1	-
All observations	239	40	43	7	86	54	9
Median Number of Relatives	≈ 0.5	≈ 1.5	2	2	1	0	0
B. Hired Help[b]							
	(number of survey observations)						
No hired men	144	40	43	7	42	12	-
1 hired man	38	-	-	-	27	10	1
2 hired men	16	-	-	-	7	8	1
3 hired men	13	-	-	-	4	9	-
4 hired men	6	-	-	-	-	4	-
5 to 10 hired men	10	-	-	-	-	10	-
11 to 20 hired men	3	-	-	-	-	-	3
21 to 100 hired men	1	-	-	-	-	-	1
101 or more hired men	3	-	-	-	-	-	3
No information	5	-	-	-	4	1	-
All observations	239	40	43	7	86	54	9
Median Number of Hired Men	0	0	0	0	≈ 0.5	2	≈ 15

[a] Family help was defined as relatives of the producers, 12-years of age or older, working on the farm unit on a full-time basis without pay.

[b] Hired help was defined as men working for a wage on a full-time basis for the producers.

TABLE A-129c

NON-FARM OCCUPATIONS OF THE PRODUCERS, BY CLASS OF FARM UNIT

(Sample in Four Tolima Municipios, 1965)

Non-farm Occupations of the Producers	All Farm Units	Farm Unit Classification					
		Sub Family	Family		Multi-family		
			Small	Medium	Small	Medium	Large
	(number of survey observations)						
Housekeeping	1	—	—	—	1	—	—
Cottage industries	8	2	1	—	5	—	—
Full-time job[a]	19	13	—	—	3	2	1
Industrial business	2	—	—	—	1	—	1
Private business practice	31	1	1	1	13	10	5
Private professional practice	1	—	—	—	—	1	—
Undisguised occupation	10	—	—	—	7	3	—
No non-farm occupation	149	24[b]	41	6	52	24	2
No information	18	—	—	—	4	14	—
All observations	239	40	43	7	86	54	9

[a] Agricultural work outside the farm unit included.

[b] Although in 1965 all had temporarily agricultural employment outside the farm unit.

Source: Montero, op. cit., p. 39.

TABLE A-129d

PLACE OF RESIDENCE OF THE PRODUCERS BY CLASS OF FARM UNIT

(Sample in Four Tolima Municipios, 1965)

Place of Residence of the Producers	All Farm Units	Farm Unit Classification					
		Sub Family	Family		Multi-family		
			Small	Medium	Small	Medium	Large
	(number of survey observations)						
The farm unit	129	26	38	6	50	8	1
The farm neighborhood	29	11	4	1	11	2	—
The municipio seat	56	2	1	—	19	33	1
A neighboring municipio	6	1	—	—	2	2	1
A distant town or village	4	—	—	—	—	3	1
The nation's capital	14	—	—	—	3	6	5
No information	1	—	—	—	1	—	—
All observations	239	40	43	7	86	54	9

Source: Montero, op. cit., p. 41.

Table A-129e

HOME CONSUMPTION RATIOS[b] BY FARM SIZE IN THE RIO LEBRIJA REGION, 1967[a]

Farm Size in Hectares	OWNERS				SHARECROPPERS[c]				TOTAL			
	Sample Size	Estimate A (Excluding avicola)	Estimate B (Excluding avicola, piña fique)	Estimate A (With avicola)	Sample Size	Estimate A (Excluding avicola)	Estimate B (Excluding avicola, piña fique)	Estimate A (Including avicola)	Sample Size	Estimate A (Excluding avicola)	Estimate B (Excluding avicola, piña fique)	Estimate A (With avicola)
		(1)	(2)	(3)		(4)	(5)					
< 5	(57)	14.5	19.9	26.0	(66)	13.7	21.4	14.6[d]	(173)	14.2	20.6	21.0
5-50	(123)	16.6	22.4	18.0	(92)	11.8	21.0	12.1[d]	(215)	15.0	21.9	16.0
> 50	(18)	9.1	12.7	9.1	(3)	19.4	36.0	19.4	(21)	9.3	13.5	9.3
TOTAL	(198)	13.0	19.2	14.0	(161)	13.0	22.3	-	(359)	13.0	20.1	--

[a]The sample was taken over the period April 1, 1967 to March 31, 1968. The data appear to have reference to 1967.

[b]Except as specified, the products included in the calculation of total output and home consumption are the major subsistence crops (platano, arveja, arracacha, corn, wheat, yuca, beans and onions), the major commercial crops (coffee, sugar cane, fique, tobacco and pineapple) and milk. For the distinction between Estimates A and B, see Sources and Methodology.

[c]The ratios for sharecroppers refer to the share of retained product which is consumed, i.e., after payments (his share of the crop) have been made to the landlord.

[d]Deduced indirectly and therefore particularly subject to error.

Sources and Methodology: Table A-129e

The information comes from Jose Hernandez G, and Marco Reyes C., La Aldea Escuela Cooperativo Como Instrumento de Cambio Rural: El Caso de la cuenca superior del Rio Lebrija (CEDE, Universidad de Los Andes, Bogota, enero, 1970), and unpublished data collected in connection with that study.

Although the tables presented in the Rio Lebrija study give ratios for home consumption for both the major commercial crops and major non-commercial ones, application of prices given in the study itself (or for products where these were not available, of average country-wide prices coming from the Banco de la Republica) did not give us the same total gross income figures as presented by the study; further, no figures were given on the home consumption rate for production of fowl. Thus there may be substantial biases for some specific products. But a knowledge of the distribution of value of output by major category of crop or product, i.e., principal crops, less important crops, cattle, and poultry, along with the results-which are consistent with general observation-that we have on the home consumption ratios on each of these categories, does not leave room for a large error as to the range within which the overall ratios must lie. Columns 1, 4 and 7 are based on our detailed calculations using the individual crop and product figures but excluding fowl. Columns 2, 5 and 8 use the same methodology but a) exclude fique and pineapple with respect to which there was a serious price problem, and b) use different prices for a couple of products. Columns 3, 6 and 9 include poultry production with the arbitrary assumption that 50% (probably an upward biased estimate) was consumed on the smallest farms.

We did some checking to be sure that the application of our home consumption ratios by category to the absolute value of product figures of the different categories would yield similar results, and they did.

TABLE A-129f

NATURE OF THE FAMILY INCOME BY MUNICIPIOS, CHIQUINQUIRA REGION, 1962

Municipios	Share of Labor Force in the Agricultural Sector[a]	INCOME (Percent Distribution)				
		IN MONEY	IN KIND			TOTAL
			Home Consumption	Wages in Kind and Other[b]	Sub-Total	
Saboyá	85.5	40.4	50.2	9.4	59.6	100.0
Chiquinquirá	77.6	59.6	37.0	3.4	40.4	100.0
San Miguel de Sema	71.2	56.8	40.7	2.5	43.2	100.0
Caldas	94.4	58.6	35.1	6.3	41.4	100.0
Simijaca	78.6	68.0	20.5	11.5	32.0	100.0
Susa	85.6	63.4	21.0	15.6	36.6	100.0
Fúquene	74.2	76.1	23.4	0.5	23.9	100.0
Ubaté	50.2	70.5	20.9	8.6	29.5	100.0
Carmen de Carupa	86.4	61.8	30.3	7.9	38.2	100.0
Cucunubá	52.8	77.2	17.7	5.1	22.8	100.0
Guachetá	71.0	74.3	21.3	4.4	25.7	100.0
Lenguazaque	56.6	62.3	31.2	6.5	37.7	100.0
Sutatausa	29.0	83.4	13.0	3.6	16.6	100.0
Tausa	73.9	62.3	18.1	19.6	37.7	100.0
TOTAL	68.4	61.5	31.3	6.4	38.5	100.0

[a] From Reyes, et al., op. cit., Table II-5.

[b] Includes as well as wages the following: presents, rent on farms, rent of oxen, etc.

Source: Marco Reyes Carmona, Rafael Prieto Duran, and Bill Hanneson, Estudio Agro-economico de la Hoya del rio Suarez Universidad de los Andes, Centro de Estudios Sobre Desarrolo Economico, and Corporacion Autonomo Regional de la Sabana de Bogota y de los Valles de Chiquinquira y Ubate (CAR), p. 128.

TABLE A-129g

MONTHLY INCOME BY ORIGIN

(In Current Pesos)

	Source of Income	Total Income	Percent of Total
I.	Income from Independent Work	215.097	64.1
	a) Home consumption	105.259	31.3
	b) Sales of Products	57.420	17.2
	c) Agricultural Profits	31.951	9.5
	d) Business Profits	17.384	5.2
	e) Income from Artesan Industry	3.083	0.9
II.	Income from Paid Work	110.188	32.7
	a) Wages in Money	88.640	26.3
	b) Wages in Kind	21.548	6.4
III.	Other Income and Transfers	11.321	3.2
	a) Presents Received	2.843	0.8
	b) Payments Received	2.778	0.8
	c) Rent for Animals	1.162	0.3
	d) Sales of Cattle	1.129	0.3
	e) Rent on Farms	701	0.2
	f) Various Sales	101	0.1
	g) Other	2.607	0.7
	TOTAL (I + II + III)	336.606	100.0

Source: Reyes, et al., op. cit., p. 132.

Section VIII: The Labour Force, Income Levels, Wage Rates, Living Conditions, Migration, etc.

Total agricultural labour force figures were presented in Table I-1. Table A-130 gives our best estimate of the departmental labour forces in agriculture at the population Census years. Table A-131 presents the cross-departmental percentage distribution of the male agricultural labour force, based on the data of Table A-130. It also shows a change in percent shares of the different departments over time. The absolute figures used are those of the Censuses.

Table A-132 gives a comparison of average rate of growth of the male agricultural labour force over the period 1938-51 with average output figures in 1953 and the male wage rate in 1951, all by departments. Table A-133 presents growth rates for the rural population as a whole, by departments; it differs from the figures of Table A-130 in that it includes people who are not members of the labour force and women.

Table A-133.1 presents McGreevey's estimates of net interregional population movements for the earlier period 1918-1938. Table A-134 presents proletization rates for a selected group of departments in 1938-1951.

Our basic real wage series, for the nation as a whole and by departments--and in each case presented separately for warm country and cold country--is presented in Table A-135

Table A-135.1 presents the same real wage indices for male agricultural workers as does Table A-135, but by sub-period averages. Table A-135.2 presents the nominal wage series for the country and for selected departments by warm vs. cool region and by gender.

Table A-135a presents alternative real wage series by departments, where the deflator is the blue collar cost of living series corresponding to the nearest city. Calculations were made for most but not all of the departments in the period 1954 and on, even if this involved deflation by the cost of living series for the capital city of a nearby department rather than the department itself. For the earlier periods only with respect to

those departments with cost of living series were calculations made.

A comparison with Table A-135 seems to indicate very substantial discrepancies over the long period--particularly dramatic in Antioquia's cold climate zone, but in fact rather general.

Another cross-check is carried out for the period 1953-65 in Table 135b, where the national "most frequent" wage figure presented by DANE is deflated by the national blue collar cost of living series. Over the period, the series matches that of Table A-135 rather well, although the 1965 figures differ substantially.

Another check on the validity of our estimates of over time real wage changes may be attempted by comparing the over time movement in the ratio "wages without food/wages with food" against the expectation that, via Engels law the implicit value of the food goes up less rapidly than the non-food part of the payment (a reasonable assumption) or possibly even approaches constancy (an assumption which can be checked directly). The same hypothesis would presumably imply that the ratio in question would be higher in high wage departments than in low wage departments.

No consistencies of the sort just mentioned jump out of the data. (See Table A-135c.) The Boyaca 1935 statistics indicate that the nominal value of food varies fairly widely among municipios (this could be due to

price differences, but if such differences are generally important, over space or time, the use of the ratio would not be very promising in the first place) and looking at the wage series for the country as a whole shows that there has been little change in the ratio over time. In most departments it has gone down and in the few where it has risen (Cauca, Cundinamarca, North Santander) there is not a demonstrably faster wage increase over 1938-39 to 1960-63 than in the other departments. Finally, there is no apparent tendency for the ratio to be higher in the high wage departments. These results indicate either

(a) data weaknesses throwing doubt on our overall results, or

(b) that food as part of wages does not decrease as a share of wages as as a share of wages as these go up, in fact it has no general relation to them;

(c) that relative changes on food prices in the rural areas have been substantial enough to affect the ratio over time;

(d) (perhaps most likely), that because the two different modes of payment correspond to different farms, regions, types of farm or whatever, the ratio at no time really reflects the imputed value of the food.

My overall impression is that one would not realistically expect the ratio to tell us much, and that its apparently non-systematic behaviour is therefore not good cause to suspect the figures unduly.

In a longer run view, McGreevey has presented estimates of the purchasing power of agricultural labour spanning a period of over 200 years. (Table A-135d.)

Another important indicator of welfare may be housing conditions. Information available on this general issue in 1938 was limited to housing services; the figures are presented in Table A-136a. The comparable data for 1951 and 1964 is presented in Tables A-136b and A-136c. In both those years there was also useful information on characteristics of the floors, walls and ceilings of rural dwellings; that for 1951 and 1964 is presented, respectively, in Tables A-137a and A-137b. Table A-138 gives a sort of test for the tightness of relationship across departments between improvements in housing conditions--in this case the decrease in earthen floors and thatched roofs and increase in percent of houses with running water and wage increases over roughly 1951 to 1964.

Table A-130

Male Agricultural Labor Force (12 years and up)

and Its Growth Rate by Departments; 1938, 1951, and 1964

	1938	Intercensual Growth Rate %	1951	Intercensual Growth Rate %	1964
Antioquia	242.3	0.25	250.3	1.22	293
Atl.	35.0	-0.79	27.8	0.59	30
Bol. y Cord.	165.5	0.45	175.5	3.39	259
Bol.					
Cord.					
Boyaca (including Casamasa)	185.6	-0.904	166.6		190
Caldas	172.3	1.51	209.4		209
Cauca	86.5	0.09	87.3	2.68	122
C/Mareo	219.0	-0.25	212.0	-0.3	220
Huila	51.8	1.37	61.8	1.396	74
Magdalena y Guajra	77.5	0.59	83.7	5.11	160
Meta	25.7	0.207	26.4	4.706	48
Narino	109.6	0.23	112.9	1.327	134
N. de San	76.5	0.285	78.6	-0.06	78
San.	156.1	0.67	170.3	-0.627	157
Tolima	141.8	-0.08	140.0	0.428	148
Valle	130.7	2.88	189.0	-0.956	167
Utros	68.3				112
Total	1,944.2		2,090.4*		2,380

*Assuming same rate of underreporting of total labor force implies 2191 total-close of ECLA.

Sources and Methodology: Table A-130

The major problem in the comparisons among the different censal years is the different relative underreporting. For 1938 we assumed that the ECLA figure on total labor force was correct, applies the same male/total labor force ratio as presented by the census of 1951 (the 1938 census used a different criteria to define women in the agricultural labor force than did the succeeding ones), and assumed relative underreporting ratios of the different departments similar to those declared by Lemieux's post censual survey in 1951, through with some arbitrary adjustments to allow for what seemed to be a typical characteristics of the 1951 situation. For 1951 we used an estimate of underreporting of rural population based on Lemieux' calculations be departments (rural and urban together) and assumed the rate of underreporting was the same for the active male agricultural population as for the population as a whole. The average rate of underreporting for the male labor force turned out to be 8.3%, almost equal to that assumed by E.C.L.A. In 1964 we assumed, arbitrarily, that the average underreporting for active males in agriculture was 3%, and that relative underreporting by departments was similar to that in 1951, as per Lemieux. It is probable that a considerable number of children were missed in all censuses but these do not per se lead to errors in our active population estimates. However, it is possible that underreporting in 1951 was greater relative to that in 1964 than we have assumed.

