DEVELOPMENT OF THE AGRICULTURAL SECTOR IN COLOMBIA

by

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CHAPTER I

An Introduction to the Key Issues in Colombian Agriculture

The performance of a country's agricultural sector may be judged by whether it produces enough food and raw materials so that their prices do not become too high, and whether it provides farmers with adequate income levels. In the long run, at least, these two goals tend to be closely linked; high productivity is almost sure to lead to higher incomes of the factors engaged in the sector and to lower relative prices of the goods it produces. 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 its members. Its ability to expand output fairly quickly when prices rise is also important, as is its contribution to the balance of payments, in the form of exports.

During most of its history the agricultural sector in Colombia could not be construed as a serious bottleneck in the development of the economy.[1] This remains true today. Agricultural production has tended to rise at only about the same level as that of population for a decade now, but the demand is apparently rising rather slowly so that this is all that is required to maintain more or less stable relative prices of agricultural and non-agricultural products.[2] And there is very clear evidence that the

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[1] Except in the sense that it is a large part of the economy; in one sense every sector is a bottleneck in that the economy would progress faster if costs went down in that sector.

[2] See Table II-4 for the detailed price series. There was a mild (10 per cent) increase in food prices as compared to other prices in the blue collar workers cost of living index during the two decades 1945-1964.

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potential productivity of the sector is very high. In the long run it is not difficult to think of means by which large increases in output could be achieved. Whether such means will be implemented remains to be seen. Our understanding of the sector is still too deficient to be able to predict with 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 would 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 a possibility; that of poverty due to very uneven distribution of income within the agricultural sector is already severe and could become worse. Here both past and future trends are in

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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 pre-war upward trend in the relative price continued to the mid-fifties 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.

doubt; much effort would be required to get a clear picture of the way income distribution has changed in the last thirty or forty years and more to guess whether past trends are likely to continue into the future.

The behavior of income distribution in the future, as well as that of output and exports of agricultural produce, will depend on the patterns of development of each of four important subsectors, i.e., coffee, livestock, commercialized crop growing, and non-commercialized or small-scale agriculture producing for the domestic market. Wide differences exist among these in terms of output per person, capital per person, land per person and technology; it is these differences which make it especially necessary to consider their individual paths in the future.

The generation of a high and increasing level of exports depends primarily on the performance of the coffee sector (although here the problem is principally the lack of demand and not difficulties on the supply side) and on the beef sector, which has historically been characterized by great inefficiency, latifundismo, absenteeism, and waste of resources. Since there are some crops, including bananas, sugar, cotton, and others, which are either exported currently or are potential exports, the commercial crop sector will also play a role in the achievement of this goal. Its likely contribution is, however, overshadowed by that of the coffee and beef sectors.[1]

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[1] With the passage of time it is hoped that 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.

The achievement of a sufficiently rapid output of goods to satisfy the domestic market in such a way that the relative price of agricultural goods does not rise will depend on the livestock, commercial and domestic sectors. Much of the recent increases in production of crops have probably occurred on commercial farms, and further increases in commercialization and mechanization of agriculture will probably contribute to the achievement of this goal. To the extent, however, that commercialized agriculture becomes the source of a high proportion of future increases in output, it may worsen the distribution of income among the people in agriculture. Whether such an event occurs--or more specifically whether the lower stratum of the agricultural income earners becomes better off or worse off in relative and absolute terms--will depend largely on the relative increases in technology and in land and capital as between large-scale farming and small-scale farming.

A very marked dualism has already developed within agriculture, almost entirely within the last fifteen or twenty years. Commercial planting of cash crops on a reasonably technical basis has developed rapidly, thus contributing to the increase in total output. Meanwhile a very large segment of the agricultural population retains its traditional methods, along with its small plots of land and low amount of capital, and barely ekes out a subsistence income. If one disregards the presence of the livestock and coffee sectors, which are to a considerable degree non-competitive with the rest of agriculture, then it can be seen that the fate of most of the low income earners in agriculture will depend to a large degree on the interaction of the traditional and commercial sectors in the future. If production on the large farms increased just sufficiently rapidly to meet the total

increase in demand generated by the non-agricultural sector, and the situation on the small farms remained unchanged, (including the number of people) then income per person on these farms would likewise remain unchanged. If the output of the large farms increased even faster, then agricultural prices would fall, and income per head would fall on the small farms unless their output increased enough to more than offset the falling prices (which would be further reduced by added output from the small farms, however), or the active population decreased. If output on the large farms increased relatively slowly, the small farmers would probably fare better. They would be better off the more rapidly their own output increased, as long as the demand for their marketable surplus[1] had an elasticity not much less than one.[2]

Another group, the landless farmers, could be displaced by increasing mechanization, which tends to characterize the commercial farming.

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[1]The demand for their surplus would be the total demand for agricultural produce on the part of the non-agricultural sector minus the supply of the large farms.

[2]If the elasticity were one their revenue would remain unchanged if they sold more. But the higher productivity and lower price would induce the farmers to consume more of their own output and thus improve their welfare.

It should be noted that the importance of the relative price of agricultural goods for any given group selling such products depends on the portion of their consumption bundle which is composed respectively of agricultural and non-agricultural goods. The more agricultural goods entering this basket the less will be the negative income effects of a fall in relative prices of agricultural goods. Thus, for the poor farmer who is completely self-sufficient, the relative price of agricultural goods has no significance at all. In Colombia, for the poorest farm worker, food might compose up to 80 or 90 per cent of outlays or computed outlays. The great majority of small farmers and landless workers probably spend more than 60 per cent of their incomes in this way, including "purchases" of goods they themselves produce. (This is an estimate since no figures of any generality are available.) Whether the food is produced at home or in some other part of

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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, 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 is in fact almost certain. 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. 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 the variables already discussed.

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

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the country is irrelevent as long as transportation costs and marketing conditions do not change, and changes in the relative prices of different types of foods serve to redistribute income among the producers involved but not to affect their average income substantially. Since the commercial farmers are much better off, and correspondingly spend a higher proportion of their income on non-agricultural goods, a decrease in the relative prices of their outputs hits them harder, but this is not our concern here.

for agricultural products increases. This increase will be the more rapid the greater is the growth of the industrial and other non-agricultural sectors' income, and the greater is the growth of demand for exports from the agricultural sector. In a closed economy, and given an income elasticity of demand less than one, 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.[1]

Time series and budget studies suggest a low income elasticity of demand for food and for agricultural produce in general. The only detailed budget study was carried out in seven major cities by the Statistical Office (DANE) in 1953.[2] Calculations based on the figures collected at that time suggest income elasticities of demand for food on the order of .4 for the highest frequency incomes for white collar workers (empleados) in Bogota

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[1]For example, if the income elasticity of agricultural goods was .5, then agricultural output could only increase at a rate one-half as great as that of the economy as a whole, i.e., something less than half as great as that of the non-agricultural sector. 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 to fall. In the Colombian context, with value added in agriculture about one-third of value added in the economy, the agricultural sector could only increase its output at about two-fifths the rate of the rest of the economy if relative prices were to stay the same. 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 2.5 per cent and the rest of the economy somewhere between 6 and 7 per cent. In fact, one must allow for the existence of exports and imports in drawing such a relationship between agricultural production and price.

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

and .6 for the highest frequency incomes for blue collar workers (obreros).[1] While these elasticities do not imply comparable ones for the demand for agricultural produce in the countryside, there is some relation between them.[2]

Based on the same 1953 survey of urban families, ECLA[3] 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;[4] 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

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[1] 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.