While each of the recent Colombian censuses has suffered from considerable underreporting, this problem was especially serious in the 1951 census, taken during a period of social turmoil due to the violencia; the problem was particularly serious in the rural areas, and presumably even more serious in the relatively newly developing rural areas. Alvaro Lopez has concluded that due to the lack of statically reliable registration of births and deaths, it is not possible to demonstrate the size of absolute errors in the censuses of 1951 and 1964.[1]

But he concluded that it is possible to preform more efficient internal checks on the rate of population growth in the intercensal periods 1938-51 and 1951-64. For this period as a whole, he concludes that the only combination of intercensal growth rates which is consistent with these various infernal consistency checks indicates a growth of about 2.4% in the period 1938-51 and 2.9 to 4.0% over the period 1951-64. (Op. Cit., Page 85) Since our major concern in Table A-31.1 is to determine rates of growth for the agricultural labor force between the three census years, Lopez' overall estimates provide a helpful base. The basic assumptions used in our estimates of the growth rate between 1951 and 1964 are the following:

a) that the adjustments made (at the departmental level) to the estimates of 1951 by the demographic expert Omar Lemieux were accurate. Lemieux did not come to a single estimate of probable underreporting in 1951, but he did designate an utmost probably estimate (12.063 million people); this is the one we will use, although Los Censos de Poplacion de Edificios y Viviendas Agropecuario de Colombia, page 72, indicates that his maximum estimate was 12,043 millions. Apparently he made some subsequent adjustment to this; since our interest is in relative underreporting amond Departments and between years, it is reasonably safe to take the relative underreporting

1 Alvaro Lopez Toro, Analisis demografico de los censos colombianos; 1951 y 1964, Circulo de Estudios sobre Desarrollo Economico, Universidad

figures he mentions in 1951 as a base from which to work, and at the same time use the total population Lopez describes as the most probable, i.e. about 12.063 million as our base.

b) Lemieux found very little underreporting in subsequent checks in several Colombian cities, including Cartagena where substantial underreporting had been thought to have occurred, so we will assume that most of the underreporting in 1951 was in rural areas. Using the official estimate of 11, 548, implies underreporting of a little under 5% overall and of course more than that for rural areas. Some confusion arises due to the fact that the departmental population figures recorded for the 1951 census were in some cases above those listed in Lemieux maximum estimate, (Page 72). This presumably results from the fact that he wrote before many of the departmental censuses came out, and DANE itself must have made adjustments for those municipios which were not recorded in the census at all. We have taken the higher of these two estimates, for each department giving a national total population of 12.094 thousands and implying an underreporting ratio of 5%. Assuming that there was some underreporting in the cities but considerably less than in the rural areas, we have assumed that the rate of underreporting in the urban areas of each Department was 1.5%, and that the rest of the underreporting was in rural areas. This seems justified by the fact that even though reporting was worst in Bolivar as a whole, that in Cartagena seems to have been good.

C) We assume that the ratio of rural underreporting found for each department applies for the male agricultural labor force. This assumption is very difficult to justify, as there is probably differential underreporting of various types. First of all, underreporting of children under 10 is presumably most serious, suggesting that underreporting for the population

as a whole may be greater than that for the whole of the labor force. On the other hand, Lopez estimates (Op. Cit., page 87) that under enumeration of children of less than 10 years was 6% in 1951 and 4% in 1964, additional to the general under enumeration. At the same time, Lopez also concludes that there is less complete reporting of men than of women, most severe in the working age categories. It would be possible to try to put Lopez' two conclusions together and deduce whether, with these assumptions, under-reporting of the working age males would be greater than or less than the population average, but the crudity of our basic statistics suggests that such an exercise is probably not worthwhile.

Using out total population figure of 12.094 thousand for 1951 and Lopez' estimate rate of population growth in 1951-64 period of about 2.95% per year (Lopez, page 83) we derive an estimated 1964 population of 17,648 If this is the actual population, (the reported population was 17,485) the under enumeration amounted to only 1% a figure which is obviously unrealisticly low. Either Lopez estimate of the growth rate is too low, or we are still underestimating the amount of underreporting in 1951 using a figure of 5%. If we assume, with Lopez, underreporting of 4% in 1964 for children under 10, underreporting of 1% for the urban population over ten and 3% for the rural population over 10, the total population is then 17,943 thousand, an average underreporting of 2.6%. Projecting this to 1951 at an average growth rate of 2.95% per year gives a 1951 population of 12,297 thousand, an average underreporting of 6.5%. Lopez believes underreporting of children under 10 was 6%; if that for other urban population was say 2%, that for other rural population would be 8%. This would seem to suggest that Lemieux's high estimate for 1951 was still not high enough, but has in any case no particular implications for our rural labor force

calculations. It seems unlikely that our growth rate figures are greatly in error; higher underreporting in 1964 would imply the same for 1951. Unfortunately, we have no information thus far comparable to the Lemieux' study to suggest the relative degrees of rural overall underreporting by Departments.

Table A-131
Male Agricultural Labour Force Distribution among Departments, 1938, 1951 and 1964 (percentages)

	1938	1951	1964	1964-1938 (change)
Antioquia	13.10	12.74	13.18	+.08
Atlántico	1.89	1.41	1.38	-0.51
Bolívar	8.95	8.93	11.65	2.70
Boyacá	10.03	8.48	8.61	-1.43
Caldas	9.31	10.66	9.53	0.22
Cauca	4.68	4.44	5.48	0.81
Cundinamarca	11.84	10.79	9.89	-1.94
Huila	2.80	3.14	3.32	0.52
Magdalena	4.19	4.26	6.30	2.11
Nariño	5.92	5.75	6.02	0.10
Norte de Santander	4.13	4.00	3.50	-0.63
Santander	8.44	8.67	7.02	-1.42
Tolima	7.66	7.12	6.66	-1.01
Valle	7.06	9.62	7.51	0.45
Colombia	100.00	100.00	100.00	0

Sources: Population censuses of the respective years.

Table A-132

Rate of Growth of the Male Agricultural Labour Force and Average Output per Man, by Departments, 1938-1951

(Percentages)

	Annual Average Rate of Growth of Agricultural Labour Force,1938-1951 (1)	Rank (2)	Average Output per man, 1953 (3)	Rank (4)	Male Wage Rate, 1951 (5)	Rank (6)
Antioquia	0.25	(8)	1543	(7)	2.80	(8)
Atlántico	-1.79	(14)	1171	(11)	2.50	(11)
Bolívar (includes Córdoba)	0.45	(6)	2202	(3)	2.60	(10)
Boyacá	-0.90	(13)	1060	(13)	2.40	(12)
Caldas	1.51	(2)	2160	(4)	3.20	(5)
Cauca	0.06	(6)	1769	(5)	2.15	(13)
Cundinamarca	-0.25	(12)	1525	(8)	2.90	(7)
Huila	1.37	(3)	1493	(9)	3.40	(3)
Magdalena (includes Guajira)	0.59	4(5)	2473	(1)	3.20	(5)
Nariño	0.23	(9)	1097	(12)	1.35	(14)
Norte de Santander	0.29	(7)	1385	(10)	3.45	(2)
Santander	0.67	(4)	909	(14)	2.65	(9)
Tolima	-0.08	(11)	2315	(2)	3.75	(1)
Valle	2.88	(1)	1657	(6)	3.30	(4)
Colombia	0.60[a]	n.a.	1647[b]	n.a.	2.85	n.a.

a) Refers to areas not in departments as well as that in departments.

b) Refers to departments only; Meta is not included.

Sources: Colum (1) is from Table A-130, Colum (3) is from Table A- , and Column (5) is from Table

Table A-133

Rural Population Growth Rates (in percentage terms)

by Departments as Indicated by Census Returns

	1938-51	1951-64
Antioquia	0.85	1.57
Atlantico	2.55	3.45
Bolivar	1.98	3.15
Cordoba		
Boyaca	0.30	1.56
Caldas	1.66	0.17
Cauca	0.17	3.15
Cordoba	1.89	4.34
Cundinamarca	0.45	0.76
Choco	0.22	2.65
Huila	2.36	-1.35
Magdalena	1.47	653
Nariño	0.88	1.34
Norte de Santander	-0.27	1.06
Santander	0.42	0.96
Tolima	1.53	-0.47
Valle del Cauca	3.70	-0.57
Total	0.93	1.36

* There are no figures for Meta for 1951 so I have left it out of the total.

Table A-133.1

Net Interregional Population Movements, 1918-38

(thousands and per cent)

Region	Net Change	Percent of Regional Population in 1918
North coast	+48%	+6.0
Gran Antioquia	-5	-0.4
Pacifica coast	+71	+8.5
Tolima-Huila	+9	+1.8
Boyacá-Cundinamarca	-113	-7.7
Santander	-8	-1.2

Source: McGreevey, op. cit., p.200. Original sources were the population censuses of the years in question. Expected population for each region was estimated on the basis of national average survival rates for each cohort. The difference between expected and actual population was then presented as net migration.

Table A-134

Proletarization Ratios in Agriculture, Selected Departments, 1938 and 1951

	Employers	Independent Workers	Paid Workers	Paid Workers/Total
		1951		
Valle	19,541	26,167	104,274	69.52
Magdalena	9,310	42,473	59,112	53.30
Boyacá	40,318	74,018	48,423	29.74
Nariño	15,778	56,664	41,311	36.32
		1938		
Valle	43,450	13,950	62,220	52.01
Magdalena	22,195	7,456	33,747	53.23
Boyacá	76,155	34,571	61,771	35.80
Nariño	48,929	20,270	34,339	33.16

Sources: Population censuses of 1938 and 1951.

TABLE A-135

Annual Agricultural Real Wage Indices by Department, Males
Hot and Cold Regions, 1935-1963

(1963 = 100)

	Antioquia		Atlantico	Bolivar	Boyaca		Caldas	
	Hot Climate	Cold Climate	HC	HC	HC	CC	HC	CC
July 1935	87.2		88.6	80.9	84.0		133.4	
March 1936	78.2		80.0	68.6	68.9		116.8	
October 1937	69.4		74.4	92.4	68.9		130.7	
1938	56.5	75.9	77.1	96.6	77.6	86.7	104.6	104.6
1939	62.8	84.3	62.1	86.1	66.7	74.5	94.5	106.2
1940	74.1	87.1	65.0	94.8	66.2	74.0	144.0	115.1
1941	61.3	82.3	61.5	67.2	89.9	100.4	100.8	129.5
1942	58.0	48.7	58.9	67.5	65.7	73.3	91.8	91.8
1943	50.0	37.2	58.8	69.4	63.6	59.2	71.6	71.6
1944	44.1	56.3	56.4	65.7	64.6	72.2	89.8	74.8
1945	64.9	68.4	63.0	68.7	65.0	61.1	92.0	85.0
1946	59.2	79.4	78.4	85.3	66.2	73.9	89.4	71.6
1947	50.4	67.6	62.0	90.3	83.8	62.3	105.9	105.9
1948	61.2	70.4	84.5	76.3	91.5	79.5	110.0	96.7
1949	65.0	75.9	76.8	87.9	75.8	84.6	113.2	64.6
1950	60.5	69.2	76.8	83.7	84.1	85.4	93.8	88.1
1951	61.8	71.9	77.1	83.2	78.3	80.0	88.2	78.0
1952	76.8	91.0	71.2	83.9	77.5	73.3	103.9	87.6
1953	74.4	86.1	67.1	76.2	74.6	76.4	104.2	88.1
1954	75.9	86.8	66.7	74.2	76.6	79.3	108.5	94.7
1955	80.7	95.3	74.5	82.2	78.7	83.3	115.6	97.1
1956	85.8	86.2	68.6	73.5	79.7	80.4	106.9	91.8
1957	82.1	80.5	56.5	62.2	75.1	73.3	99.0	90.2
1958	83.7	81.2	58.4	68.4	80.0	76.4	100.4	89.9
1959	83.7	83.3	73.4	80.0	86.0	82.4	95.2	88.8
1960	84.9	83.7	79.8	87.5	98.6	101.0	91.1	86.9
1961	86.8	88.6	85.8	94.0	94.9	90.0	93.8	86.6
1962	99.2	98.6	98.3	99.5	104.4	99.8	106.6	98.7
1963	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(continued on following page)

TABLE A-135, continued

	Cauca		Cundinamarca		Huila		Magdalena		Nariño	
	HC	CC	HC	CC	HC	CC	HC	CC	HC	CC
July 1935	105.4		85.4		74.7		85.4		110.6	
March 1936	103.0		65.8		65.4		75.9		81.3	
October 1937	100.0		67.8		84.1		93.6		95.8	
1938	78.3	92.0	70.2	82.6	69.4	69.6	86.8	86.8	75.7	90.2
1939	65.5	83.1	64.4	75.7	63.7	62.7	88.6	78.8	91.8	68.2
1940	77.7	89.5	91.9	108.2	81.9	80.6	78.7	78.8	89.8	80.4
1941	63.1	109.1	80.5	108.6	80.6	79.3	71.5	91.9	80.3	81.9
1942	77.0	73.9	70.5	71.1	68.3	67.2	72.6	54.4	60.5	72.1
1943	62.0	71.4	54.1	63.6	57.4	56.5	51.8	45.3	57.2	68.2
1944	71.8	62.0	69.8	65.8	58.8	57.8	65.7	55.8	70.0	85.4
1945	86.8	79.9	67.7	72.4	62.0	61.0	74.5	65.1	74.7	89.0
1946	75.7	87.1	84.8	99.8	73.4	67.6	82.1	82.1	112.2	93.3
1947	91.6	70.3	90.0	79.4	79.8	78.5	88.7	88.7	86.2	52.5
1948	90.8	86.1	82.7	82.8	90.3	85.4	84.3	91.9	90.5	82.7
1949	107.1	104.8	83.5	93.5	87.0	82.5	96.2	82.0	81.6	82.3
1950	97.3	98.0	84.5	84.8	70.6		89.3		96.4	87.8
1951	83.4	83.5	90.6	86.6	80.1	72.0	93.8	90.9	83.2	76.0
1952	92.5	90.5	84.1	79.3	84.7	79.7	82.9	93.1	80.3	83.9
1953	99.5	92.9	84.9	76.0	82.2	79.7	82.1	92.6	82.6	84.3
1954	90.5	89.5	85.7	74.1	82.5	79.1	86.4	83.8	80.3	83.1
1955	94.4	99.0	95.4	84.5	99.9	89.9	91.4	99.1	82.9	85.8
1956	85.8	90.3	98.9	86.7	90.8	86.4	86.2	87.4	82.6	88.2
1957	73.4	81.9	88.0	83.4	71.8	71.3	66.6	90.0	68.3	71.4
1958	86.1	79.2	90.5	85.7	73.8	70.8	71.5	76.8	71.9	65.8
1959	86.5	88.3	89.1	86.1	86.8	83.4	76.8	76.8	76.1	77.6
1960	88.9	89.2	88.2	82.8	97.8	86.8	86.1	73.6	95.3	84.4
1961	90.5	96.9	93.6	89.4	115.5	100.4	99.0	94.6	86.0	82.0
1962	105.5	101.9	104.5	104.6	120.0	120.5	99.6	113.9	113.1	109.3
1963	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(continued on following page)

TABLE A-136, continued

	North Santander		Santander		Tolima		Valle		National Average	
	HC	CC	HC	CC	HC	CC	HC	CC	HC	CC
July 1935	83.4		85.1		71.1		114.8		104.59	
March 1936	82.5		70.1		68.3		115.0		93.45	
October 1937	108.0		87.4		75.2		118.7		101.48	
1938	65.1	80.2	87.6	82.6	87.5	88.5	128.2	136.7	89.07	93.5
1939	60.3	85.0	80.3	61.8	82.2	66.4	96.2	128.2	79.67	89.3
1940	84.2	103.7	94.4	72.6	74.2	75.1	131.9	112.5	94.87	100.2
1941	77.3	95.2	81.2	95.3	77.3	78.1	103.5	110.3	80.46	107.5
1942	84.2	86.2	77.0	58.1	65.1	57.6	109.6	116.9	77.37	76.0
1943	64.9	69.9	77.0	50.7	56.8	57.4	83.9	89.5	65.32	62.3
1944	63.2	62.2	69.4	54.2	68.5	57.7	82.8	88.3	68.25	68.8
1945	55.2	68.0	78.5	59.7	39.6	60.1	91.0	90.2	70.41	76.1
1946	62.4	76.8	69.5	73.4	45.6	69.3	83.5	89.0	72.67	79.6
1947	86.0	63.4	82.4	72.4	35.3	35.7	99.4	101.0	79.00	81.3
1948	80.4	93.3	91.0	67.9	85.2	82.8	98.2	100.3	85.85	85.9
1949	92.3	96.9	101.7	85.6	91.2	85.9	111.2	110.0	84.39	80.1
1950	77.8	86.4	86.0	69.4	81.3	77.3	86.8		79.3	82.2
1951	86.8	91.6	87.1	67.8	90.3	86.6	92.1	98.2	85.1	79.7
1952	103.5	100.8	92.6	72.4	94.6	92.1	104.7	110.0	87.8	87.7
1953	86.0	101.7	91.9	73.9	99.3	97.1	102.5	114.0	81.9	86.7
1954	83.6	86.9	91.1	70.2	93.2	88.4	98.9	108.2	83.4	85.3
1955	89.1	92.3	101.9	78.1	105.0	106.3	104.2	108.3	90.4	96.5
1956	86.3	88.9	99.4	77.8	96.2	95.4	96.7	98.5	84.1	88.6
1957	79.2	84.6	90.4	72.7	87.3	88.3	92.4	100.2	72.9	81.2
1958	82.1	83.5	74.8	73.9	90.8	82.7	93.0	100.9	79.1	83.9
1959	84.1	79.6	77.0	76.7	92.2	90.6	98.0	102.5	83.2	80.1
1960	94.1	100.2	84.1	88.8	100.9	100.8	105.1	111.2	87.9	94.9
1961	91.0	100.9	86.5	85.4	101.4	91.4	99.2	108.2	90.3	93.8
1962	101.3	108.7	100.5	102.4	106.8	101.1	107.0	108.2	100.6	104.4
1963	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOURCES AND METHODS: Wages "most frequently paid" (a modal concept, I believe) for each department were deflated by the index of prices of 15 commonly consumed foods for the capital of each department. The national average for each of cold and warm regions was derived by averaging the departmental indices with weights proportional to the number of agricultural workers in the respective cold or warm regions of various departments. Wage figures are from the Anuario General Estadistica, food price series from the Revista del Banco de la Republica.