[2] They are not equivalent because:
(a) the agricultural sector produces exports and non-food products;
(b) urban food prices include a margin for commerce, processing, etc. and this margin may vary for the foods consumed by people at different income levels;
(c) the share of personal income in total income may vary (an elasticity based on a time series or calculated with a view to being applicable over time would have to allow for this).

[3] United Nations, Analyses and Projections of Economic Development; The Economic Development of Colombia, United Nations, Geneva, 1957, p. 253.

[4] Op. cit., p. 26.

for food of 0.48.[1] The comparable income elasticity would be somewhat lower.[2]

Table I-1 presents figures on the value of agricultural production, exports, imports and aggregate supply on the domestic market. Relating aggregate domestic supply to figures on gross national income and the relative price of agricultural products, we obtain Equation (1). It suggests an elasticity of demand of 0.30 (calculated at the means) for changes in gross national income.

$$(1) \quad Q = \underset{(11.21)}{-36.17\ P} + \underset{(.015)}{0.239\ Y}$$

$R^2 = .984$ on 10 degrees of freedom

where,

Q = quantity of agricultural produce, in pesos

P = a price index

Y = income, in pesos

(Price elasticity of demand, also calculated at the means, is 0.63.) Although it does not distinguish between growth in demand through population growth and through increases in income per person, the income elasticity of

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[1] Expenditure-elasticity is defined as the per cent change in expenditure on a given item when total expenditure rises by 1 per cent, and the relative price of the item in question remains constant. The calculation here is at best illustrative, since relative price of food is higher in the city (tending to make it an underestimate of the true expenditure elasticity) and the rural-urban shift no doubt affects the figure, so that it would not likely be the same as the comparable calculation made for the same income groups in the city, or in the country. The fact that it is based on two averages, each based on very wide ranges of income, also introduces difficulties.

[2] My calculations of the two elasticities for Bogota showed the expenditure elasticity being from 50 to 100 per cent higher than the income elasticity depending on whether white or blue collar workers were being considered, and on the income range used.

TABLE I-1

Domestic Supply of Agricultural Goods and Their Relative Prices

	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 (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

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TABLE I-1, continued

SOURCES AND METHODOLOGY: Column 1 comes from unpublished tables of the Banco de la Republica. Columns 2 and 3 are based on figures published in the Anuario de Comercio Exterior. But in the case of coffee, exports were defined as output minus domestic consumption; otherwise changes in stocks or changes in contraband exports could lead to errors. The method of calculation used was thus equivalent simply to the addition of estimated domestic consumption of coffee to the estimated consumption of other agricultural goods. Column 4 is Column 1 minus Column 2 plus Column 3. Column 5 comes from the deflation of Column 4 by a series of the price of agricultural products received by the farmer, adjusted so as to exclude the influence of coffee prices except to the extent that coffee is consumed in the country. Column 6 is the relative price of agricultural products in the domestic market, as defined by a division of the agricultural product price series by the gross national income deflator.

Equation (1) could be used for predictive purposes, if the population is expected to continue to grow at about the same rate as in the past. An extrapolation of this elasticity to the future,[1] along with the assumption that the demand for net exports (i.e., exports minus imports) increases at the same rate as that for domestically used produce, would imply a rate of growth of agricultural output for the domestic market of only a little over one-quarter of the rate of growth for the rest of the economy to give stable prices. Even if the income elasticity were 0.5, agriculture would only have to grow at 40 per cent of the rate of the rest of the economy.

Probable Development of Commercial, Large-Scale Agriculture

The development of mechanized commercialized agriculture has been a phenomenon almost entirely of the last two decades in Colombia. It is variously applauded for its contribution to otherwise lagging output, and bemoaned since it tends to be mono-crop cultivation on rented land, with short-run profits as a goal, and little consideration for maintenance of land quality.[2] It has been argued that this lack of concern for the longer run will eventually halt the increase in this type of farming. Given developments in the technology of agriculture in the developed countries, it seems unlikely that mono-crop cultivation will leave any lasting negative

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[1] Since the income elasticity of demand for any product may vary with income levels, and since the composition of demand for agricultural goods (e.g., as between food products and industrial raw materials) may also vary over time and with income levels, such an extrapolation must be a crude tool.

[2] Another criticism of this type of operation is, of course, that it is not very labor intensive in general, and hence does not help to solve the problem of rural underemployment. But this is, for the moment, a separate question.

effects on the land quality,[1] and that the increase in commercial agriculture will for this reason soon level off. 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 decrease the supply substantially;[2] but this also seems somewhat unlikely inasmuch as improvements in technology are likely to match any such negative factors. Pending more detailed studies we can guess that commercialized farming will continue to expand for the forseeable future.

Technology and the Technological Gap Between Commercial and Traditional Farms

Yields of some crops appear to be considerably lower on small-scale farms now than on the larger-scale commercialized farms (see Table A-53 of the appendix). Technology is more retarded on the small farms for almost all 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 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) would probably tend to close this gap. But during the last couple of decades the gap has certainly widened,

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[1] 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.

[2] 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, with other things (including the prices of the inputs) held constant.

Many of the commercial farmers are city based, and the opportunity cost of their own time and capital is much higher than that of the small farmer.

so one cannot be optimistic about its narrowing in the next decade or so. Again there is a great dearth of quantitative evidence which can be brought to bear on this issue.

Rural-Urban Migration

In the event that commercial farming continues to proceed apace, and that technological progress occurs relatively no more rapidly in the small-scale farm than in the large one, then the only salvation of the small-scale farmer may be emigration. Here a vicious circle effect has already been 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. Both of these considerations make emigration less probable and increasing overpopulation 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. Its failure to do so would not be particularly problematic 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 seems unlikely. Thus the dye 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 out migration can be greatly facilitated by increases in education, or other incentives which increase mobility.

The Outlook of a Specialist

In an interesting commentary on the possibility that various government extension services might effect the desired redistribution of agricultural income, the sociologist Andrew Pearse, who is very familiar with the Colombian rural landscape, 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.
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> 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 to city destinies.[1]

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 new kind of reference group for the well-off peasants and tends to widen the degree of social differentiation.

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

The numerous examples of labor legislation in Latin America have done relatively little to improve the lot of the peasant. The usual result is the development by the patrons of more generalized extra legal forms of control, based on a unionization of patrons, including "black list," threats of dismissal, and, on occasion, terror against leaders. 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.

The remainder of this book will focus on the sources of output growth in the past (Chapters II and III); the implications of the land tenure

system and other aspects of the structure 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 V); the contribution, past and potential, of agriculture to exports (Chapter VI); the distribution of agricultural output (Chapter VII); and some current topical issues such as the implications of land reform, mechanization, supervised credit and several other relatively recent phenomena (Chapter VIII).

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CHAPTER II

Historical Development and Sources of Growth in Colombian Agriculture

This chapter gives a brief look at the historical development of agriculture in Colombia, and presents some crude guesses as to the relative importance of the direct sources of growth--land, labor, capital and a residual whose chief component is probably technological change. The figures on these aggregates are dubious in the first place and any guesses at their effects on output are the more dubious due to our lack of knowledge as to the nature of the production function. But the exercise is of interest since the estimates probably do indicate the general range of importance of the different inputs.

A. A Brief Historical Overview

Growth and Change

For the bulk of Colombia's history, its agricultural sector and its population have been concentrated in the Andean highlands, where health conditions were (and to a lesser extent still are) better than in the disease-ridden lowlands. Only in the latter part of the nineteenth century and in the twentieth century has a redistribution of the agricultural population on a large scale gotten under way.[1] And, only in this same period has the rise

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[1] 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

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of coffee as a major export made Colombia a trading economy. In the nineteenth century, coffee was preceded by three other agricultural exports--tobacco, quinine, and indigo. Each of these rose and fell, making little impact on the domestic economy, partly because of the relatively short duration of their reigns, and the relatively small quantities exported. The fact that they tended to be produced by monopolies, or by comparatively small numbers of people, was in part responsible for their leaving few if any improvements in the domestic transportation system, and leading only to the importation of consumer goods, many of them luxury goods.[1]

Coffee began to take on major importance around the 1880's and continued to expand dramatically through the 1920's, and at a slower rate thereafter. It led to a transformation of the whole economy. The eastern departments of Santander and North Santander were the original home of coffee production, but the new crop led eventually to a more important transformation in the Quindio region of Caldas, Tolima, and Huila, as well as in parts of Antioquia, Valle, and Cundinamarca. Settlers from Antioquia swarmed over the temperate slopes of Caldas during the latter part of the nineteenth century, eventually giving this department one of the densest rural populations in the country.

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regions, by a winter), and the rapidity of growth of weeds, all constituted negative factors. Rainy season floods drowned crops and livestock and even 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.

[1]An interesting contrast between the success of coffee, in terms of leading to a transformation of the whole economy, with 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."

While the population which derives its main source of income from coffee has continued to grow, and may even have taken a further jump as a result of the dramatic increases in the price of coffee between 1950 and 1956,[1] one may still think of the period 1880 to 1925 or 1930 as the one in which coffee became a dynamic moving force in the growth of the economy. Registered coffee exports grew at about 5.6 per cent through the whole period 1880 to 1930. (The same rate of growth applies between 1898, which was a peak year of the late 1890's, and 1930.)

While coffee accounted for much of the change in the country from 1880 on, the value of coffee produced was, even by 1950 (a year of fairly high coffee prices), only one-third of the value of all crops. (At the turn of the century this ratio must have been much lower, say 10 to 15 per cent.[2] (At the turn of the century probably only about 10 to 20 per cent of farmers engaged in crop production were producing coffee. By 1930 the ratio was probably

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[1]The hectares planted to coffee did react very positively to this price increase and output, after the gestation period rose, although not dramatically. Preliminary results of the 1964 census of population, however, showed decreased rural populations in three of the coffee growing departments most wracked by the rural violence. So it seems unlikely that the "coffee population" increased greatly unless there was a good deal of switching from non-coffee crops to coffee within these departments.

[2]Coffee exports rose only 3.5 per cent per year between 1930 and 1940 and not at all between 1940 and 1950--thus the end of the rapid expansion came around 1930. But since coffee prices rose relative to other agricultural prices between 1930 and 1950, the value share of coffee must have been lower during the earlier years of this period; it was lower still at the turn of the century since coffee output grew faster than that of other crops between 1900 and 1930, and the relative price of coffee probably increased if anything during the period.

30 per cent or higher and by 1960 about 45 per cent.[1]) So, as in all underdeveloped countries, crop production for domestic consumption was the chief activity. Production statistics for crops are at best educated guesses--output must have been rising somewhat faster than population. An estimate based on ECLA figures for the period 1925 to 1950 would suggest an annual increase of about 2.5 per cent. Population was growing at 2 per cent (more or less) at the turn of the century; by 1950 the rate was about 3 per cent.

Livestock production is carried on in an extensive (as opposed to intensive) way. Registered slaughter (and presumably actual slaughter as well), has grown sluggishly over time; between 1925 and 1950, according to ECLA figures, the rate of growth was about 2.25 per cent per year. Since 1950 it has risen at a somewhat healthier 3.1 per cent. As of 1950 value added in the livestock sector averaged about half that in crops, i.e., one-third of the value of crops and livestock together. Considering the whole period since 1925 the ratio has usually been higher than this, often as much as 40 per cent of the crop plus livestock total.

ECLA noted[2] that the growth of livestock production had almost exactly paralleled the growth of the population between 1925 and 1953 (2.1 per cent),[3] whereas crop production grew at a more rapid 2.6 per cent. Overall agricultural production grew unevenly during this period; the fluctuations are explained by ECLA as follows:

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[1] In 1960, the ratio of farms with some coffee to all farms primarily devoted to crops was about 47 per cent, while the per cent of value of crop production contributed by coffee was only about 34 per cent. I assume arbitrarily that the per cent of farms growing coffee is higher than the per cent of crop production which is coffee for earlier years as well. It is a natural result of the fact that many farms grow coffee but also other crops.

[2] United Nations, op. cit., p. 152.

[3] This may have been something of an underestimate for the rate of growth of population.

If the historical period is divided into phases, production is seen to have increased faster than population during the decade 1925-34. This period coincided with the development of the industrial sector, large-scale public investment (especially in transport), intensive urbanization programs and substantial investment, even in the agricultural sector itself, all of which appear to have acted as incentives to agricultural progress at the time when they took place (especially in 1925-30) and for several years afterwards. During the two subsequent five-year periods (1935-1944), agricultural production increased at almost the same rate as population, while per capita availabilities remained stable.

However, among other factors, heavier investment in the agricultural and livestock sector 1945-49 brought about a strong revival in production, which raised per capita availabilities by 5.8 per cent in relation to the two previous five-year periods. Moreover, the influence was then felt of the policy followed by the Caja de Crédito Agrario at the beginning of the 'forties, which not only set up stores (Almacenes de Provisión Agrícola) and established a rotary fund to encourage various important crops, but also substantially expanded loans to farmers. A policy for coffee protection was initiated and pursued, the principal effect of which was to maintain the high production level and even to improve upon it, but which also appears to have stimulated the cultivation of other crops. The area sown with staple crops was enlarged by more than 250,000 hectares (22.6 per cent), to the benefit of the agricultural and livestock sectors.

Finally, a significant change in agricultural production took place during the last four years of the period (1950-53), being reflected in a per capita production figure 2.8 per cent below that of the previous five-year period. The sharp decline in agricultural production in 1950 owing to bad weather, and its slow recovery in subsequent years, together with lower farm investment, a drop in livestock production during the last two years, and civil disturbances, which were particularly pronounced in rural areas, were the main factors responsible for this change.[1]

Production techniques in agriculture probably showed little improvement until around 1945 or 1950, and net capital formation appears to have been small.

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[1] United Nations, op. cit., pp. 152-153.

It seems, then, that most of the output increases which occurred in the crop sector were the result of the use of more labor and land, and of the stimulus resulting from the opening up of trading possibilities.[1] The agricultural labor force (crops and livestock) was probably growing at a little above 1 per cent between 1918 and 1951.[2] That part applying itself to crops was probably increasing at a comparable rate.

A major new development within the agricultural sector in the post-World War II period has been that of a commercial, technical, mechanized sector, producing such crops as rice, cotton, sugar and corn. According to ECLA's estimates, which are presented in Table II-2, the capital stock in machinery and equipment in agriculture was virtually the same in 1950 as in 1925. (It had been rising gradually during the late 1920's and early 1930's only to fall again as a result of the depression and the war years.) This indicates that agriculture in Colombia was not becoming more mechanized until the post-World War II period, to which the commercialized sector owes its origin. Since 1950, and especially during the period 1950 to 1957, the stock of machinery and equipment in the country increased very substantially, and although it seems to have fallen off or failed to increase since the late 1950's due to the tightness in the balance of payments, it is still considerably above the 1950 level.

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[1]This conclusion corresponds to that of Hla Myint, "The Theory of Comparative Costs and the Underdeveloped Countries," Economic Journal, June 1958.

[2]This is suggested by the ECLA figures (Statistical Annex to United Nations, op. cit., p. 6) showing a growth of 1 per cent between 1925 and 1950. The growth was only 1 per cent between 1925 and 1930, according to their figures, but 1.3 per cent between 1925 and 1940 (or 1.4+ per cent between 1930 and 1940), with this faster growth--possibly just assumed by ECLA--maybe being reasonable during the depression years. Very little growth was assumed for 1946-1953 (less than 1 per cent), presumably due to the violence.