TABLE A-135.2

Annual Agricultural Real Wage Indices by Department, Males and Females Hot and Cold Regions, 1935-1963, Antioquia

(1963 = 100)

	Males				Females			
	Warm Climate		Cool Climate		Warm Climate		Cool Climate	
	Without food	With food	Without food	With food	Without food	With food	Without food	With food
1936								
1937								
1938	0.70	0.50	0.70	0.40	0.50		0.50	
1939	0.70	0.40	0.70	0.50	0.50		0.50	
1940	0.80	0.40	0.70	0.70	0.40		0.40	
1941	0.70	0.50	0.70	0.50	0.50		0.40	
1942	0.80	0.50	0.50	0.40	0.50		0.50	
1943	0.90	0.60	0.50	0.50	0.50		0.60	
1944	1.00	0.60	0.95	0.70	0.80		0.70	
1945	1.40	0.75	1.10	0.85	0.90		0.70	
1946	1.50	1.10	1.50	1.20	1.00		1.00	
1947	1.50	1.00	1.50	1.00	1.00		1.00	
1948	2.10	1.50	1.80	1.30	1.60		1.40	
1949	2.30	0.90	2.00	1.40	1.80		1.80	
1950	2.70	1.80	2.30	1.60	1.80		1.60	
1951	3.00	7.10	2.60	1.80	2.10		1.90	
1952	3.00	1.95	2.65	1.70	2.00		1.85	
1953	3.25	2.10	2.80	1.80	2.20		1.85	
1954	3.70	2.45	3.15	2.15	2.50		2.25	
1955	3.75	2.55	3.30	2.20	2.80		2.35	
1956	3.70	2.55	3.25	2.20	2.95		2.60	
1957	4.20	2.80	3.60	2.40	3.25		2.85	
1958	4.60	3.10	3.90	2.75	3.55		3.25	
1959	4.90	3.30	4.25	2.90	3.90		3.40	
1960	5.40	3.60	4.65	3.20	4.25		3.70	
1961	5.95	3.80	5.30	3.35	4.60		4.10	
1962	6.80	4.65	5.90	3.75				
1963	8.95	5.85	7.80	4.95				
1964								
1965								
1966								
1967								
1968	13.60	8.80	11.70	8.65				
1969	13.75	9.40	12.21	7.85				

BOLIVAR [1]

	HOMBRES				MUJERES			
	Clima caliente		Clima Frío		Clima caliente		Clima frío	
	Sin alimentación	Con alimentación	Sin alimentación	Con alimentación	Sin alimentación	Con alimentación	Sin alimentación	Con alimentación
1936	0							
1937	0							
1938	0.80	0.50			0.50			
1939	0.80	0.50			0.40			
1940	0.80	0.40			0.40			
1941	0.60	0.50			0.30			
1942	0.70	0.40			0.30			
1943	0.80	0.50			0.30			
1944	1.00	0.60			0.60			
1945	1.20	0.80			0.55			
1946	1.50	1.00			0.50			
1947	2.00	1.00			1.00			
1948	1.90	1.20			1.10			
1949	2.10	1.40			1.30			
1950	2.50	1.60			1.40			
1951	2.60	1.60			1.50			
1952	2.60	1.35			1.30			
1953	2.65	1.85			1.35			
1954	2.80	1.80			1.85			
1955	2.90	1.70			1.50			
1956	3.15	1.85			2.00			
1957	3.65	2.00			2.00			
1958	4.05	2.30			2.75			
1959	4.85	2.80			2.85			
1960	5.80	3.50			3.50			
1961	6.96	4.50			3.35			
1962	7.15	4.65						
1963	9.60	5.70						
1964								
1965								
1966								
1967								
1968								

1. Until 1952 Bolivar included what then became the separate department of Cordoba.

BOYACA

	Males				Females	
	Warm Climate		Cool Climate		Warm Climate	Cool Climate
	Without food	With food	Without food	With food	Without food	With food	Without food	With food
1936		0.40	0.10					
1937		0.40	0.15					
1938	0.50	0.20	0.50	0.20	0.30		0.40	
1939	0.50	0.20	0.50	0.20	0.30		0.35	
1940	0.50	0.30*	0.50*	0.20*	0.40		0.35	
1941	0.60	0.40*	0.60*	0.25	0.45		0.30	
1942	0.50	0.20	0.50	0.20	0.30		0.40	
1943	0.60	0.30	0.50	0.20	0.35		0.40	
1944	0.75	0.40	0.75	0.35	0.55		0.50	
1945	0.95	0.55	0.80	0.45	0.60		0.60	
1946	1.00	0.50	1.00	0.30	0.80		0.80	
1947	1.50	0.50	1.00	0.50	1.00		0.80	
1948	1.80	0.90	1.40	0.60	1.30		1.30	
1949	1.60	1.10	1.60	1.00	1.60		1.40	
1950	2.20	0.90	2.00	0.80	1.60		1.30	
1951	2.40	1.00	2.20	0.90	1.60		1.50	
1952	2.30	0.95	1.95	0.80	1.70		1.50	
1953	2.40	0.95	2.20	0.85	1.70		1.65	
1954	2.75	1.30	.255	0.90	2.10		1.80	
1955	2.85	1.30	2.70	1.10	2.00		2.05	
1956	3.10	1.45	2.80	1.20	2.35		2.05	
1957	3.65	1.65	3.20	1.40	2.70		2.35	
1958	4.30	2.00	3.70	1.65	3.30		2.75	
1959	4.70	2.20	4.05	1.70	3.75		3.00	
1960	5.10	2.55	4.70	1.95	4.30		3.65	
1961	5.80	2.75	4.95	2.20	4.75		3.85	
1962	6.75	2.95	5.80	2.55				
1963	8.55	4.00	7.70	3.35				
1964								
1965								
1966								
1967								
1968								
1969								

* The original and erroneous figures here were presented in 1944 and 1945 Annuarios. They are wrong as can be seen by going back to the 1940 Annuarios when the figures are presented on a trimester basis. The subsequent Annuarios took the maximun, rather than "most frequent" figure for these years.

CALDAS

	Males				Females			
	Warm Climate		Cool Climate		Warm Climate		Cool Climate	
	Without food	With food	Without food	With food	Without food	With food	Without food	With food
1936	0.60	0.70	0.60					
1937	0.50	0.80	0.50					
1938	0.80	0.55	0.80	0.55	0.55		0.50	
1939	0.80	0.50	0.90	0.50	0.45		0.60	
1940	1.00	0.50	0.80	0.70	0.50		0.60	
1941	0.70	0.60	0.90	0.50	0.60		0.60	
1942	0.80	0.50	0.80	0.50	0.50		0.50	
1943	0.80	0.60	0.80	0.50	0.50		0.55	
1944	1.20	0.80	1.00	0.70	0.80		0.80	
1945	1.30	1.00	1.20	0.80	0.60		0.65	
1946	1.50	1.00	1.20	1.00	0.80		1.50	
1947	2.00	1.50	2.00	1.00	1.00		1.80	
1948	2.50	1.70	2.20	1.50	1.90		1.70	
1949	2.80	2.10	1.60	1.80	2.20		1.90	
1950	3.20	2.30	3.00	2.00	2.40		2.30	
1951	3.50	2.40	3.10	2.10	2.70		2.60	
1952	3.80	2.60	3.20	2.10	2.75		2.35	
1953	4.20	2.75	3.55	2.25	2.80		2.50	
1954	4.70	3.05	4.10	2.60	3.00		2.30	
1955	4.65	2.90	3.90	2.40	3.00		2.55	
1956	4.65	2.90	4.00	2.45	3.30		3.00	
1957	5.10	3.35	4.60	2.90	3.80		3.50	
1958	5.65	3.70	5.00	3.70	4.30		3.80	
1959	5.85	4.00	5.40	3.70	4.30		3.80	
1960	6.00	4.00	5.65	3.75	4.80		4.35	
1961	6.80	4.50	6.20	4.00	4.70		4.30	
1962	7.65	4.90	7.00	4.65				
1963	9.70	6.80	9.60	6.30				
1964								
1965								
1966								
1967								
1968	14.65	9.85	14.25	9.45				
1969	18.14	11.12	17.33	9.40				

CAUCA

	Males				Females	
	Warm Climate		Cool Climate		Warm Climate	Cool Climate
	Without food	With food	Without food	With food	Without food	With food	Without food	With food
1936		0.50					
1937		0.50					
1938	0.50	0.30	0.50	0.30	0.35	0.30	
1939	0.50	0.30	0.55	0.40	0.35	0.40	
1940	0.50	0.30	0.50	0.45	0.40	0.40	
1941	0.40	0.40	0.60	0.30	0.40	0.40	
1942	0.60	0.30	0.50	0.30	0.40	0.50	
1943	0.60	0.40	0.60	0.40	0.45	0.60	
1944	0.80	0.50	0.60	0.40	0.50	0.50	
1945	1.00	0.55	0.80	0.60	0.55	0.60	
1946	1.00	0.60	1.00	0.60	0.80	0.80	
1947	1.50	0.85	1.00	1.00	0.80	1.00	
1948	1.70	1.50	1.40	0.90	1.30	1.30	
1949	2.00	1.30	1.70	1.10	1.50	1.30	
1950	2.40	1.50	2.10	1.30	1.70	1.30	
1951	2.30	1.40	2.00	1.10	1.70	1.60	
1952	2.35	1.35	2.00	1.20	1.75	1.65	
1953	2.65	1.60	2.15	1.35	1.90	1.80	
1954	2.85	1.70	2.45	1.50	2.05	1.75	
1955	2.80	1.70	2.55	1.60	2.15	1.80	
1956	2.85	1.80	2.60	1.65	2.00	1.85	
1957	3.00	1.85	2.90	1.75	2.25	1.95	
1958	3.70	2.10	2.95	1.80	2.55	2.20	
1959	4.05	2.50	3.60	2.10	3.00	2.65	
1960	4.55	2.45	3.95	2.65	3.15	2.90	
1961	4.95	3.05	4.60	2.80	3.75	3.40	
1962	5.80	3.15	4.85	2.85			
1963	7.50	4.25	6.50	3.90			
1964							
1965							
1966							
1967							
1968	13.15		10.90				
1969	12.61		10.83				

CHOCO

	Males				Females	
	Warm Climate		Cool Climate		Warm Climate	Cool Climate
	Without food	With food	Without food	With food	Without food	With food	Without food	With food
1936						
1937						
1938						
1939						
1940						
1941						
1942						
1943						
1944	1.00	0.60			0,80	
1945	1.50	1.00			(1.00)	
1946	1.50	1.00	1.30	1.20	(1.00)	
1947						
1948	2.70	2.00		1.20	3.00	
1949	2.50	1.60			2.40	
1950	2.90	1.90			2.10	
1951	2.60	1.80	3.00	2.10	2.00	
1952	2.75	1.70	3.00	1,25	1.90	
1953	2.80	1.85	3.50	2.00	1.95	
1954	2.85	1.90	4.00	2.85	2.20	
1955	2.95	2.00	4.00	2.75	2.00	
1956	3.65	2.15	4.20	2.50	2.65	
1957	4.50	2.50	5.00	2.50	2.70	
1958	4.60	2.75	4.75	3.50	2.90	
1959	4.90	2.85	5.00	2.75	3.60	
1960	5.00	3.45	5.00	3.20	4.05	
1961	5.80	3.70	6.00	3.35		
1962	6.00	3.80	5.50	3.00		
1963	7.70	5.70	8.00	4.80		
1964						
1965						
1966						
1967						
1968						

CUNDINAMARCA

	Males				Females	
	Warm Climate		Cool Climate		Warm Climate	Cool Climate
	Without food	With food	Without food	With food	Without food	With food	Without food	With food
1936		0.50						
1937		0.50						
1938	0.60	.30	0.60	0.30	0.40		0.40	
1939	0.60	0.40	0.60	0.30	0.45		0.40	
1940	0.80	0.40	0.80	0.60	0.50		0.40	
1941	0.70	0.35	0.90	0.35	0.50		0.40	
1942	0.70	0.35	0.60	0.25	0.40		0.40	
1943	0.60	0.40	0.60	0.40	0.50		0.40	
1944	1.00	0.70	0.80	0.50	0.65		0.60	
1945	1.10	0.80	1.00	0.70	0.80		0.75	
1946	1.50	1.00	1.50	0.60	1.20		1.00	
1947	2.00	1.00	1.50	1.00	1.00		1.00	
1948	2.00	0.90	1.70	0.90	1.50		1.30	
1949	2.10	1.30	2.00	1.10	1.70		1.50	
1950	2.70	1.60	2.30	1.30	2.00		1.80	
1951	3.20	1.70	2.60	1.40	2.60		2.20	
1952	3.00	1.50	2.40	1.30	2.20		1.85	
1953	3.35	1.65	2.55	1.40	2.40		1.90	
1954	3.95	2.15	2.90	1.65	2.75		2.25	
1955	4.10	2.15	3.25	1.80	2.80		2.45	
1956	4.50	2.20	3.35	1.90	2.95		2.55	
1957	4.85	2.50	3.90	2.00	3.50		2.90	
1958	5.60	2.80	4.50	2.15	3.90		3.40	
1959	5.80	2.90	4.75	2.65	4.55		3.75	
1960	6.60	3.35	5.25	2.90	4.75		4.10	
1961	7.15	3.55	5.80	3.00	4.80		4.65	
1962	7.70	3.85	6.55	3.55				
1963	9.90	5.90	8.40	4.65				
1964								
1965								
1966								
1967								
1968	19.10		14.50					
1969	19.88		17.22					

HUILA

	Males				Females	
	Warm Climate		Cool Climate		Warm Climate	Cool Climate
	Without food	With food	Without food	With food	Without food / With food	Without food / With food
1936	0.30	0.60				
1937	0.30	0.80				
1938	0.70	0.35	0.70	0.35	0.40	0.40
1939	0.70	0.40	0.70	0.30	0.30	0.35
1940	0.80	0.40	0.80	0.70	0.40	0.40
1941	0.80	0.40	0.80	0.40	0.40	0.40
1942	0.80	0.40	0.80	0.40	0.50	0.50
1943	0.80	0.60	0.80	0.60	0.50	0.45
1944	1.00	0.60	1.00	0.60	0.60	0.60
1945	1.20	0.70	1.20	0.70	0.80	0.70
1946	1.60	1.00	1.50	0.80	1.00	1.10
1947	2.00	1.00	2.00	1.25	1.00	0.80
1948	2.60	1.60	2.50	1.60	1.50	1.50
1949	2.90	1.70	2.80	1.70	1.60	1.60
1950	3.00	1.70			1.90	
1951	3.50	2.00	3.20	1.90	2.30	2.30
1952	3.40	1.75	3.25	1.75	1.95	2.00
1953	3.65	1.85	3.60	1.80	2.15	2.20
1954	4.00	2.10	3.90	2.00	2.60	2.65
1955	4.65	2.45	4.25	2.55	2.85	2.80
1956	4.65	2.45	4.50	2.65	2.80	2.75
1957	4.85	2.75	4.90	2.85	3.30	3.00
1958	5.70	2.95	5.55	3.10	3.60	3.50
1959	6.70	3.90	6.55	3.85	3.90	3.75
1960	7.70	4.55	6.95	3.95	4.80	4.65
1961	9.25	4.85	8.15	4.85	5.70	5.70
1962	9.65	5.70	9.85	6.00		
1963	11.80	7.40	12.00	7.75		
1964						
1965						
1966						
1967						
1968	19.40		19.40			
1969	19.57		19.84			