Technical change, like mechanization, has been relatively slow through most of this century, but has probably accelerated in the post-World War II period. The increase in output between the years 1951 and 1964 resulting from this source was probably between 0.5 and 1.5 per cent per year.[1] Interesting new developments are currently occurring in the field of plant and animal research, much of it stimulated by the Rockefeller Foundation.

Some Charateristics of Agriculture

The technical level of agriculture has always been low in Colombia. Historically, this has 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. 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 than various foreign breeds, being small, slow to mature, and low yielding. The death rate is high and steers are still light at slaughter. (More details on this are presented in the annex on livestock.) Pasture development has been slow, and the storage of fodder and feeding of concentrates very limited. In the case of crops the lack of education of the farmer and the lack of government interest in improvement have helped to maintain the low level status quo.

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[1] See crude calculations later in this chapter.

The low level of technology manifests itself in a great variety of ways, as for example, the following:

1. A very widespread use of unimproved seed. A decade ago, ECLA, in its study,[1] suggested that only in the cases of cotton and sugar had the use of improved varieties resulted in generally increased yields. Since then barley can be added to this list. Hybrid corn is now widespread in the progressive Cauca Valley, though not generally in the rest of the country; the average yield for the country does not appear to have risen. Improvement has also occurred in rice, wheat, potatoes, tobacco, and possible several other crops; the effect may have been considerable in the cases of potatoes and tobacco, whose yields have risen substantially since 1950. There is the problem of identifying what part of the increase in yield is due to better varieties and what part to other changes; not enough research has been expended in this direction to provide us with the answer.

2. Limited use of fertilizers. In the case of chemical fertilizers the shortage of capital and credit and the weakness of the distribution system contribute to the problem. But lack of information is also important. Such potentially useful material as the waste products of slaughter houses are generally not turned to any account, characteristic of a general tendency to waste in the Colombian economy. (See Tables III-24, III-25 and III-26 for specific data.)

3. Serious erosion in several parts of the country, which becomes dramatic (and even scenic) in such regions as Santander and Boyaca. This adds to the

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

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.[1]

4. Little knowledge of soil conservation practices. Luckily this 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.

5. 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.

The achievement of technological progress has been slowed by a variety of problems, one of which no doubt is the low level of literacy and income of the typical farmer. But there are others. 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 made even more ineffectual by the extensive method practiced under which there is absentee ownership, etc. In the case of plants difficulties are compounded by the very small size of farms, most of which grow several crops. The various crops are attacked by different plagues and a complete control would involve all of these farms exercising the appropriate measures. The possibility that any one farmer will do so effectively is less the more different crops he has, and the possibility that a given crop will be treated throughout an area is less the greater the number of farmers growing it. Progressive

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[1]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.

farmers often run into difficulty because of reinfection from their neighbor's farms.

As of the early 1950's, ECLA suggested[1] 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 but remains deficient. The use of fungicides, insecticides, and weed killers has at times been hampered by balance of payments problems; it had shown an erratic increase from 1950 to 1956-1957, but in both 1958 and 1959 was below the 1950 level.[2] 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 per cent of the grain produced annually in Colombia is destroyed by fungi and pests.[3]

A shortage of technical experts contributes to the low performance of agriculture. This is a natural result of an education system which has traditionally almost completely disregarded agricultural training from the elementary and secondary levels on through to the University level. Those

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[1] United Nations, op. cit., p. 142.

[2] According to unpublished estimates of the Banco de la Republica. I do not have figures for the years since 1959.

[3] The Rockefeller Foundation, Program in the Agricultural Sciences, Annual Report, 1959-1960, p. 114.

people who do pass through this system are not well paid and are often obliged to take up other work.[1]

There has been a multiplicity of public and semi-official organizations dealing with agriculture, the majority not connected with the Ministry of Agriculture. This has led to a dissipation of economic and technological resources and a lack of unified action, thus decreasing the total effect 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 has been about 10 per cent. While much of the remaining 90 per cent is on very sloped terrain and of poor quality, there is probably still a reasonable amount of untapped land resources. Introducing the social infrastructure which would make this land a part of the economy would be expensive in many cases and most informed persons believe that the most efficient way to increase agricultural production at the moment is by increasing the yields on currently cultivated land. During the twentieth century, land under cultivation has, however, continued to increase, according to the questionable figures which we have.[2] Estimates of the rate of increase in the years 1951 to 1965 are about 1.25 per cent, and for 1938 to 1951, in the neighborhood of

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[1]ECLA noted this over ten years ago, and although minor attempts have been made at improvement, the picture has not changed significantly (see Chapter 3, p. 67). United Nations, op. cit., p. 144.

[2]The American Embassy, the source of these figures for 1951 and on, does not indicate how problems of double cropping are handled. One might guess that a change from one crop to two per year usually occurs on a large-scale farm only when irrigation is introduced, and since this has not occurred to any great extent in Colombia, such an interpretational problem may not be very serious. A more serious problem is the accuracy of the estimate itself.

1.95 to 2.05 per cent. In other words, the rate of increase in land cultivated seems to be decreasing.[1]

A frequently noted characteristic of agriculture in Colombia is that the crop farms are usually located on mountain slopes or on steep or broken ground, whereas flat lands, often of high quality, are used for livestock. This phenomenon, whose implications for total output and for equality of income will be commented upon later, has had several causes.

1. As the frontiers of agriculture progressed the extensive tracts of flat land were bought by wealthy purchasers for stock farming (some large tracts had been given by the Crown in the older parts of the country), always in large plots. Consequently, the poorer farmers had to resort to the less productive land.

2. Due to more favorable health conditions, the high and middle altitude regions were settled earlier than the flat lands, most of which are in hot regions, where periodic floods and the existence of permanent swamps made life difficult and hazardous. Thus population, over the course of time, became more dense in the former regions.

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[1] Several studies have been done at various times on the currently unutilized land susceptible to utilization. One of the first general surveys was that presented by ECLA (United Nations, op. cit., p. 163), 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 per cent in Caldas to about 100 per cent in Cordoba. For the departments as a whole it probably averaged around 35 per cent. 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.

INCORA (the Colombian Institute of Agrarian Reform) is currently engaged in a classification of the country's land by quality; this should throw much more detailed light on the extent of untapped resources in land.

3. Part of the hillside population is now made up of former gold miners, an occupation dating back several centuries.

Mechanization practices, while they have increased a good deal since World War II, are still not too widespread (whether this is good or bad will be discussed later). Mechanization has been used primarily in 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. 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, tomatoes, cotton and bananas for export has been efficiently spread. Spraying from planes is common for cotton.

ECLA noted a severe lack of agronomists specializing in advice on the use of implements, with the result that many farmers did not know either how to operate them, or the ways in which they were optimally used. Lack of roads has sometimes precluded use of heavier machinery because of difficulties in transport of the machinery itself, and of fuels, parts, etc. The severity of these problems has receded somewhat in the last decade. But there has still been little research on the economic use of machinery, or the amount it can contribute to output.

A characteristic of poor and backward agricultural regions is single-cropping with a resultant loss of soil fertility and an inability, both cultural and technological, to revitalize the land.[1] Moreover, the average crop

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[1]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, so that there is always a 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 is not a serious danger.

produced is susceptible to wide price fluctuations and therefore the one-crop farmer's income is subject to significant variations. Unfortunately, no figures are available on the extent of single crop farming.[1]

The Colombian economy is characterized by very disparate income levels in different regions. This general phenomenon holds 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 Nariño, Cauca and Boyaca. The stimuli of differing income levels for farmers in different regions has led to considerable movements of the farm population. The largest flow, as already mentioned, 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. The rural populations of Magdalena, Cordoba, Atlantico and Bolivar all grew at over 3 per cent per year between 1951 and 1964 (see Table A-90), while almost none of the other departments had rates of growth of even 2 per cent. This is strong circumstantial evidence of a rapidly increasing agricultural population.[2] The fairly large-scale

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[1]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 per cent 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.