MAGDALENA

	Males				Females	
	Warm Climate		Cool Climate		Warm Climate	Cool Climate
	Without food	With food	Without food	With food	Without food / With food	Without food / With food
1936		0.60				
1937		0.80				
1938	0.80	0.50	0.80		0.40	0.40
1939	0.90	0.50	0.80		0.40	0.50
1940	0.80	0.50	0.80		0.40	0.35
1941	0.70	0.60	0.90		0.40	0.40
1942	0.80	0.50	0.60		0.35	0.30
1943	0.80	0.50	0.70	0.40	0.40	0.35
1944	1.00	0.65	0.85	0.50	0.45	0.50
1945	1.20	0.90	1.05	0.86	0.60	0.60
1946	1.50	1.00	1.50	1.00	1.20	1.10
1947	2.00	1.00	2.00	1.50	1.10	1.50
1948	2.20	1.60	2.40	1.20	1.50	1.30
1949	2.70	1.80	2.30	1.50	1.60	1.10
1950	2.90	2.00			3.00	
1951	3.20	2.10	3.10	2.00	1.80	1.90
1952	2.85	1.75	3.20	1.90	1.65	2.00
1953	3.10	1.95	3.50	1.85	1.65	1.80
1954	3.45	2.10	3.35	1.90	1.85	2.10
1955	3.55	2.20	3.85	2.00	1.85	2.85
1956	3.70	2.30	3.75	2.20	1.85	2.60
1957	3.70	2.30	5.00	2.60	2.00	3.00
1958	4.55	2.45	5.00	2.95	2.65	3.65
1959	5.00	2.95	5.00	4.00	3.10	4.00
1960	5.85	3.80	5.00	3.25	3.80	4.50
1961	7.60	4.65	7.25	4.95	4.55	4.75
1962	7.75	4.75	8.85	5.85		
1963	9.85	6.50	9.85	6.80		
1964						
1965						
1966						
1967						
1968	17.30		17.00			
1969	19.43		22.50			

NARIÑO

	Males				Females			
	Warm Climate		Cool Climate		Warm Climate		Cool Climate	
	Without food	With food	Without food	With food	Without food	With food	Without food	With food
1936		0.25						
1937		0.30						
1938	0.30	0.20	0.30	0.20	0.30		0.30	
1939	0.40	0.20	0.25	0.20	0.25		0.20	
1940	0.40	0.20	0.30	0.30	0.20		0.20	
1941	0.35	0.30	0.30	0.25	0.20		0.20	
1942	0.30	0.20	0.30	0.20	0.20		0.20	
1943	0.35	0.25	0.35	0.25	0.25		0.20	
1944	0.50	0.30	0.50	0.25	0.35		0.30	
1945	0.60	0.45	0.60	0.30	0.80		0.25	
1946	1.00	0.50	0.70	0.40	1.20		0.70	
1947	1.00	0.50	0.50	0.40	1.00		0.40	
1948	1.30	0.80	1.00	0.70	0.90		0.80	
1949	1.30	0.80	1.10	0.70	0.90		0.80	
1950	1.70	0.90	1.30	0.70	0.90		0.80	
1951	1.70	1.00	1.30	0.80	1.10		0.90	
1952	1.55	0.90	1.30	0.75	0.95		0.80	
1953	1.75	0.95	1.50	0.80	1.10		0.85	
1954	1.90	1.10	1.65	1.85	1.15		0.95	
1955	1.90	1.10	1.65	0.85	1.25		0.95	
1956	1.95	1.15	1.75	0.90	1.20		1.10	
1957	2.11	1.20	1.85	0.95	1.45		1.25	
1958	2.55	1.35	1.95	1.10	1.65		1.40	
1959	2.75	1.60	2.35	1.30	1.90		1.60	
1960	3.55	2.15	2.65	1.50	2.55		1.80	
1961	3.70	2.20	2.95	1.70	2.60		1.85	
1962	4.55	2.60	3.70	1.95				
1963	5.60	2.95	4.70	2.65				
1964								
1965								
1966								
1967								
1968	9.10	5.40	7.70	4.55				
1969	9.61	5.32	9.14	4.92				

NORTE DE SANTANDER

	Males				Females	
	Warm Climate		Cool Climate		Warm Climate	Cool Climate
	Without food	With food	Without food	With food	Without food	With food	Without food	With food
1936		0.60						
1937		0.80						
1938	0.60	0.40	0.60	0.40	0.50		0.50	
1939	0.70	0.45	0.80	0.45	0.30		0.50	
1940	0.80	0.30	0.80	0.70	0.50		0.50	
1941	0.70	0.40	0.70	0.40	0.50		0.50	
1942	0.80	0.40	0.70	0.40	0.50		0.50	
1943	0.80	0.40	0.70	0.30	0.50		0.50	
1944	1.00	0.60	0.80	0.45	0.60		0.60	
1945	1.00	0.60	1.00	0.50	0.80		0.70	
1946	1.20	0.70	1.20	0.60	1.00		1.00	
1947	2.00	1.00	1.20	0.80	1.00		1.00	
1948	2.40	1.40	2.10	1.10	1.60		1.40	
1949	2.70	1.50	2.30	1.10	1.80		1.60	
1950	3.00	1.70	2.70	1.50	2.10		1.90	
1951	3.50	1.90	3.00	1.60	2.40		2.00	
1952	3.60	1.85	2.85	1.55	2.60		2.00	
1953	3.70	1.90	3.55	1.60	2.50		1.90	
1954	3.85	2.00	3.25	1.55	2.75		1.90	
1955	4.05	2.15	3.40	1.55	2.80		2.15	
1956	4.00	2.10	3.35	1.60	2.85		2.20	
1957	4.80	2.30	4.15	1.90	3.50		3.10	
1958	5.70	2.85	4.70	2.20	4.25		3.55	
1959	6.00	3.25	5.05	2.55	4.60		3.75	
1960	6.65	3.55	5.75	2.85	4.70		3.95	
1961	6.95	3.80	6.25	2.00	5.05		4.30	
1962	7.60	3,95	6.60	3.20				
1963	9.55	4.75	7.75	4.00				
1964								
1965								
1966								
1967								
1968	17.75		14.90					
1969	19.15		17.36					

TOLIMA

	Males				Females	
	Warm Climate		Cool Climate		Warm Climate	Cool Climate
	Without food	With food	Without food	With food	Without food / With food	Without food / With food
1936		0.80				
1937		0.80				
1938	1.00	0.50	1.00	0.50	0.50	0.50
1939	1.00	0.60	0.80	0.50	0.35	0.50
1940	0.80	0.40	0.80	0.40	0.50	0.40
1941	0.80	0.50	0.80	0.60	0.40	0.40
1942	0.80	0.50	0.70	0.50	0.50	0.50
1943	0.80	0.50	0.80	0.50	0.50	0.50
1944	1.20	0.80	1.00	0.60	0.70	0.70
1945	1.20	0.80	1.20	0.80	0.90	0.90
1946	2.00	1.00	1.50	1.00	1.20	1.00
1947	2.00	1.80	2.00	1.00	1.50	1.00
1948	2.60	1.50	2.50	1.40	1.80	1.80
1949	2.90	1.80	2.70	1.60	1.90	1.80
1950	3.30	2.10	3.10	1.90	2.20	2.10
1951	3.80	2.30	3.60	2.10	2.40	2.40
1952	3.85	2.25	3.70	2.20	2.45	2.65
1953	4.40	2.45	4.25	2.50	2.20	2.75
1954	4.80	2.70	4.50	2.65	2.90	2.80
1955	4.80	2.70	4.80	2.65	3.30	3.20
1956	4.90	2.80	4.80	2.60	3.25	3.65
1957	5.50	2.95	5.50	2.90	3.85	3.90
1958	6.50	3.65	5.85	3.70	4.65	4.80
1959	6.90	3.85	6.70	3.95	5.00	4.95
1960	7.80	4.55	7.70	4.50	5.75	6.05
1961	8.85	4.91	7.90	4.70	6.35	5.40
1962	9.20	5.75	8.60	4.85		
1963	11.80	6.96	11.65	6.70		
1964						
1965						
1966						
1967						
1968	19.85		19.80			
1969	23.00		16.56			

SANTANDER

	Males				Females	
	Warm Climate		Cool Climate		Warm Climate	Cool Climate
	Without food	With food	Without food	With food	Without food / With food	Without food / With food
1936		0.50		0,22		
1937		0.60		0,30		
1938	0.70	0.30	0.75	0.35	0.40	0.40
1939	0.80	0.35	0.70	0.60	0.40	0.45
1940	0.80	0.30	0.70	0.40	0.50	0.40
1941	0.60	0.40	0.80	0.40	0.50	0.45
1942	0.70	0.30	0.60	0.40	0.50	0.40
1943	0.80	0.40	0.60	0.30	0.50	0.50
1944	0.90	0.50	0.80	0.45	0.65	0.55
1945	1.10	0.65	0.95	0.55	0.70	0.70
1946	1.00	0.50	1.20	0.50	1.00	1.00
1947	1.50	0.70	1.50	0.50	1.00	1.00
1948	2.00	1.00	1.70	0.80	1.40	1.20
1949	2.30	1.20	2.20	1.00	1.60	1.40
1950	2.40	1.20	2.20	1.10	1.70	0.70
1951	2.70	1.30	2.40	1.10	1.90	1.70
1952	2.70	1.25	2.40	1.00	1.90	1 75
1953	2.90	1.30	2.65	1.20	2.10	1.85
1954	3.20	1.45	2.80	1.30	2.25	1.95
1955	3.50	1.70	3.05	1.40	2.40	2.15
1956	3.60	1.75	3.20	1.40	2.40	2.15
1957	4.00	2.00	3.70	1.60	2.90	2.70
1958	4.65	2.30	4.15	1.80	3.60	3.05
1959	5.25	2.55	4.70	2.05	3.75	3.30
1960	5.95	2.90	5.65	2.55	4.35	4.00
1961	6.75	3.15	6.00	2.85	4.85	4.65
1962	7.35	3.55	6.75	3.00		
1963	9.60	4.75	8.65	4.00		
1964						
1965						
1966						
1967						
1968	17.45		15.00			
1969	19.48		16.68			

VALLE DEL CAUCA

	Males				Females	
	Warm Climate		Cool Climate		Warm Climate	Cool Climate
	Without food	With food	Without food	With food	Without food / With food	Without food / With food
1936		0.80		0.50		
1937		0.80		0.50		
1938	1.00	0.50	1.00	0.50	0.70	0.70
1939	0.80	0.50	1.00	0.50	0.40	0.55
1940	1.00	0.50	0.80	0.70	0.65	0.60
1941	0.80	0.60	0.80	0.60	0.60	0.60
1942	1.00	0.50	1.00	0.50	0.60	0.70
1943	1.00	0.60	1.00	0.60	0.60	0.60
1944	1.20	0.80	1.20	0.60	0.80	0.85
1945	1.40	1.00	1.30	0.90	1.10	1.00
1946	1.50	1.00	1.50	1.00	1.20	1.00
1947	2.10	1.20	2.00	1.00	1.50	1.35
1948	2.40	1.40	2.30	1.50	1.80	1.80
1949	2.70	1.80	2.50	1.70	2.00	1.60
1950	2.90	1.80			2.30	
1951	3.30	2.00	3.30	2.00	2.60	2.50
1952	3.35	1.95	3.30	2.00	2.35	2.45
1953	3.50	2.20	3.65	2.30	2.50	2.65
1954	3.90	2.35	4.00	2.65	2.50	2.70
1955	3.95	2.55	3.85	2.55	2.65	2.70
1956	4.10	2.60	3.90	2.50	2.75	2.80
1957	4.60	2.90	4.65	2.75	3.60	3.35
1958	5.00	3.15	5.05	3.00	3.85	4.05
1959	5.80	3.55	5.65	3.55	4.65	4.45
1960	6.60	3.80	6.50	3.80	4.95	4.95
1961	6.90	4.15	7.00	4.30	3.10	5.85
1962	7.65	4.50	7.20	4.55		
1963	9.60	6.00	8.95	6.60		
1964						
1965						
1966						
1967						
1968	14.95		14.80			
1969	17.22		16.56			

Table A-135a

Real Wages of Male Agricultural Workers, By Department: 1963=100

Year	Antioquia		Atlantico		Bolivar		Boyaca		Caldas		Cauca		Cundinamarca		Cordoba		Huila		Magdalena		Narino		Norte de Santander		Santander		Valle		Nacional	
	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.F.	C.C.	C.I
	Medellin		Barran.		Barran.		Bogota		Manizales		Pasto		Bogota		Barran.				Barran.		Pasto		Bucar.		Bucar.		Cali			
1937																														
1938	775	843																												
1939	738	870											57.7	67.7																
1940	901	929											55.3	64.9																
1941	794	935											76.1	89.3																
1942	805	622											67.5	101.9																
1943	813	532											62.1	62.5																
1944	804	899											45.9	53.9																
1945	968	896											63.7	59.8																
1946	901	1106.1	76.4										62.9	67.1																
1947	771	908											78.5	92.2																
1948	897	907											88.5	78.0																
1949	926	947											76.0	88.3																
1950	871	875											74.8	83.7																
1951	867	887	76.8										79.8	80.0											873	927				
1952	908	945	66.2										86.9	82.8											817	831				
1953	929	942	67.1										83.4	78.3											786	776				
1954	90.2	88.1	66.7				75.5	77.7					86.7	77.4											804	797				
1955	99.4	100.6	69.5	-	71.6	-	78.3	82.3			87.0	91.4	93.8	81.2											811	817				
1956	92.9	93.3	68.8	-	73.3	-	83.5	83.5	107.1	92.9	83.5	87.8	97.4	91.0	82.0	-											78.6	76.3	0.0	109.0	845	835
1957	90.8	89.5	61.0	-	70.9	-	81.6	79.3	100.0	100.0	75.8	89.6	104.8	91.9	80.2	-			85.3	92.5	79.2	81.7	100.0	103.7	86.0	83.1	93.9	98.1	882	906
1958	87.3	84.6	64.3	-	71.4	-	83.8	79.9	96.9	86.7	81.4	72.0	93.6	88.8	70.6	-			83.9	85.1	76.7	81.7	95.1	98.2	85.0	83.9	83.5	85.0	858	872
1959	85.5	84.9	78.5	-	79.3	-	84.9	81.1	92.9	86.7	83.2	85.3	94.3	89.4	80.8	-			70.0	94.7	71.7	74.3	98.8	105.5	81.8	83.9	80.7	60.2	789	843
1960	88.9	87.6	82.3	-	90.1	-	89.3	91.2	89.6	85.0	88.8	88.9	90.7	87.4	94.4	-			78.1	85.8	75.4	68.3	100.5	102.4	81.6	80.7	81.4	88.3	828	846
1961	89.7	91.5	91.3	-	99.3	-	91.5	86.6	93.4	86.0	87.0	93.2	99.7	93.6	93.5	-			79.6	79.6	75.8	77.2	95.6	99.4	83.3	82.6	90.1	94.0	843	857
1962	97.1	96.4	100.0	-	97.5	-	105.5	108.6	100.2	92.6	100.0	96.4	97.6	93.3	101.0	-			88.5	75.5	92.9	82.7	99.0	105.5	88.0	92.6	97.5	103.0	889	872
1963	100.0	100.	100.0	-	100.0	-	100.0	100.0	100.0	100.0	100.0	100.	104.0	104.2	98.5	-			105.5	100.7	87.1	82.7	91.9	101.8	88.7	87.5	98.0	106.5	931	928
							100.0	100.0	100.0	100.0	100.0	100.	100.0	100.0	100.0	-			102.9	117.5	105.4	102.0	96.8	107.6	93.1	94.8	84.0	84.5	98.0	97.0
																			100.	100.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100

City whose Cost of Living Series was used to Deflate Nominal Wages

A-135b

Real Wage Index, Male Agricultural workers, Colombia, warm and cool zones, 1953-65
(Deflation by the national blue collar cost of living series)

Year	Real Wage Index, 1963 = 100		National Price Index of 15 Articles of Prime Necessity	National Blue Collar Cost of Living Index
	Warm Zone (1)	Cool Zone (2)	(3)	(4)
1953	81.0	86.4	110	
1954	82.6	85.1	122	99.9
1955	89.8	96.3	117	100.1
1956	84.4	89.4	128	105.6
1957	72.5	80.9	161	124.0
1958	78.4	83.5	177	140.4
1959	82.5	87.5	185	151.9
1960	86.8	89.3	195	160.5
1961	89.9	92.9	216	174.1
1962	101.4	107.4	213	181.6
1963	100.0	100.0	280	231.1
1964	87.0	91.6	369	272.1
1965	94.0	98.8	376	291.3

Sources: As for Table A-135

Table A-135c

Male Wages Without Food/Wages With Food, by Department,

1938-40 and 1961-63

		Warm Zone	Cold Zone
Antioquia	1938-40	1.69	1.50
	1961-63	1.45	1.58
Atlantico		1.31	
		1.28	
Bolivar		1.71	
		1.59	
Boyaca		2.5	
		2.18	2.28
Caldas		1.68	1.43
		1.49	1.53
Cauca		1.67	1.35
		1.75	1.67
Cundinamarca		1.82	1.67
		1.86	1.85
Huila		1.91	1.63
		1.71	1.61
Magdalena		1.67	
		1.59	
Nariño		1.85	1.21
		1.78	2.15
Norte de Santander		1.83	1.45
		2.10	2.24
Santander		2.42	1.59
		2.09	2.17
Tolima		1.87	1.86
		1.69	1.67
Valle del Cauca		1.87	1.65
		1.65	1.51
Colombia	1938-40		
	1961-63		

Sources and Methodology:

The sources are the same as for Table A-135. Three year averages are used to assure that the ratios are not too affected by short term fluctuations or random error.