[2]Figures from the 1964 population census on the agricultural labor force have not yet been published.

migration which seems to be implied by these different 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 and Caldas. Between 1951 and 1964 the rural populations of Huila, Tolima and Valle all decreased, while that of Caldas stayed about the same. Presumably there was, therefore, a push factor from these regions, not associated with economic variables. But this almost certainly does not account for the magnitude of the migrations involved here.[1]

B. 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 land, labor and capital, are all of such dubious quality as to render a sophisticated production function analysis out of the question. Nevertheless, the series available are presented and used in a crude way. Tentative guesses as to the relative importance of land, labor and capital as causes of the increase in output over fairly long periods of time are made; 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, cerdit, etc., cannot be even guessed at by production function analysis, but in Chapter III we discuss the micro-economic evidence available on them.

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[1] The statistics themselves, however, do not enable one to explain such 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.

Table II-1 gives summary figures on output and the major inputs, along with some ratios of these variables. Over the thirty-nine year period 1925 to 1964, output per man has risen at an average of about 2 per cent per year, thus approximately doubling over the period. Diagram II-1 shows on semi-log paper the trend in productivity per man based on a splicing together of the two output series (from ECLA and the post-1950 national accounts, respectively) presented in Table II-1. This trend has shifted slightly upward in the course of time and there is evidence that the sources of increases in output have changed over time.

The crude capital stock figures of ECLA suggest a gradual increase in capital per man between 1925 and 1953. No estimates of total capital have been made since then, to my knowledge, but it seems likely that this trend has continued. The machinery per man ratio did not show the same smooth upward drift. The cropped land per man ratio seems, if anything, to have risen between the years 1937-1938 and the early fifties, although again the figures are extremely dubious.[1] Unfortunately we do not have an estimate of the number of people engaged in crop farming and in livestock farming separately, so this ratio does not tell us whether the cropped land per man working in crop farming has risen.[2]

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[1] It is possible that cropped land was underestimated in 1937-1938 and therefore the rate of growth of cropped land from then to 1951 was overestimated. On the other hand, an increase in the ratio in question 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.

[2] If it has, this would seem to fly in the face of impressionistic evidence that farm break-up and minifundismo is getting worse in some regions. It is possible that the two are not inconsistent, but result from the increase in crop land occurring on the larger size commercial farms as these expand their area or switch from livestock to crops.

DIAGRAM II-1

Annual Output Per Man
(1950 pesos)

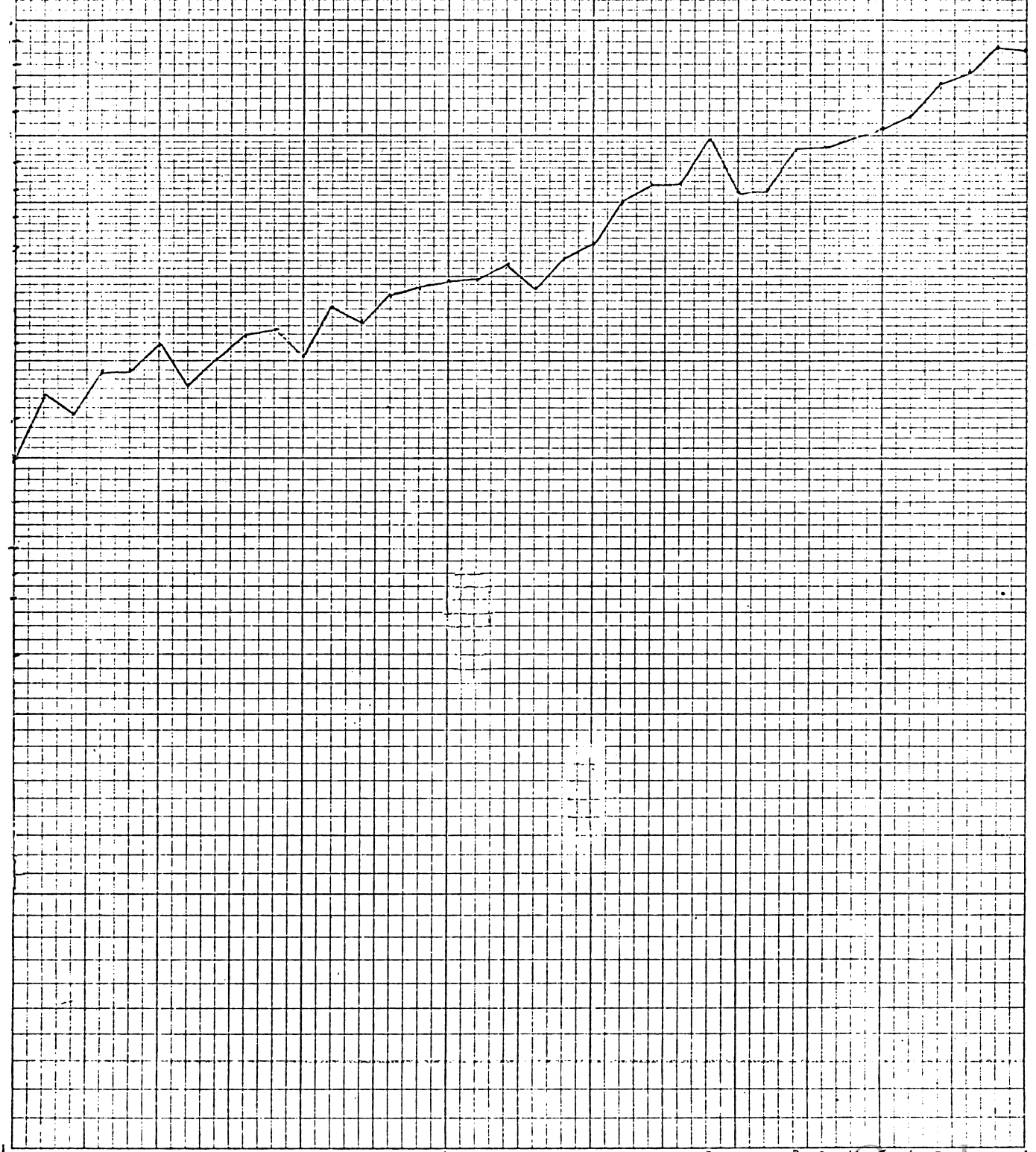

TABLE II-1

Output and Inputs of Colombian Agriculture Over Time

	Output (millions of 1950 pesos)		Output Indices			Active Population (thousands)	Capital (millions of 1950 pesos)	Land Used For Major Crops (thousands of hectares)[3]
	(1)[1]	(2)[2]	Crops (3)	Livestock (4)	Total (5)	(6)	(7)	(8)
1925	1,288		32.0	49.4	38.0	1,717	4,287	
1926	1,434		39.7	50.3	41.2	1,737	4,379	
1927	1,414		37.1	52.0	43.3	1,756	4,468	
1928	1,529		42.3	53.6	47.7	1,776	4,575	
1929	1,549		44.9	52.0	48.7	1,796	4,666	
1930	1,626		49.2	51.1	50.3	1,814	4,770	
1931	1,546		44.9	50.3	47.7	1,841	4,859	
1932	1,638		47.5	55.3	50.3	1,869	5,103	
1933	1,729		50.1	58.7	53.0	1,898	5,185	
1934	1,766		49.2	64.5	54.7	1,927	5,265	
1935	1,792		50.1	63.7	55.6	1,956	5,363	
1936	1,892		54.4	62.9	59.2	1,987	5,467	
1937	1,884		55.2	61.2	58.3	2,016	5,565	
1938	1,992		57.0	62.9	60.9	2,047	5,666	1,815-1,965
1939	2,024		58.7	62.0	61.8	2,067	5,774	
1940	2,070		66.4	61.2	63.6	2,086	5,922	
1941	2,098		61.7	63.7	64.5	2,104	6,091	
1942	2,164		63.0	66.2	67.1	2,124	6,299	
1943	2,118		59.5	70.4	65.3	2,146	6,533	
1944	2,227		63.0	74.6	68.9	2,166	6,777	
1945	2,307		66.5	76.3	72.4	2,186	7,008	
1946	2,465		71.6	79.6	75.9	2,191	7,237	
1947	2,556		74.2	82.1	78.6	2,193	7,444	
1948	2,562		73.3	80.4	77.7	2,197	7,677	
1949	2,728		80.3	83.0	84.8	2,199	7,774	
1950	2,505	2,808	69.9	86.3	77.7	2,202	7,936	
1951	2,591	2,842	79.1	74.9	78.6	2,216	7,909	2,585
1952	2,877	3,036	85.8	76.9	84.0	2,215	7,855	2,736
1953	2,863	3,043	87.1	76.6	84.2	2,215	7,924	2,606
1954		3,124	88.3	78.9	86.4	2,237		2,738
1955		3,201	87.1	88.4	88.6	2,260		2,714
1956		3,301	89.5	93.0	91.3	2,282		2,774
1957		3,503	95.6	97.2	96.9	2,305		2,636
1958		3,614	100.0	100.0	100.0	2,332		2,826
1959		3,795	107.4	102.0	105.1	2,351		2,976
1960		3,798	104.2	107.7	105.1	2,375		3,090
1961		3,947	107.7	110.0	109.2	2,399		3,002
1962		4,077	111.7	116.2	113.6	2,423		3,129
1963		4,101	108.6	124.8	113.7	2,447		3,039
1964		4,331	117.5	127.0	120.3	2,471		3,195

(continued on following page)

TABLE II-1, continued

	Total Cropped Land (thousands of hectares)[3] (9)	Output Man (in 1950 pesos) (10)	Capital Man (thousands of 1950 pesos) (11)	Output Capital (12)	Land in Major Crops Man (hectares) (13)	Land Under Crop Man (hectares) (14)	Index of Yields for Major Crops (15)	Index of Yields for All Crops (16)
1925		750	2.5	.30				
1926		826	2.5	.33				
1927		805	2.5	.32				
1928		861	2.6	.33				
1929		862	2.6	.33				
1930		896	2.6	.34				
1931		840	2.6	.32				
1932		876	2.7	.32				
1933		911	2.7	.33				
1934		916	2.7	.33				
1935		884	2.7	.33				
1936		952	2.8	.35				
1937		935	2.8	.34	.89-.97		280-309	
1938		973	2.8	.35				
1939		979	2.8	.35				
1940		992	2.8	.35				
1941		997	2.9	.34				
1942		1,012	3.0	.34				
1943		987	3.0	.32				
1944		1,028	3.1	.33				
1945		1,055	3.2	.33				
1946		1,125	3.3	.34				
1947		1,166	3.4	.34				
1948		1,166	3.5	.33				
1949		1,241	3.5	.35				
1950		1,138	3.6	.32				
1951		1,142	3.6	.33	1.2		306	
1952		1,223	3.5	.37	1.2		314	
1953	2,900	1,226	3.6	.36	1.2	1.3	334	300
1954	2,908	1,246			1.2	1.3	323	304
1955	2,916	1,263			1.2	1.3	321	299
1956	2,925	1,291			1.2	1.3	323	306
1957	2,933	1,356			1.1	1.3	363	326
1958	2,941	1,383			1.2	1.3	354	340
1959	2,950	1,440			1.3	1.3	361	364
1960	3,318	1,427			1.3	1.4	337	314
1961	3,467	1,468			1.3	1.4	359	311
1962	3,421	1,502			1.3	1.4	357	327
1963	3,379	1,488			1.2	1.4	357	321
1964	3,578	1,559			1.3	1.4	368	328

(continued on following page)

TABLE II-1, continued

SOURCES AND METHODOLOGY:

Column 1: ECLA, op. cit., Statistical Annex, p. 1.
Column 2: National Accounts, 1950-1961 and 1962-1964.
Columns 3-5: ECLA, op. cit., p. 152.
Column 6: ECLA, op. cit., Statistical Annex, p. 6.
Column 7: ECLA, op. cit., p. 7.
Columns 8 & 9: Deduced from 1965 and 1966 reports of the agricultural attache to the American Embassy.
The remaining columns are derived from the first nine.

Despite the severe data problems, one can ask whether the figures are consistent with the impressionistic evidence that little technological change occurred before the second World War and that since then it has occurred at an increasing, although possibly still not very great rate. We will make a variety of arbitrary assumptions with respect to the marginal productivity of labor (hoping that the true marginal productivity lies between the extremes chosen) and deduce the amount of technical change implied by each assumption.

Consider the period 1937-1938 to 1953, for which we have some figures for changes in each major input. If the amount of land for livestock could be thought of as having risen at the same rate as that for crops, and if the quality of newly added crop land was not inferior to that previously used, then, since all the above growth rates were about the same, it would be true that if the marginal productivity of labor were zero, this would imply that no technological change had occurred. The higher the marginal productivity of labor, the more technological change implicit in the figures.

If the marginal productivity of labor were given by the average recorded wage rate of farm labor (which was roughly the same in real terms at the beginning and at the end of this period, and was about 2 3/4 pesos per day worked

Per Cent Changes in Inputs per Man and Output per Man, 1937-1938 to 1953

	Total Change	Change Per Year
Output per man (crops and livestock)	29.1%	1.7-2.1%
Capital per man	28.6	1.8
Land in crops per man	21.2-32.1	1.35-1.9

in 1950 pesos), then the implied contribution of technological change would have been in the neighborhood of 1.0 to 1.3 per cent per year.[1] If one made

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[1] Active agricultural population was rising at 0.6 per cent. Capital stock was rising at 2.4 per cent, land at between 1.95 and 2.5 per cent, and output at between 2.3 and 2.7 per cent. (One estimate uses only the ECLA figures--Table I-1, Column 1; the other and lower one uses ECLA figures to 1950 and figures from the national accounts for 1950-1953--Table I-1, Column 2.) Output per man was thus rising at between 1.7 and 2.1 per cent, capital per man at about 1.8 per cent, and land per man at between 1.35 and 1.9 per cent.

Suppose the growth between 1950 and 1951 (to take two adjacent years more or less at random) was at the average for the period as a whole, i.e., 2.3 to 2.7 per cent. The absolute increase in output would be 61.1 to 72.9 million pesos (assuming a trend output level for 1950 of 2.700 million pesos). If land, labor and capital had all risen at about the same rate (as land and capital seem to have), then with constant returns to scale, so would output. But labor grew less rapidly. With the marginal product of labor at 2.75 pesos per day (say 225 to 275 days per year or 620 to 760 pesos per year) the short fall between the implied growth of 61.1 to 72.9 million pesos and the actual growth would be,

(620 to 760) · (the additional number of men by which the labor force would have had to grow to increase at the same rate as output),

i.e., (620 to 760) · (1.7 to 2.1 per cent of the 1950 active agricultural population),

i.e., (620 to 760) · (37,400 to 46,200).