TABLE A-135d

Purchasing Power in Alternative Wage-Goods of One Year's Labour in Agriculture, 1727 - 1962
(kilos)

	1727	1768	1791	1848	1892	1962
Corn	3,823	2,516	2,156	3,125	1,168	1,929
Meat	1,917	1,006	1,006	833	416	304
Flour	1,333	1,312	1,565	694	463	868
Potatoes	5,110	4,472	5,030	3,125	1,786	2,713

Source: McGreevey, op. cit., p. 132; the original sources which he cites are Luis Ospina Vasquez, Industria y proteccion, p. 429. Figures for 1962 based on DANE, Anuario general de estadistica, 1962 (Bogota 1964), pp. 700-16. The 1962 figures are not necessarily comparable with those for earlier years.

TABLE A-136a

Housing Services in Rural Areas[a], By Department, 1938

Department	Number of Buildings (1)	Dwelt in Houses[b] (2)	Other Uses (3)	Number with Aqueduct (4)	Number with Lights (5)	Number with Alcantarillado (6)	Percent with Aqueduct (7)	Percent with Lights (8)	Percent with Alcantarillado (9)	Percent with Nothing (10)
Antioquia	165,292	148,562	15,180	5,691	10,756	3,580	3.44-3.79	6.51-7.17	2.17-2.38	92.31
Atlantico	6,165	5,770	327	-	17	-	-	.28-.29	-	99.72
Bolivar	88,140	83,259	4,406	445	629	82	.50-.53	.71-.75	.09-.10	99.12
Boyaca	155,514	142,144	12,890	26	135	31	.02	.09	.02	99.90
Caldas	85,673	77,829	7,045	2,618	4,851	1,002	3.06-3.33	5.66-6.17	1.17-1.27	92.22
Cauca	66,434	57,090	8,912	190	646	120	.29-.33	.97-1.12	.18-.21	98.94
Cundinamarca	143,482	133,142	9,431	1,566	2,317	731	1.09-1.17	1.61-1.73	.51-.55	98.02
Huila	27,344	25,531	1,675	83	76	6	.30-.32	.28-.30	.02	99.47
Magdalena	40,122	36,205	3,623	71	709	59	.18-.19	1.77-1.94	.15-.16	98.15
Nariño	79,759	71,227	8,044	202	256	17	.25-.28	.32-.36	.02	99.44
Norte de Santander	44,152	41,230	2,586	368	852	78	.83-.89	1.93-2.05	.18-.19	97.43
Santander	93,186	84,214	8,336	2,020	2,104	280	2.17-2.38	2.26-2.48	.30-.33	96.81
Tolima	73,940	69,202	4,122	1,275	1,099	176	1.72-1.83	1.49-1.57	.24-.25	97.52
Valle del Cauca	64,811	59,945	4,065	1,031	1,566	185	1.59-1.70	2.42-2.58	.29-.30	96.61
Intend. & Com.	42,377	39,364	2,674	128	327	81	.30-.32	.77-.82	.19-.20	99.13
Total	1,176,391	1,074,714	93,316	15,714	26,340	6,428	1.34-1.45	2.24-2.43	.55-.59	97.13

[a] "Caserios y corregimientos."

[b] Excludes buildings used for other purposes than dwelling and unoccupied houses.

Source: Controlaría General de la Republica, Dirección Naciónal de Estadística, *Censo de Colombia 1938, Tomo XVI, Resumen*, Bogota: Imprenta Nacional, 1942. Columns (7) - (9) present a lower estimate, based on the division of Col (4)-(6) by Col. (2). The implicit assumption is that only dwelt-in houses have the services in question—an assumption tending to bias the ratios upwards. But there are other downward biases, in particular the fact that multi-dwelling buildings probably have the services more frequently than do other buildings. The upper figure tries, impressionistically, to take this factor into account.

Table A-136b

Some Aspects of Housing Conditions in Rural Areas, By Department - 1964

	Antioquia	Atlantico	Bolivar	Boyaca	Caldas	Cauca	Cordoba	Bogota	Cundinamarca
I. % of Dwelling Units:									
a) With running water	29.8	12.6	8.0	8.9	10.1	6.8	6.7	23.2	17.5
b) Indoors	17.7	6.5	4.7	4.4	6.4	2.3	2.8	15.5	8.7
II. % of Dwelling Units with electric lights	10.5	12.6	5.3	2.9	4.3	3.2	2.9	15.5	5.5
III. % of Dwelling Units with sanitary facilities:									
a) Toilet	11.4	5.8	3.4	2.2	5.3	1.9	2.6	15.2	6.9
b) Latrine	10.6	26.8	13.0	4.5	2.2	11.7	8.5	20.8	5.6
c) Total	22.0	32.6	16.4	6.7	7.5	13.6	11.1	36.0	12.5
IV. % of Dwelling Units with baths	11.1	8.4	4.1	2.3	5.1	2.0	3.7	14.9	7.0

	Cundinamarca and Bogota	Choco	Huila	Magdalena	Meta	Narino	Norte de Santander	Santander	Tolima	Valle del Cauca	Bolivar and Cordoba
I. % of Dwelling Units:											
a) With running water	17.7	2.9	7.1	10.7	13.6	6.0	21.6	14.6	12.0	13.8	7.4
b) Indoors	8.9	1.7	3.4	5.2	5.4	1.6	8.8	7.1	4.9	7.4	3.8
II. % of Dwelling Units with electric lights	5.8	2.6	2.5	7.7	3.0	3.3	5.9	6.7	3.6	9.0	4.2
III. % of Dwelling Units with sanitary facilities:											
a) Toilet	7.1	1.2	2.5	4.3	4.0	1.2	5.3	4.1	3.6	7.1	3.1
b) Latrine	6.1	1.7	6.9	15.5	9.3	15.2	7.2	10.1	10.0	12.1	10.9
c) Total	13.2	2.9	9.4	19.8	13.3	16.4	12.5	14.2	13.6	19.2	14.0
IV. % of Dwelling Units with baths	7.3	1.2	2.6	5.8	4.2	1.3	5.5	4.4	4.0	7.3	3.9

Sources: The departmental volumes of the 1964 Housing Census (taken with the population census).

TABLE A-137a

Rural Dwellings, by Principal Material Used in Floors, Walls, and Roofs: By Departments, 1951

(Percentages)
1951

	Antioquia	Atlantico	Bolivar	Boyaca	Caldas	Cauca	Cundinamarca	Choco	Huila	Magdalena	Meta	Nariño	Norte de Santander	Santander	Tolima	Valle del Cauca
Floors																
Wood	39.6	0.8	0.7	4.0	79.2	13.7	17.0	44.5	18.3	2.7	13.4	14.8	3.6	7.0	32.7	52.6
Cement or Tile	5.2	26.3	3.1	0.9	1.8	2.1	4.9	0.2	5.6	7.3	10.9	0.4	4.3	2.6	7.4	3.7
Brick	2.3	0.7	0.0	0.7	0.2	4.4	2.2	0.1	3.2	1.0	0.0	3.5	10.1	3.9	0.8	3.6
Earth	52.2	71.9	95.9	94.1	15.6	73.4	75.4	2.8	72.5	88.7	75.6	68.1	81.4	86.3	58.8	35.8
Other	0.7	0.2	0.3	0.3	3.2	6.3	0.5	52.4	0.4	0.3	1.0	13.2	0.6	0.2	0.1	4.3
Walls																
Brick	2.1	7.3	0.3	0.4	0.8	1.7	5.1	0.0	0.7	2.2	0.9	0.2	0.7	0.6	0.8	3.3
Cement Block	0.4	1.3	0.3	0.1	0.7	0.1	0.4	0.0	0.1	0.5	5.7	0.0	0.1	0.1	0.8	0.4
Adobe and Bahareque	80.5	70.4	76.3	86.7	66.8	75.6	82.0	3.3	85.4	66.0	42.1	75.5	94.1	76.0	71.3	73.8
Wood	15.0	15.9	9.9	7.3	26.7	11.6	8.5	17.3	9.8	24.1	35.1	10.2	4.2	21.2	22.9	16.1
Other	2.1	5.1	13.2	5.5	5.0	10.9	4.0	79.3	3.9	7.2	16.1	14.0	0.9	2.1	4.1	6.4
Roofs																
Earthen Tile	56.1	1.8	0.2	24.2	65.1	22.3	12.8	2.5	12.4	1.3	1.6	21.9	19.2	32.4	3.0	45.8
Cement or Asbestos	0.9	12.8	0.6	0.5	1.0	0.5	3.4	0.2	0.7	2.5	7.2	0.5	1.5	0.9	1.8	0.9
Metalic Tile	3.6	6.3	1.5	1.0	4.0	2.1	20.9	6.5	5.1	5.1	16.7	0.7	3.3	2.5	19.4	5.8
Straw and similar	33.6	77.7	95.2	73.0	16.3	71.0	60.6	84.1	70.4	89.8	44.5	75.1	72.0	62.9	65.9	34.3
Other	5.8	1.3	2.5	1.3	13.5	4.1	2.3	6.7	11.4	1.3	30.0	1.8	4.0	1.3	9.8	13.2

Source: The 1951 departmental housing census volumes.

Table A-137b

Principal Materials Used in Floors, Walls, and Roofs of Rural Dwellings, By Department, 1964

	Antioquia	Atlantico	Bolivar	Boyaca	Caldas	Cauca	Cordoba	Cundinamarca	Bogota	Choco	Huila	Magdalena	Meta	Narino	Norte de Santander	Santander	Tolima	Valle del Cauca
Floors																		
Wood	29.4	0.6	0.3	9.8	79.2	13.5	0.2	24.6	46.7	54.5	25.5	2.4	10.9	32.6	3.5	11.0	25.6	56.5
Tile	3.0	2.4	1.3	0.6	1.7	2.8	0.6	2.5	2.9	0.0	0.6	1.2	1.3	0.8	2.2	1.3	0.6	6.8
Cement	22.5	44.2	9.5	5.9	7.3	8.0	9.3	12.8	6.0	1.3	17.4	21.9	19.4	2.2	22.1	12.9	33.2	9.3
Brick	1.0	0.9	0.0	0.4	0.0	2.7	0.0	0.9	2.9	0.0	2.0	0.5	0.0	4.2	6.6	2.3	0.5	1.6
Earth	43.6	51.9	88.9	83.2	11.0	67.7	89.7	59.1	39.4	4.7	54.3	73.7	67.4	56.6	65.1	71.3	39.9	24.8
Synthetic Materials	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Other	0.5	0.0	0.0	0.1	0.6	5.3	0.0	0.0	2.1	39.4	0.2	0.3	1.0	3.6	0.4	0.2	0.1	0.6
Walls																		
Brick	1.9	21.8	1.4	4.4	2.3	5.4	0.3	12.5	57.3	0.0	2.4	6.2	0.9	1.3	3.9	4.1	3.1	13.0
Cement Block	1.5	6.0	2.9	0.8	4.2	0.6	2.2	4.4	2.8	0.4	1.0	4.0	16.6	0.5	1.7	2.2	5.9	0.8
Adobe	9.6	1.6	0.8	38.6	2.2	6.8	0.2	24.7	11.4	0.0	1.0	2.9	4.5	6.2	2.4	12.3	0.9	3.4
Pressed Earth	31.1	4.6	0.5	14.0	1.2	7.0	0.1	3.8	1.0	0.5	1.1	3.5	0.4	21.7	32.0	36.3	1.2	0.5
Wood	18.9	17.0	21.1	9.8	16.5	9.2	28.6	9.7	3.5	26.8	10.8	29.6	40.3	22.3	5.7	17.1	19.6	13.6
Bahareque	35.3	47.8	69.1	28.2	72.6	63.3	64.2	42.7	21.1	2.5	82.6	52.5	25.6	44.2	53.2	27.1	68.3	67.5
Waste Materials	0.2	0.0	0.6	0.1	0.1	0.2	0.5	0.1	1.3	2.3	0.2	0.3	1.0	0.1	0.0	0.0	0.0	0.2
Other	1.5	1.2	3.6	4.1	0.9	7.5	3.8	2.1	1.6	67.3	0.9	1.0	10.7	3.4	1.0	0.9	1.0	0.9
Roofs																		
Earthen Tile	55.7	11.9	1.2	38.0	72.8	36.6	0.2	15.2	26.8	2.0	20.9	6.3	0.7	35.0	19.8	42.1	2.8	62.6
Asbestos-Cement Tile	2.0	19.8	2.3	6.2	3.3	1.4	0.6	9.9	25.0	0.3	0.7	6.9	4.6	0.8	3.8	6.1	2.2	3.6
Metallic Tile	10.9	8.6	5.5	12.2	10.9	8.0	2.7	47.3	31.0	7.4	30.9	15.5	48.3	2.3	26.4	12.7	53.2	12.9
Cement Plate[b]	0.3	0.2	0.1	0.2	0.0	0.0	0.0	0.1	1.6	0.0	0.0	0.4	0.0	0.0	0.0	0.2	0.2	0.2
Straw and Similar	25.9	58.1	90.0	41.6	6.7	48.2	95.4	25.7	11.6	85.5	38.0	68.0	36.0	59.7	42.8	36.8	37.8	16.5
Pieces of Wood[a]	4.8	0.3	0.4	1.3	5.4	2.3	0.9	0.9	0.2	1.6	7.9	1.6	5.7	0.8	5.9	1.4	2.8	3.2
Waste Materials	0.2	0.0	0.0	0.0	0.3	0.2	0.2	0.3	0.5	1.1	0.4	0.0	0.1	0.4	0.0	0.4	0.1	0.0
Other	0.2	1.1	0.5	0.5	0.4	3.3	0.0	0.6	3.3	2.1	1.1	1.2	4.6	1.0	1.0	0.3	0.7	0.8

a. Translated from "astilla de madera"

b. Translated from "plancha cemento"

Table A-138

Relative Rural Housing Conditions and Relative Agricultural Wage Rates, By Department

Department	Decrease in Percent with Earth Floor (Percentage points)	Increase in Percent with Running Water (Percentage points)	Decrease in Percent with Thatched roof (Percentage points)	Average Rank for the three Variables	Average Rank for Variables (1) and (3)	Percent Wage Increase[b]	Rank in Variable (6)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Antioquia	8.6 (11)	13.1 (2)	7.7 (13)	8.7	12	13.4	(6)
Atlantico	20.0 (1)	6.6 (6)	19.8 (9)	5.3	5	7.9	(8)
Bolivar	6.7 (12)	4.7 (11)	3.2 (14)	12.3	13	3.1	(12)
Boyaca	10.8 (10)	8.3 (5)	31.4 (3)	6	6.5	≈ 19.7	(3)
Caldas	4.6 (14)	-11.5 (14)	9.6 (12)	13.3	13	2.0	(14)
Cauca	5.7 (13)	5.2 (9)	22.8 (7)	8.7	10	4.0	(11)
Cundinamarca	≈16.3 (4)	11.3 (4)	34.9 (1)	3	2.5	9.5	(7)
Huila	18.2 (3)	5.5 (8)	32.4 (2)	4.3	2.5	22.1	(2)
Magdalena	15.0 (6)	5.9 (7)	21.8 (8)	7	7	4.2	(10)
Mariño	11.5 (8)	5.1 (10)	15.4 (11)	9.7	9.5	2.6	(13)
Norte de Santander	16.3 (4)	16.4 (1)	29.2 (4)	3	4	18.8	(4)
Santander	15.0 (6)	11.5 (3)	26.1 (6)	5	6	13.6	(5)
Tolima	18.9 (2)	0.9 (13)	28.1 (5)	6.7	3.5	57.7	(1)
Valle del Cauca	11.0 (9)	2.9 (12)	17.8 (10)	10.3	9.5	4.5	(9)

( ) Figures in parenthesis indicate the rank of the department in respect of the variable in question.

[b]Average (weighted between warn and cold regions) difference between wage in 1955-63 and in 1945-49

Sources: The housing figures are based on Tables A-136 and A-137; the wage calculation is based on Table A-135.

Section 9. The Coffee Industry

Due to its obvious importance in the agricultural sector and its traditional dominance of Colombia's exports, more detailed statistics are and a number of studies have been directed at this sector. Some of the relevant figures are presented in the text of this study, others here. Basic price and output statistics are given in Table A-150. It is worth noting that figures going farther back have been published by William Paul McGreevey, An Economic History of Colombia, 1845-1930, Cambridge, Cambridge University Press, 1971. Table A-151 shows the importance of coffee in agricultural output in relation to all crops and to crops plus livestock.

Table A-150

Price and Output Statistics

Year	Output in Metric Tons of Pergamino Coffee (Central Bank Estimate) (1)	Output in Metric Tons of Pergamino Coffee (Author's Estimate)	Producer Price per Metric Ton of Pergamino Coffee (current pesos)	Price per Pound of Manizales Coffee New York (U.S. cents)	Index of Real Coffee Prices 1950=100 (57)
1915				14.50	
1916				14.44	
1917				12.94	
1918		93.6		16.38	57.2
1919		137.8		27.69	84.0
1920		118.3		21.50	65.0
1921		191.1		15.63	62.5
1922		144.3		17.50	60.9
1923		169.0		18.81	60.8
1924		180.7		24.94	74.1
1925		158.6	312	27.63	77.2
1926		200.2	284	28.50	62.1
1927		192.4	268	25.06	60.8
1928		217.1	256	27.26	52.1
1929		231.4	240	22.81	54.5
1930		254.8	284	17.24	81.2
1931		247.0	284	15.55	100.7
1932		260.0	284	11.35	119.7
1933		267.8	283	10.46	116.0
1934		257.4	297	13.70	87.6
1935		309.4	297	10.26	84.6
1936		325.0	304	11.26	81.8
1937		331.5	249	11.63	65.1
1938		348.4	249	10.97	57.9
1939		344.5	269	11.66	59.6

Table A-150 (con't.)

Year	Output in Metric Tons of Pergamino Coffee (Central Bank Estimate) (1)	Output in Metric Tons of Pergamino Coffee (Author's Estimate) (2)	Producer Price per Metric Ton of Pergamino Coffee (current Pesos) (3)	Price per Pound of Manizales Coffee in New York (U.S. cents) (4)	Index of Real Coffee Prices 1950=100 (5)	Index of New York Price in Constant US Dollars (6)
1940		347.1	193	8.37	45.6	
1941		371.8	283	14.74	67.3	
1942		427.7	295	15.87	65.3	
1943		412.1	321	15.87	60.9	
1944		431.6		15.87		
1945		429.0	434	15.87	63.0	
1946		456.8	600	22.50	75.6	
1947		465.4	768	30.11	82.8	
1948		478.4	789	32.57	70.7	32.57
1949		453.7	986	37.61	83.3	39.88
1950	412		1476	53.25	100.0	54.50
1951	452		1875	58.70	113.8	53.80
1952	504		2003	57.01	127.3	53.38
1953	507		2098	59.92	125.8	57.33
1954	498		2836	79.93	151.5	75.61
1955	454		2472	64.57	131.75	60.90
1956	493		3270	73.97	165.24	67.89
1957	584		3640	63.94	156.66	56.83
1958	589		3501	52.34	133.05	46.07
1959	620		2842	45.21	99.82	39.80
1960	563		3105	44.89	103.3	39.51
1961	619		3281	43.62	100.56	38.39
1962	587		3209	40.77	94.32	35.88
1963	588		3966	39.585	91.57	34.83
1964	629		4990	48.980	97.85	42.95
1965	594		5004	48.49	91.65	41.83
1966	644		5232	47.43	82.83	39.39
1967	587		5823	41.94	84.59	34.83
1968				42.60		34.71
1969				44.93		35.29
1970				58.00[a]		44.62[a]

Sources and Methodology for Table A-150

Column 1 presents estimates of output of pergamino coffee in metric tons per calendar year, from the unpublished data used by the Banco de La Republica in estimating output of the agricultural sector. Column 2 is based on estimates of domestic production constructed for the World Bank study of Colombia, for the years 1938-48, and on export figures for previous years. In each case the figures are adjusted to pergamino metric ton equivalents. For the years prior to 1938, since the production figures are based on export figures, errors are introduced due to lags and due to possible occasional withholding from the international market, not so much through deliberate government policy but through transportation problems, etc.

Column 3 presents the current peso price of a metric ton of pergamino coffee estimated at the farm. For 1950 and on the figures come from the unpublished estimates of the Banco de la Republica. For 1938-1948 they come from the World Bank study; the estimate for 1949 was made by the author. The 1925-32 estimates were based on Table A-2. The price of a pound of Manizales coffee in U.S. cents in New York as given in Column 4 is reproduced from the Boletin de Informaciones Estatistica Sobre Cafe, No. 41, 1967, published by the Federacion Nacional de Cafeteros de Colombia, page 4. For recent years the data were taken from International Bank for Reconstruction and Development, *Economic Growth of Colombia: Problems and Prospects*. Baltimore: The Johns Hopkins University Press, 1972, p.265. The latter study is also the source of Col. (6). Column 5 presents an index of real coffee prices with 1950 = 100. The deflator used to convert the monetary prices to real prices was the blue collar cost of living series for 1954 and on. The blue collar cost of living series in Medellin was used for the years 1938-54 and the G.D.P. deflator for 1925-38. Finally, the Lopez cost of living series for Medellin was used for 1918-1925.

Table - A-151

Coffee as a Percent of All Crop Output

Year	Value of Crop Output (Current Prices on the Farm) (1)	Value of Coffee Output (Current Prices) (2a)	Value of Coffee Output (Current Prices on the Farm (2b)	Value of Coffee/ Total Value of Crops (3)	Value of Crops and Livestock (4)	Value Added: Crops and Livestock (Current Market Prices) (5)	Value Added in Crop Livestock and other (Current Market Prices) (6)	Value of Crops and Livestock (Current Market Prices) (7a)	Value of Crops and Livestock (Current Market Prices) (7b)	Value of Coffee/ Value of Crops and Livestock (Current Prices) (8)	Implicit Price Series for Value Added in the Agricultura Sector (9)
1925		49.5						329.5		.150	
1926		56.9						395.0		.144	
1927		51.6						371.0		.139	
1928		55.6						404.5		.137	
1929		55.5						420.0		.132	
1930		72.4						348.3		.207	
1931		70.1						300.8		.233	
1932		73.8						247.0		.298	
1933		75.8						272.2		.278	
1934		76.4						409.3		.186	
1935		91.8						403.5		.228	
1936		98.8						463.2		.213	
1937		82.4						469.5		.176	
1938		86.7						535.6		.161	
1939		92.7						597.3		.155	
1940		66.9						538.5		.124	
1941		105.2						545.8		.192	
1942		126.2						652.9		.193	
1943		132.3						796.4		.166	
1944		167.5						1041.9		.161	
1945		186.2						1205.4		.154	
1946		262.1						1193.1		.219	
1947		357.4						1855.2		.192	
1948		377.5						1965.9		.192	
1949		447.3						2385.7			

Table A-151 (Continued)

Year	Value of Crop Output (Current Prices on the Farm) (1)	Value of Coffee (Current Prices) (2a)	Value of Coffee Output (Current Prices on the Farm) (2b)	Value of Coffee/ Total Value of Crops (3)	Value of Crops and Livestock (4)	Value Added: Crops and Livestock (Current Market Prices) (5)	Value Added in Crop Livestock and other (Current Market Prices) (6)	Value of Crops and Livestock (Current Market Prices (7a)	Value of Crops and Livestock (Current Market Prices (7b)	Value of Coffee/ Value of Crops and Livestock (Current Prices (8)	Implicit Price Series for Value Added in the Agricultural Sector (9)
1950	1701.8		609.0	.358	5508.5	2514.0	2807.8	2793.1	2790.5	.218	50.7
1951	2205.5		848.1	.384	5672.4	2907.2	3190.1		3227.0	.263	56.9
1952	2285.0		1010.4	.442	6038.5	3148.0	3449.6		3494.3	.289	64.1
1953	2499.9		1063.2	.425	6094.3	3430.3	3736.3		3807.6	.279	68.9
1954	3180.1		1412.6	.444	6210.7	4232.9	4600.7		4698.5	.301	83.5
1955	2832.3		1122.5	.396	6391.9	4090.4	4476.9		4540.3	.247	71.2
1956	3481.9		1612.3	.463	6625.0	4780.9	5168.0		5306.8	.304	80.2
1957	4419.0		2126.6	.481	7021.4	5938.1	6387.2		6591.3	.323	93.5
1958	4789.8		2063.7	.431	7300.5	6580.2	7086.1		7304.0	.283	100.0
1959	4922.5		1716.6	.349	7704.4	7202.7	7764.9		7995.0	.215	103.7
1960	5053.6		1747.5	.346	7693.2	7764.1	8402.8		8618.2	.203	112.4
1961	5771.3		2031.0	.352	7921.2	8528.4	9328.1		9466.5	.215	119.4
1962	6028.6		1883.9	.312	8269.2	9015.4	9910.6		10007.1	.188	121.4
1963	7705.4		2334.9	.303	8336.5				12479.7	.187	149.7
1964	11074.4		3137.4	.283	8816.9				16805.0	.187	190.6
1965	10844.8		2972.4	.274	8773.6						

Sources and Methodology For Table A-151

Col.s (1), (2b), (3), (4), and (5) are from unpublished data of the Banco de la Republica, used in the calculation of the national accounts. Col. (6) shows value added in crops, livestock, and other rural activities such as construction of dwellings, etc.

Col. (2a), giving the value of coffee output before 1950 comes from Table U-3. Col. (7a), is based on ECLA figures and previously presented in Table A-3.

Col. (7b) is derived by multiplying Col. (5) the value added in crop and livestock production by 1.11. The multiplier was based on that implied by the constant price value of output and value added series for livestock and crops in the unpublished statistics of the Banco de la Republica. By 1962 this multiplier was actually 1.12 but the error introduced by using a constant multiplier is small. The implicit assumption that the value of output/value added ratio is the same in current prices as in constant prices might introduce a small error, but no more. For 1963 and 1964, the figures were estimated by multiplying an implicit price series for crops and livestock, (Col. 9) by the quantity series based on 1958 market prices (Col. 4), since the current price value added series was not available. This technique which conceptually would seem as good as or better than that used to derive the figures for 1950-62 was not used for those years since it provided results mildly inconsistent with the figures in Col. (6).

Col. 8 results from the division of Col. 2 (2a and 2b) by Col. 7 (7a and 7b).

It should be noted that the value of coffee figures in Col. 2 are those paid to the coffee farmers and at times are well below the prices which would prevail in a free market (with no government intervention).

This introduces a certain downward bias in the coffee share figures of Col. 8. An alternate estimate trying to correct this will be made later when more figures become available.

Note also that the figures in Col. 8 do not correspond well with those in the FAO-ECLA coffee study (p. 12.).

TABLE A-1 52

Price and Area Planted to Coffee, 1932-1959

	Real Coffee Price (1)	New Plantings (2) (thousands of hectares)	Net Increase in Area, Annual Averages (3)
1932			
1933			
1934			
1935			
1936	2.86	22.0	
1937			
1938			
1939			
1940			
1941			
1942	2.74	21.7	17.0
1943			
1944			
1945	2.89	25.5	
1946			
1947			
1948	3.44	17.3	
1949			
1950			
1951	4.84	20.3	
1952			
1953	5.36	34.4	
1954	6.45	26.6	19.0
1955	5.67	21.6	
1956	7.14		
1957	6.84		
1958	5.84	6.04	21, 50+[a][b]
1959	4.35		

(continued on following page)

TABLE A-152, continued

[a]American Embassy.

[b]FAO-ECLA and Agricultural Census of 1960.

SOURCES AND METHODOLOGY: The real price figures of column (1) are based on an annual real price series--price paid to the farmer was deflated by cost of living series. Figures on new plantings (column 2) are from the FAO-ECLA coffee survey made in 1955-6, (United Nations, Food and Agricultural Organization, Coffee in Latin America: Colombia and El Salvador, New York, 1958). The third column (net increase in coffee area) gives crude guesses based on a variety of sources. The 1932-1951 average is based on the difference between the area estimated in the coffee census of 1932 and the American Embassy figure of 1951. The 1951-1956 figures are the guesses of the American Embassy. The 1956-1959 figure, from a comparison of the 1959 Agricultural Census figure and the 1955-1956 FAO-ECLA survey, indicates a sharp increase in area; the American Embassy guessed that area was growing much slower. The former is probably closer to the truth.

(Table A-150)

This table must be revised in the light of more recent statistics.

Table A-153

Value of Output per Hectare: Coffee vs. Other Crops

Year	Value of Output/Hectare		Land (thousands of hectares)			Value of Output (millions of pesos)		
	Coffee	Other Major Crops	All Major Crops	Coffee	Other Major Crops	Total Major Crops	Coffee	Other Major Crops
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1937-8	319	120-132	2018-2185	392	1626-1793	300.0	84.0	216
1948			2.369	589	1780		377	
1949			2.532	656	1876		447	
1950	928	665	2.410	656	1754	1775	609	1166
1951	1284	751	2.630	660	1970	2328	848	1480
1952	1496	679	2.778	675	2103	2437	1010	1427
1953	1280	793	2.783	831	1952	2612	1063	1540
1954	1619	965	2.923	873	2050	3391	1413	1979
1955	1375	823	3.010	816	2194	2927	1123	1805
1956	2224	952	2.913	725	2188	3695	1612	2083
1957	2690	1251	2.787	790	1997	4626	2127	2499
1958	2482	1318	2.901	832	2069	4791	2064	2727
1959	2052	1515	3.029	859	2170	5004	1717	3287
1960	1956	1563	3.090	893	2197	5182	1748	3435
1961	2444	1834	3.010	831	2179	6028	2031	3997
1962	2285	1959	3.115	824	2291	6371	1884	4487
1963	28798	2488	3.051	809	2242	7910	2332	5578
1964	3862	3320	3.230	813	2417	11162	3130	8024
1965	3663	3141	3.416	812	2604	11152	2972	8179
1966	4213	3752	3.434	811	2623	12999	3201	9840
1967			3.300	811	2489		3419	
1968			3.308	816	2492			

Sources and Methodology for Table A-153

Figures on the value of coffee output come from unpublished national accounts tabulations of the Banco de la Republica. All figures on area under cultivation are from USDA, Changes in ... and value of output for non-coffee crops are based on the same source; for "other crops" both output and ~~hectares~~ area figures exclude what Atkinson calls the minor crops. Major crops are defined as coffee, yuca, beans, platanos, panela, corn, potatoes, wheat, tobacco, bananas, cocoa, cotton, rice, sugar, sesame, barley, sorgum, and soya beans. Some of the same questions which arise in agriculture in general with respect to the relationship if any between farm size and efficiency may naturally be asked about coffee too. Table A-154 presents information on crop composition of farms classified as coffee farms in 1966.