(We have assumed here that the marginal product of labor would be constant if 37,400 or 46,200 workers were added. This implies a slight upward bias in our estimate of technical change.)

Taking the slow growth of output and high days per year assumptions, this would imply that with no technical change, output would have grown by,

61.1 - 28.4 = 32.7 million pesos less than it did,

= 53.5 per cent of the growth which actually occurred.

This implies a 1.0 per cent rate of technological change per year. Taking rapid output growth and high days per year, we would have had output growth of

72.9 - 35.1 = 37.8 million pesos without technical change.

Hence, about half of the 2.7 per cent growth rate is technological change, i.e., about 1.3 per cent. With slow output growth and low days per year assumptions, output would have grown,

61.1 - 23.1 = 38.0 million pesos without technical change.

37.8 per cent of 2.3 per cent growth rate implies technological change at a rate of a little less than 0.9 per cent per year.

the extreme assumption that land and capital contributed nothing to growth and that labor was homogeneous, the implied rate of technological change would be 1.7 to 2.1 per cent. The appropriate marginal productivity to use here is not clear. It could conceivably be greater than the marginal product as defined above (2 3/4 pesos per day) but more likely, it would be below. The increase in labor force that occurred between these years was concentrated in either paid workers or family helpers,[1] suggesting that the wage rate might, if anything, overestimate the contribution of labor increase to output increases.[2]

Breakdown of the Agricultural Labor Force, 1938 and 1951 Population Censuses

1938			1951		
Owners, managers, etc.	582,667	861,433	Employers	315,566	778,317
Renters, tenant farmers and squatters	278,766		Independent operators	462,751	
Empleados (white collar workers)	9,124		Empleados	24,651	
Obreros (manual workers)	780,152		Obreros	794,075	1,056,588
			Family helpers	262,513	

[1] If my interpretation to the effect that family helpers must have been included in the category of "obreros" in the 1938 census is correct.

[2] 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.

It appears, then, that the rate of technological change was between zero and 1.3 per cent per year (and, with still very high probability, between 0.5 and 1.0) for the 1937-1938 to 1953 period. One can be reasonably sure that the rate was, if anything, slower in earlier periods. Output per man, as seen in Diagram 1, accelerated its growth after 1945 (although this is a rather arbitrary cutoff point given the tendency of the series to fluctuate), with very rapid growth occurring in the 1945 to 1949 period.[1] While we have no figures on land per man ratios before the crude 1937-1938 estimate, the ECLA capital per man ratio increases more rapidly after 1943 or 1945 than before. It is even possible that cropped land per man increased faster after 1940 or so due to the Land Law of 1936 which legalized some squatters and decreased rural tensions. It would seem possible to explain much of the

Per Cent Changes in Inputs and Output, 1953 to 1964

	Total	Per Year
Land	22.6 - 23.3	1.85 - 1.90
Land/Man	9.94	0.82
Output	42.3	3.3
Output/Man	27.6	2.25
Labor	11.56	1.0
Capital	n.a.	n.a.

[1]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.

[2]Albert O. Hirschman, Journeys Towards Progress, circa p. 114. Some people argue that the effect was just the opposite, and tensions were increased by the law.

faster growth of output per man in the 1945 to 1953 period to greater increases in capital/man and land/ man ratios than those which prevailed in the two preceding decades.

Since 1953 there has been very little if any increase in the land/man ratio (less than 1 per cent per year according to both "major crop" and "all crop" estimates). Output per man has probably risen at better than 2 per cent per year. Capital stock estimates are the most difficult problem here, especially as the only component which one might estimate with some accuracy, machinery and equipment, is, at least according to ECLA's calculations, a small part of the total, almost all of which is in the form of construction and improvements. A reasonable guess might be that the capital/man ratio has risen as fast in the decade in question as it did over the earlier period, or faster.[1] An increase of 2.5 per cent would not be impossible. But even if we assume such an increase, the slower increase in the land/man ratio[2] and

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[1]One might be tempted to assume that it rose faster since investment in machinery and equipment was certainly much greater, and one would guess that other forms of capital formation took place also at faster rates. However, active population may well have been increasing faster too, thus holding down the increase in the factor/man ratios.

[2]Apart from the crudity of the basic statistics, the assumption that the newly introduced land is of the same quality as the older land may not be realistic. If the new land is of basically poor quality, then we overstate the increase in "effective land" when we simply measure it in terms of area. Or if the newly introduced land is of the same quality as the old land, but requires a greater investment in social overhead capital to bring it into the economic system, then one should attribute only part of the increase in output to the land itself. (The only likely 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.) It is probably safe to assume that the additional land has a quality (as defined above) at least half as high as the existing land, in which case the increase in area would still be an important contributor to increases in output between

(continued on following page)

the considerably faster increase in the output/man ratio do suggest what in any case seems reasonable on impressionistic grounds--that technological change has played a greater role in the post-1953 period than in the pre-1953 period.[1,2] It is not possible to deduce the rate of technological change using assumptions about the marginal productivity of labor as we did for the earlier period since we cannot assume that capital and land increased at the same rates.

(continued from preceding page)

1935-1939 and 1949-1953, while the increase between around 1950 and 1964 would then be primarily explained by other factors and only to a rather small extent by land.

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. Reconciliation of these two somewhat different results is awaiting my ascertaining the sources of data used by the Department of Agriculture.

Note that Table A-95 with estimates of yields of specific crops over time is consistent with our conclusion that yield increases have been a post-1950 phenomenon for the most part.

[1] The 1953 cutoff point is chosen on no other grounds than data availabilities.

[2] A less sophisticated approach than that involved in the usual production function analysis is to classify gains as having resulted from increasing yields (due to improved technology or increased man/land and/or capital/land ratios) or from increasing area under cultivation. In the following table we present guesses at the relative importance of these two components of increases in output. Taking the period since 1951 and comparing the cumulated increases in output of subsequent years over that of 1951, we see that, of the average increase in output of 21.5 per cent, about 10.3 per cent of this would be accounted for by the increase in land (if other factors were increased in such a way as to retain their ratio to land constant and thus hold yields constant, assuming the new land to be of the same quality as the old) and the remaining 11.2 per cent as a result of increasing yields due to more capital or better technology or more inputs of some other kind per unit of land. The yield indices presented in Table II-1 also

(continued on following page)

C. More Specific Sources of Increasing Output

Machinery

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 are such attempts warranted. A rapid increase did occur in the machinery and equipment capital stock in the mid-fifties,[1] (see Table II-2) and was followed by relatively fast growth of agricultural

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	Output Index	Index of Land Cropped
1949-1953	100.0	100.0[a]
1954-1956	107.8	106.1
1957-1959	125.6	108.8
1960-1963	134.4	118.6
Cumulation: 1952-1963	121.5	110.3

[a]Figure refers to 1951.

give an indication of the changes, corresponding to a gradual increase totalling perhaps 20 per cent over the 1951-1964 period.

Our guess as to the events of the pre-1950 period is much weaker; the figures at hand suggest that only perhaps 10 to 30 per cent of the increase in output took the form of improved yields. The data on both output and land are very weak, however.

[1]The machinery and equipment capital stock series is dubious since it is necessary to make arbitrary length of life assumptions, but regardless of these, the unusually high imports of the years 1954 to 1956 always imply a rapid increase in the capital stock in this period.