Table A-154

Land Use on Coffee Farms, by Size, 1966

Farm Area (Hectares)	Hectares per farm	Hectares in crops	Hectares in Coffee	Hectares in Plantains	Hectares in Corn	Hectares in Other crops	Number of Farms
<0.5	0.25	0.228	0.159	0.040	.007	0.021	19,920
0.5-1	0.62	0.518	0.336	0.080	0.025	0.077	27,061
1-2	1.29	0.97	0.56	0.154	0.069	0.188	48,785
2-3	2.287	1.62	0.93	0.230	0.106	0.352	53,581
3-4	3.356	2.12	1.18	0.302	0.178	0.457	37,862
4-5	4.30	2.73	1.51	0.343	0.233	0.643	24,124
5-10	6.856	3.81	2.12	0.480	0.299	0.909	83,915
10-20	13.65	6.10	3.45	0.720	0.467	1.474	53,562
20-30	23.60	8.38	4.83	1.066	0.555	1.927	20,298
30-40	32.938	9.85	5.18	1.339	0.874	2.473	10.630
40-50	43.17	10.14	5.70	1.17	0.93	2.34	5,978
50-100	64.30	12.09	6.20	1.54	1.23	3.13	14,397
100-200	138.07	20.00	9.63	2.59	1.93	5.85	6,740
200-500	283.75	23.75	8.92	1.93	3.69	9.21	3,017
500-1000	673.08	65.90	28.73	2.99	5.69	28.50	839
1000-2500	1531.14	36.36	13.52	2.77	5.19	14.88	369
>2,500	6024.66	31.78	2.01	2.19	12.34	15.25	167
All	18.67	4.22	2.26	0.52	0.36	1.07	411,245

Source: Unpublished tabulations prepared by DANE, on the basis of its agricultural sample for the first semester of 1966.

Table A-155
Coffee Area and Number of Farms, by Department, Selected Years
(Area in thousands of hectares)

Department	Number of Farms	Coffee alone	Inter-crop-ped	Total	Number of Farms	Total area in Coffee	Avera ge area in coffee	Total
Antioquia	34,197	34.74	96.93	131.67	33,203	114.8	3.5	26.3
Boyacá	7,464	3.95	6.90	10.8	10,496	10.8	1.4	23.6
Caldas	59,103	87.22	156.30	243.5	45,930	187.4	4.1	10.2
Cundinamarca	31,658	48.20	53.18	101.4	29,749	91.0	3.1	18.4
Cauca	39,081	25.43	88.35	113.8	17,559	24.1	1.4	15.6
Huila	9,273	15.26	13.13	28.4	17,746	44.7	2.5	25.0
Magdalena	1,452	1.71	0.92	2.6	2,088	17.2	8.3	76.4
Nariño	23,540	5.21	34.68	39.9	7,071	14.9	2.1	10.4
Norte de Santander	11,771	58.73	6.74	65.5	6,107	29.4	4.81	26.8
Santander	13,594	14.04	9.02	23.0	11,454	24.6	2.2	26.5
Tolima	25,389	66.64	70.82	137.5	27,917	115.6	4.3	17.4
Valle	26,519	66.63	70.82	132.8	23,975	83.8	3.9	26.7
Colombia	283,041	401.90	630.09	1032.0	234,674	776.7	3.3	20.1

Sources: Col. (1) is from *Muestra Nacional Agropecuaria* de 1954, p.36. The heading of the table in question implies that these figures are from a 1954 National Coffee Sample taken separately from the National Agriculturla sample. In the former quite small plots were not included, leading to a much lower estimate of interplanted coffee (377.6 thousand hectares) than that emerging from the National Agricurual Sample (630.1 thousand hectares). See the discussion in ibid, p.37. The 'coffee alone' area estimates coincided relatively well, with the coffee sample figure being 439.6 thousand hectares Cols (2) and (3) are from ibid, p.18.

It should be noted (see ibid, p.12) that the sample was designed to produce accurate estimates at the national but not at the departmental level, so undue confidence should not be placed in these figures. Were interplanted zones converted to coffee area equivalent the total for this year would be smaller.

Table - A-156

Coffee as a Percent of All Crop Output

Year	Value of Crops Output (Current Prices on the Farm) (1)	Value of Coffee (Current Prices) (2a)	Value of Coffee Output (Current Prices on the Farm) (2b)	Value of Coffee/ Total Value of Crops (3)	Value of Crops and Livestock (4)	Value Added: Crops and Livestock (Current Market Prices) (5)	Value Added in Crop Livestock and other (Current Market Prices) (6)	Value of Crops and Livestock (Current Market Prices) (7a)	Value of Crops and Livestock (Current Market Prices) (7b)	Value of Coffee/ Value of Crops and Livestock (Current Prices) (8)	Implicit Price Series for Value Added in the Agricultural Sector (9)
1925		49.5						329.5		.150	
1926		56.9						395.0		.144	
1927		51.6						371.0		.139	
1928		55.6						404.5		.137	
1929		55.5						420.0		.132	
1930		72.4						348.3		.207	
1931		70.1						300.8		.233	
1932		73.8						247.0		.298	
1933		75.8						272.2		.278	
1934		76.4						409.3		.186	
1935		91.8						403.5		.228	
1936		98.8						463.2		.213	
1937		82.4						469.5		.176	
1938		86.7						535.6		.161	
1939		92.7						597.3		.155	
1940		66.9						538.5		.124	
1941		105.2						545.8		.192	
1942		126.2						652.9		.193	
1943		132.3						796.4		.166	
1944		167.5						1041.9		.161	
1945		186.2						1205.4		.154	
1946		262.1						1193.1		.219	
1947		357.4						1855.2		.192	
1948		377.5						1965.9		.192	
1949		447.3						2385.7		.187	

Table - A-156 (Continued)

Year	Value of Crops Output (Current Prices on the Farm (1)	Value of Coffee (Current Prices) (2a)	Value of Coffee Output (Current Prices on the Farm (2b)	Value of Coffee/ Total Value of Crops (3)	Value of Crops and Livestock (4)	Value Added: Crops and Livestock (Current Market Prices) (5)	Value Added in Crop Livestock and other (Current Market Prices) (6)	Value of Crops and Livestock (Current Market Prices (7a)	Value of Crops and Livestock (Current Market Prices (7b)	Value of Coffee/ Value of Crops and Livestock (Current Prices (8)	Implicit Price Series for Value Added in the Agricultural Sector (9)
1950	1701.8		609.0	.358	5508.5	2514.0	2807.8	2793.1	2790.5	.218	50.7
1951	2205.5		848.1	.384	5672.4	2907.2	3190.1		3227.0	.263	56.9
1952	2285.0		1010.4	.442	6038.5	3148.0	3449.6		3494.3	.289	64.1
1953	2499.9		1063.2	.425	6094.3	3430.3	3736.3		3807.6	.279	68.9
1954	3180.1		1412.6	.444	6210.7	4232.9	4600.7		4698.5	.301	83.5
1955	2832.3		1122.5	.396	6391.9	4090.4	4476.9		4540.3	.247	71.2
1956	3481.9		1612.3	.463	6625.0	4780.9	5168.0		5306.8	.304	80.2
1957	4419.0		2126.6	.481	7021.4	5938.1	6387.2		6591.3	.323	93.5
1958	4789.8		2063.7	.431	7300.5	6580.2	7086.1		7304.0	.283	100.0
1959	4922.5		1716.6	.349	7704.4	7202.7	7764.9		7995.0	.215	103.7
1960	5053.6		1747.5	.346	7693.2	7764.1	8402.8		8618.2	.203	112.4
1961	5771.3		2031.0	.352	7921.2	8528.4	9328.1		9466.5	.215	119.4
1962	6028.6		1883.9	.312	8269.2	9015.4	9910.6		10007.1	.188	121.4
1963	7705.4		2334.9	.303	8336.5				12479.7	.187	149.7
1964	11074.4		3137.4	.283	8816.9				16805.0	.187	190.6
1965	10844.8		2972.4	.274	8773.6						

Sources and Methodology For Table A-156

Col.s (1), (2b), (3), (4), and (5) are from unpublished data of the Banco de la Republica, used in the calculation of the national accounts. Col. (6) shows value added in crops, livestock, and other rural activities such as construction of dwellings, etc.

Col. (2a), giving the value of coffee output before 1950 comes from Table U-3. Col. (7a), is based on ECLA figures and previously presented in Table A-3.

Col. (7b) is derived by multiplying Col. (5) the value added in crop and livestock production by 1.11. The multiplier was based on that implied by the constant price value of output and value added series for livestock and crops in the unpublished statistics of the Banco de la Republica. By 1962 this multiplier was actually 1.12 but the error introduced by using a constant multiplier is small. The implicit assumption that the value of output/value added ratio is the same in current prices as in constant prices might introduce a small error, but no more. For 1963 and 1964, the figures were estimated by multiplying an implicit price series for crops and livestock, (Col. 9) by the quantity series based on 1958 market prices (Col. 4), since the current price value added series was not available. This technique which conceptually would seem as good as or better than that used to derive the figures for 1950-62 was not used for those years since it provided results mildly inconsistent with the figures in Col. (6).

Col. 8 results from the division of Col. 2 (2a and 2b) by Col. 7 (7a and 7b).

It should be noted that the value of coffee figures in Col. 2 are those paid to the coffee farmers and at times are well below the prices which would prevail in a free market (with no government intervention).

This introduces a certain downward bias in the coffee share figures of Col. 8. An alternate estimate trying to correct this will be made later when more figures become available.

Note also that the figures in Col. 8 do not correspond well with those in the FAO-ECLA coffee study (p. 12.).

Section X International Trade in Agricultural Products

Coffee has, of course, always dominated Colombia's exports, though bananas have been important over a long period of time, and more recently a number of new items have attained quantitative significance. On the import side, agricultural products have never loomed really large, although on occasion (as in the early 1940's) they have amounted to as much as 15-20 % of all imports. The agricultural sector has, in short, generated a large export surplus. The tables which make up this section present some detailed breakdowns of this trade. Figures on total exports and imports, and those of other sectors are presented to give a base for effective comparisons and calculations of relative importance. For the early period--total export figures for 1906-1939 are presented in Table A-160--it is inevitably true that data problems are severe and the range of possible error quite substantial. The method of calculation for this table was direct use of Colombia's trade statistics; an interesting and highly useful alternative calculation has been preformed by a McGreevy, making use of the statistics of Colombia's major trading partners. These data are presented in Table A-161. By the late twenties the reporting of trade is fairly systematic in DANE's publication Anuario de Commercio Exterior; this information is the basis for the tabulations of Table A-162. Probably the major weakness in that table is in respect of unregistered or contraband exports; these are taken into account in the estimates of ECLA (statistical appendix, page 20) and McGreevy, which are presented in Tables A-163a and A-163b respectively. For the recent period the best estimates are presumably those of the International Monetary Fund, presented in Table A-164.

Figures on total imports and agricultural imports with some subcategories are presented for the period 1930-51 in Table A-166. Alternative series for total imports are those of ECLA, and McGreevy, both presented in Table A-165. My calculations for the 1951 and on period are presented in Tables A-167a, and A-167b, with the first table being based on the Colombian foreign trade statistics presented in the Anuario de Commercio Exterior and the other being based on the Yearbook of International Trade Statistics. (I.M.F.) Differences in classification do generate some substantial differences in the tables.

TABLE A-160

Exports and Agricultural Exports, 1906-1939, Where Available

	Total Registered Exports (excluding gold) (1)	Gold Exports in Dollars (2)	Gold Exports in Pesos (3)	Total Registered Exports (including gold) (4)
1906	11.66	7.60		
1907	11.05	7.60		
1908	12.16	7.60		
1909	12.80	7.60		
1910	14.80	7.60	7.83	22.62
1911	17.77	7.60	7.83	22.59
1912	28.44	7.60	7.83	36.27
1913	29.34	7.60	7.87	37.21
1914	26.99	7.60	7.91	34.89
1915	26.91	7.60	8.09	34.99
1916	31.51	7.60	7.83	39.34
1917	34.28	7.60	8.17	42.44
1918	37.29	7.60	7.18	44.47
1919		5.70	5.16	
1920		5.51	6.11	
1921	56.74	5.70	6.47	63.21
1922	49.04	5.03	5.44	54.48
1923	58.93	5.42	5.68	64.61
1924	84.53	5.88	6.52	91.05
1925	83.64	4.96	4.99	88.63
1926	111.07	3.51	3.56	114.62
1927	108.13	3.16	3.23	111.36
1928	128.13	2.82	2.88	131.01
1929	116.72	2.68	2.78	119.50
1930	92.08	3.12	3.23	95.31
1931	93.70	3.82	3.95	97.64
1932	64.65	4.88	5.12	69.77
1933	59.89	9.90	12.12	72.01
1934	131.98	11.43	18.49	150.47
1935	123.94	10.92	19.50	143.44
1936	130.20	12.93	22.65	152.85
1937	163.01	14.68	25.88	188.88
1938	125.85	17.29	30.89	156.74
1939	132.62	18.93	33.17	165.79

TABLE A-160, continued

	Total Registered Exports (including gold and services) (5)	Exports of Agricultural Products (6)	Per Cent of Exports (Column 4) Which Are Agricultural (7)	Per Cent of Goods and Services Exports (Column 5) Which Are Agricultural (8)
1906				
1907				
1908				
1909				
1910				
1911				
1912				
1913				
1914				
1915				
1916				
1917				
1918				
1919				
1920				
1921				
1922		42.88	78.71	
1923		51.96	80.42	
1924		77.01	84.57	
1925	95.37	76.93	86.80	80.66
1926	123.56	92.09	80.34	74.53
1927	120.05	82.34	73.94	68.59
1928	141.36	101.02	77.11	71.46
1929	128.82	89.94	75.26	69.82
1930	102.36	74.11	77.76	72.40
1931	104.96	61.71	63.20	58.79
1932	74.86	50.03	71.71	66.83
1933	77.55	55.75	77.42	71.89
1934	157.69	91.49	60.80	58.02
1935	151.19	88.63	61.79	58.62
1936	160.95	103.75	67.88	64.46
1937	200.59	111.42	58.99	55.55
1938	167.24	102.46	65.37	61.27
1939	177.56	100.30	60.50	56.49

TABLE A-160, continued

SOURCES AND METHODOLOGY: Figures on total registered exports including gold are available in Annales de Economia y Estadistica, Controleria General de la Republica, V. , p. and were (reprinted in Katherine Wylie, The Agricultre of Colombia, p. 155.) This series was adjusted on the grounds that the gold exports included in it were erratic from year to year, and the alternative assumption made was that 95 per cent of the gold production in each year was exported. The estimates of exports of items besides gold were made with the help of the per cent distribution of exports listed in Wylie, op. cit., p. 154, and the total export figures (including the erratic gold exports) just cited. The figures for gold production --used to estimate gold exports-- come from various issues of Anuario General de Estadistica. Column 5 is based on the ECLA assumptions with respect to the ratio of total exports of goods and services to total exports of goods. The estimates of exports of agricultural products were based on the per cent distribution of exports listed in Wylie, op. cit., p. 154.

TABLE A-16

Agricultural and Total Exports

(absolute figures in millions of current pesos)

	Registered Exports (excluding gold) (1)	Gold Exports (2)	Total Registered Exports (3)	Registered and Exports Estimated Services (4)	Registered Exports of Agricultural Products (5)	Agricultural Exports / All Exports of Goods and Services (6)	Share of Agricultural in All Registered Exports (7)
1928	132.50	2.88	135.38	146.07			
1929	121.68	2.78	124.46	134.16			
1930	104.23	3.23	107.46	115.41			
1931	80.45	3.95	84.40	90.73			
1932	67.11	5.12	72.23	77.50	50.11	.647	.694
1933	67.59	12.12	79.71	85.84	56.18	.654	.705
1934	123.89	18.49	142.38	149.22	92.38	.619	.649
1935	123.60	19.50	143.10	150.83	91.82	.609	.642
1936	136.84	22.65	159.49	167.95	104.68	.623	.656
1937	152.17	25.88	178.05	189.09	113.42	.600	.637
1938	144.45	30.89	175.34	186.91	104.20	.558	.594
1939	136.47	33.17	169.64	181.69	102.01	.561	.602
1940	126.04	36.77	162.81	174.69	82.57	.473	.507
1941	133.55	38.17	171.72	185.79	89.28	.481	.520
1942	170.94	34.72	205.66	219.44	151.04	.688	.734
1943	218.52	32.72	251.24	266.82	185.94	.697	.740
1944	227.14	32.21	259.35	279.32	176.47	.632	.680
1945	246.18	27.25	273.43	289.01	194.87	.674	.713
1946	351.84	25.44	377.28	403.31	291.79	.724	.773
1947	446.27	22.29	468.56	499.49	367.45	.736	.784
1948	504.93	19.62	524.55	567.56	417.69	.736	.796
1949	625.91	23.43	649.34	701.94	501.16	.714	.772
1950	771.39	24.73	796.12	861.40	630.67	.732	.792
1951	1,093.38	35.89	1,129.21	1,251.23	887.81	.710	.786
1952	1,183.13	34.39	1,217.52	1,310.05	990.7	.756	.814

(continued on following page)

Sources and Methodology for Table A-. 161

Column (1) comes from the *Anuario de Comercio Exterior*. Gold exports (Col 2) were estimated by the author form the production figures, allowing for domestic consumption. Service export figures are the ECLA estimates (ECLA, Analysis..., axexo estadistico, p. 20). Since exports of services could hardly have been registered in any significant degree, it may plausibly be assumed that these values were guesstimates and as such did try to include all services. Coolum 5 is bases on figures in the *Anuario de Comercio Exterior*.

TABLE A-164

Agricultural and Total Exports

(millions of current dollars)

	Registered Exports	Gold Exports	Total Registered Exports of Goods	Exports of Services	Total Registered Exports of Goods and Services
1947	255.0	13.4	268.4	17.7	286.1
1948	288.5	11.7	300.2	24.7	324.9
1949	321.0	12.6	333.6	27.0	360.6
1950	395.5	12.3	407.8	24.4	432.2
1951	459.8	14.3	474.1	31.6	505.7
1952	473.2	13.7	486.9	36.1	523.0
1953	607.4	14.5	621.9	43.8	665.7
1954	657.0	13.2	670.2	45.6	715.8
1955	579.6	12.9	592.5	49.4	641.9
1956	653.7	14.7	668.4	64.9	733.3
1957	589.9	11.2	601.1	79.1	680.2
1958	527.1	12.0	539.1	75.3	614.4
1959	514.2	13.7	527.9	82.5	610.4
1960	480.2	15.1	495.3	96.2	591.5
1961	462.5	14.0	476.5	101.6	578.1
1962	461.9	13.9	475.8	95.6	571.4
1963	474.0	11.3	485.3	104.3	590.1
1964	548.1				

(continued on following page)

TABLE A-164, continued

	Agricultural Exports			Share of All Registered Exports of Goods and Services Which Are Agricultural	Share of All Registered Exports of Goods Which Are Agricultural
	Food	Beverages and Tobacco	Total		
1947					
1948					
1949					
1950					
1951	355.1	4.8	359.9	71.2	.759
1952	390.8	4.1	394.9	75.5	.811
1953	506.3	6.5	512.8	77.0	.825
1954	561.9	6.4	568.3	79.4	.848
1955	504.7	5.3	510.0	79.5	.861
1956	445.4	7.5	452.9	61.8	.678
1957	415.7	2.9	418.6	61.5	.696
1958	370.6	2.00	372.6	60.6	.691
1959	376.8	2.04	378.8	62.1	.718
1960	347.7	2.40	350.1	59.2	.707
1961	328.9	4.07	333.1	57.6	.699
1962	352.9	5.73	358.5	62.7	.754
1963	325.4	7.29	332.7	56.4	.686
1964	412.98	9.50	422.5		

Table A-165

Registered Imports of Agricultural Products Related to Total Registered Imports
1930-1951 (Absolute Figures in Millions of Pesos)

Year	Goods (1)	Services (2)	Goods and Services (3)	Food (4)	Other Agricultural Products (5)	Total Agriculture (6)	Agriculture/ Goods (7)	Agriculture/ Goods & Services (8)	Food/ Agriculture (9)
1930	70.382	25.34	95.72						
1931	45.971	16.55	62.52						
1932	34.327	20.93	55.26	1.769	.709	2.478	.072	.045	.714
1933	55.627	21.14	76.77	1.649	1.592	3.241	.058	.042	.509
1934	98.066	25.49	123.56	3.530	3.802	7.332	.074	.059	.481
1935	119.676	17.95	137.63	5.184	4.643	9,927	.082	.071	.528
1936	134.441	17.48	151.92	8.213	5.106	13.319	.099	.088	.617
1937	169.682	27.15	196.83	10.191	6.781	16.972	.100	.086	.600
1938	159.252	31.85	191.10	12.040	2.668	14.708	.092	.077	.818
1939	183.442	36.69	220.13	14.199	9.829	24.028	.131	.109	.591
1940	148.193	32.60	180.79	10.706	9.658	20.364	.137	.113	.526
1941	170.006	34.00	204.01	8.448	12.449	20.897	.123	.102	.404
1942	104.981	33.59	138.57	6.145	15.597	21.742	.207	.157	.283
1943	146.692	51.34	198.03	7.165	15.156	22.321	.152	.113	.321
1944	174.666	45.34	220.01	13.736	26.069	39.805	.228	.181	.345
1945	281.182	25.31	306.49	28.547	26.291	54.838	.195	.179	.521
1946	403.043	44.34	447.38	25.787	32.853	58.640	.145	.131	.440
1947	638.625	60.66	699.29	47.549	45.200	92,749	.145	.133	.513
1948	589.079	58.91	647.99	34.081	46.780	80.861	.137	.125	.421
1949	515.921	118.91	634.83	20.723	50.075	70.798	.137	.112	.293
1950	711.112	113.77	824.89	45.389	73.851	119.240	.168	.145	.381
1951	1051.000	313.75	1365.44	54.247	103.617	157.864	.150	.116	.344

Table A-165 (continued)

Year	Cereals (Includes Malt, Flours, and Other Simple Preparations (10)	Animal Based (11)	Cereals/All Agriculture (12)	Animal Based/ All Agriculture (13)	Forestry Products (14)	Processed Foods (15)
1930						
1931	n.a.					
1932	n.a.	.238	n.a.	.096	.236	.303
1933	n.a.	.143	n.a.	.044	.382	.430
1934	2.236	.735	.304	.100	.679	.805
1935	2.484	1.068	.252	.109	.669	1.791
1936	2.983	1.786	.224	.134	.721	2.303
1937	4.453	2.161	.262	.127	1.095	4.080
1938	4.070	2.153	.277	.146	1.151	2.793
1939	6.021	4.851	.251	.202	1.130	3.321
1940	4.387	2.813	.215	.138	1.228	3.716
1941	2.468	1.314	.118	.063	1.538	3.075
1942	2.819	2.312	.130	.106	.681	1.916
1943	2.823	1.593	.126	.071	1.761	2.357
1944	6.912	6.118	.174	.154	2.105	5.228
1945	13.403	9.004	.244	.164	1.933	8.533
1946	8.673	6.565	.148	.112	3.956	9.845
1947	22.987	11.263	.248	.121	7.955	13.400
1948	18.233	8.589	.225	.106	5.028	6.159
1949	7.860	11.671	.111	.165	1.041	4.420
1950	20.749	15.049	.174	.126	8.935	6.919
1951	33.861	17.757	.214	.112	13.154	10.661

SOURCES AND METHODOLOGY FOR TABLE A-165: The figures of Column 1 come from the Anuario de Comercio Exterior, published by DANE. Column 2 gives ECLA's estimates of imports of services. Column 3 is the sum of the first two columns.

Column 7 is based on the detailed statistics taken from the Anuario de Comercio Exterior. The definition of agricultural imports is arbitrary, in the sense that there is no traditionally defined rule which indicates the share of value added in the final price of a given import which must have been contributed by the agricultural sector before it is classified under another title. The inclusions in Column 7 are the following: wool and other hairs; foods based on crops, both processed and unprocessed (though with the larger portion in each year being unprocessed); food products coming from forests (usually a quite small item); crop raw materials; raw materials from forests; raw and intermediate products based on animals; processed or unprocessed animal foods. With this list of inclusions, the total agricultural imports of 1951 are 158 million pesos, roughly. Some of the inclusions in the calculation of this figure are dubious, but seem to be desirable for purposes of continuity with the post-1950 figures. This includes products of the forest, which in the post-1950 figures tend to get lumped in with vegetable products in such a way that it is very difficult to distinguish between them. Also there is a conceptual problem in defining which tree products really fall in the category of agriculture and which in the category of forest products. Since these two categories(forest products and processed foods) are the two least plausible inclusions, we present separate figures for them in the table.

"Gomas y resinas" was a large category in 1951 and some preceding years. Presumably natural rubber was the major component of this category and it is usually considered an agricultural item. But this is not clear since rubber is also listed separately. But under this separate listing the quantity is smaller than that found in the detailed classification of imports, so it remains possible that some rubber is included in "gomas y resinas." In any case there is a real possibility that whatever is in that category, apart from rubber, would be an agricultural type product. Wood, etc., seem to have been small items so we did not exclude them. Figures as we took them from the Anuario de Comercio Exterior were classified into: crop foods processed and crop foods unprocessed; crop raw materials (including rubber from a section later in the classification); forest products (food and non-food); wool and hairs' anomal raw materials. Column 4 (food) includes processed and unprocessed crop, animal and forest based foods. Since the classification is defined in terms of food vs non-food products, one might assume that the breakdown would be reasonably accurate. This is not necessarily true however. Its relation to the IMF figures in Table A-156 is interesting, however.

Table A-166

Registered Imports of Agricultural Items Related to Total Registered Imports 1950-Present

Absolute Figures in Millions of Dollars

Year	Goods (1)	Services (2)	Total Goods & Services (3)	Food excluding Malt (4)	Animal & Vegetable Oils & Fats (5)	Raw Materials (7)-(4)-(5) (6)	Total Agricultural Imports (4)+(5)+(6) (7)	Agricultural Imports/ Imports of Goods & Services (8)	Agricultural Imports/ Imports of Goods (9)
1951	419.0	125.0	544.0	25.268	240.13	11.889	61.170	.112	.146
1952	451.4	108.5	523.9	26.659	21.372	11.184	59.218	.113	.143
1953	546.7	126.0	672.7	34.287	26.600	- .082	60.805	.090	.111
1954	671.8	134.1	805.9	54.109	35.988	-3.987	86.110	.107	.128
1955	669.3	149.7	819.0	--	--	--	--	--	--
1956	657.2	147.1	804.3	32.160	45.459	2.759	80.378	.099	.122
1957	482.6	151.3	633.9	35.515	16.277	28.920	80.712	.127	.167
1958	399.9	172.0	571.9	28.354	12.991	25.713	67.058	.117	.168
1959	415.6	147.6	563.2	30.643	10.821	20.449	61.913	.109	.148
1960	518.6	180.0	698.6	28.440	13.580	18.149	60.169	.086	.116
1961	557.1	189.9	747.0	38.272	7.161	21.393	66.826	.089	.119
1962	540.4	175.6	716.0	33.972	10.283	16.125	60.380	.084	.112
1963	506.0	238.6	744.6	22.526	4.450	21.220	40.196	.065	.095
1964	586.3	--	--	41.454	7.907	18,671	68.032	--	--

Table A-166 (continued)

Year	Food Imports/ Agricultural Imports	Cereals (Including Malt and Other Simple Preparations	Animal Based Products	Cereal Imports/ Agricultural Imports	Animal Based Imports/ Agricultural Imports	Prepared Foods
	(10)	(11)	(12)	(13)	(14)	(15)
1951	.413	13.808	8.066	.226	.132	4.264
1952	.450	12.436	6.800	.210	.114	7.306
1953	.564	12.142	9.522	.200	.156	9.719
1954	.628	22.780	19.739	.264	.229	15.100
1955	--	13.688	--	--	--	13.742
1956	.400	16.924	11.335	.210	.141	9.696
1957	.440	19.536	11.312	.242	.140	12.194
1958	.422	15.142	10.719	.225	.159	--
1959	.495	17.502	12.421	.282	.200	6.996
1960	.474	12.916	14.685	.214	.244	3.006
1961	.573	25.198	16.995	.377	.254	4.169
1962	.563	14.848	16.138	.245	.267	5.286
1963	.467	--	15.489	n.a.	.321	4.268

SOURCES AND METHODOLOGY FOR TABLE A-166: Column 7 which corresponds conceptually (as closely as we could make it) to Column 7 of Table A-165 is based on a similar set of inclusions. Forest products, which are no longer distinguishable from vegetable products in any of the aggregations of the Anuario de Comercio Exterior, are certainly included to some degree, although not all such products are included. We have excluded pulp and paper, cut wood, and cork which were included in the figures of Table A-165. The figures in Table A-166 also include prepared food items, and as in the case of Table A-165, these are listed in a separate column for comparative purposes.

Our inclusions in the category "food" (Col. 4) were crops & products: wheat, rice, corn, other cereals (excluding barley);coffee, tea, cacao, chocolate; flour, ground grains, fruits, vegetables, sugar, candy, herbs, margarine and vegetable fats, other foods. "Seeds, nuts, etc." and "vegetable oils" are excluded. Animals & products: animals going primarily for food, meats, milk and butter, cheese, eggs, honey, animal oils and fats, processed oil and grease of animal and vegetable origin.

The major definitional problems revolve around the seeds, nuts, etc., category, and the animal and vegetable oils and fats. We are over-including in some categories and underincluding in others. The total of the dubious categories has been falling, but remains large enough to put the total and its direction of change into considerable doubt. Column (5) includes those animal and vegetable based oils and fats not included in the category "food."

Table A-166a

Imports and Agricultural Imports: Alternative Series, 1951 and on

Year	Registered Import of Goods	Imports of Services	Registered Imports of Goods and Services	Registered Imports of Agricultural Items				Registered Imports of Agricultural Products/	
				Food	Animal and Vegetable Oils and Fats	Raw Materials	Total	All Registered Imports of Goods	All Registered Imports of Goods and Services
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1951	419.0	125.0	544.0	22.673	3.70	37.347	62.889*	15.0	.116
1952	415.4	108.5	523.9	22.581	5.30	35.369	62.165*	15.0	.119
1953	546.7	126.0	672.7	26.700	9.71	29.05	55.109*	10.1	.082
1954	671.8	134.1	805.9	46.696	9.86	33.474	87.785*	13.1	.109
1955	669.3	149.7	819.0	39.997	7.72	34.791	78.552*	11.7	.096
1956	657.2	147.1	804.3	28.897	4.91	48.492	78.714	12.0	.098
1957	482.6	151.3	633.9	29.870	6.00	48.133	79.279	16.4	.125
1958	399.9	172.0	571.9	23.693	5.22	43.203	68.106	17.0	.119
1959	415.6	147.6	563.2	23.651	7.44	36.862	63.086	15.2	.112
1960	518.6	180.0	698.6	18.984	9.59	37.590	61.317	11.8	.088
1961	557.1	189.9	747.0	33.415	4.94	34.921	67.354	12.1	.090
1962	540.4	175.6	716.0	23.378	10.90	34.412	62.389	11.5	.087
1963	506.0	238.6	744.6	15.870	7.02	35.584	51.116	10.1	.069
1964	586.3								
1965									

IN THE 1960s, MANY POLITICIANS IN COLOMBIA STILL BELIEVED THAT increases in agricultural production required large, capital-intensive production units, and Berry showed that employment and production could increase if technology and other inputs were delivered to medium and small farms.

These ideas supported land reform policies, as long as they generated productive units of sufficient size. Berry also discussed the inevitability of solving extreme poverty in rural areas through rural-urban migration, since given the large number of farms with insufficient land to guarantee a decent income, migration was called for to increase rural wages.

Miguel Urrutia Montoya

[Extract from the Foreword]

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