TABLE II-2

Stock of Machinery and Output, 1945-1963

	Capital Stock in Machinery and Equipment (millions of 1950 pesos)		Output Indices (1958 = 100)	
	Estimate A	Estimate B	All Agriculture	Crops
	(1)	(2)	(3)	(4)
1945	190.4	149.3	72.4	66.5
1946	195.4	153.2	75.9	71.6
1947	208.3	163.3	78.6	74.2
1948	221.9	174.0	77.7	73.3
1949	242.8	190.4	84.8	80.3
1950	275.9	221.6	77.7	69.9
1951	300.9	251.6	78.6	79.1
1952	322.9	259.8	84.0	85.8
1953	353.6	277.4	84.2	87.1
1954	418.1	309.8	86.4	88.3
1955	492.6	349.9	88.6	87.1
1956	540.2	380.8	91.3	89.5
1957	547.4	376.0	96.9	95.6
1958	538.9	371.4	100.0	100.0
1959	525.7	363.1	105.1	107.4
1960	514.2	359.4	105.1	104.2
1961	508.5	354.3	109.2	107.7
1962	491.8	350.1	113.6	111.7
1963	471.8		113.7	108.6

(continued on following page)

TABLE II-2, continued

SOURCES AND METHODOLOGY: Columns 1 and 2 are from Table III-3 where the sources and methodology used are explained. Columns 3 and 4 are from Table II-1 and the sources are similarly explained there.

output (4.75 per cent) in the 1957 to 1959 period (or 4.35 in the 1956 to 1959 four-year period). A possible causal relationship is thrown in some doubt by the fact that one of the two land series--major crops--showed a sharp increase in the same period, while the other one--total cropped land--did not.[1] The issue cannot be resolved with the data at hand.

For no specific input did any relationship with the output seem sufficiently close to suggest further analysis. This does not mean that these inputs had no effect, only that the number of variables helping to determine output was too great to leave the effect of one variable visible.

Labor Migration

The amount of growth not due to increases in the quantity of land, labor or capital may be due to a variety of changes including both those normally thought of as technological change (such as new varieties) and others such as organizational improvements.[2] In the latter category fall improvements in the geographical distribution of labor.

If factors are all optimally distributed with respect to each other at a given point in time, then output per man can increase only as a result of an increase in land or capital, or an improvement in technology. However, in situations in which the marginal productivity of a factor is not the same in all pursuits or regions, part of any increase in productivity per person

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[1] Even if land cropped did increase, this might have been a result of the increase in machinery, so the output increase could still be attributed to the machinery. I have insufficient details to know whether this was the case.

[2] The distinction is perhaps hazy and possibly unimportant. What is of interest is that the residual can be instructively decomposed in various ways.

observed in subsequent periods could be due to an improved allocation of that factor among these different pursuits or regions. Very different wage rates in different areas of Colombia suggest strongly that the marginal productivity of labor is not uniform. Table II-3 presents data on farmers who had migrated between departments before 1951 and on wage scales by department in 1938 and 1951. These data indicate a flow from the low salary departments to the high salary ones. Presumably similar readjustments also occur within departments, with the same beneficial results on total output.

Since we do not know the extent to which the migrants were agricultural workers with little or no land and the extent to which they were land owners, it is not clear how accurate a calculation of the gain involved in the migration can be achieved by using agricultural wage statistics. Assuming that all of the migrants were agricultural workers without land, and each received the average wage paid in his department, then the difference between their wage bill as it was in 1951 and the wage bill as it would have been if they had not migrated, is 12.26 million pesos, on the assumption that they work 250 days per year. This is less than one-half of 1 per cent of value added in agriculture in 1951.[1] If one assumed that the migration all occurred in

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[1] There are many rather dubious assumptions underlying this calculation, some of them implying an upward bias and some a downward bias. In particular, 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 since we are assuming that the wage rates of the various departments have not been affected by the migration, whereas in fact there is some empirical evidence to suggest that they have; hence we are omitting from our gain calculation a sort of "surplus" which could increase the total gain somewhat, but almost certainly not enough to

(continued on following page)

TABLE II-3

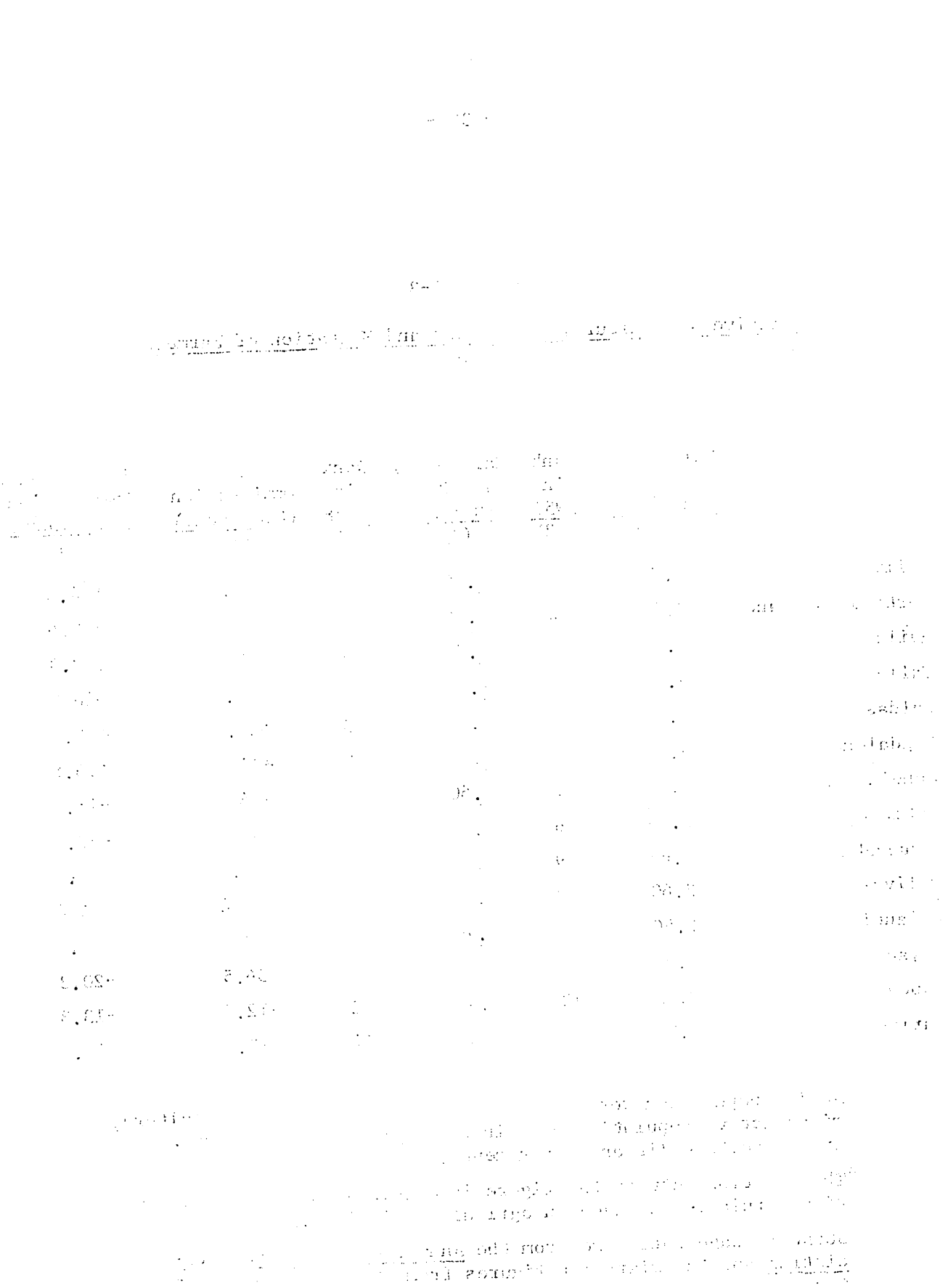
Relative Agricultural Wage Rates and Migration of Farmers
(pesos)

	Male Daily Wage Rates in 1951 (1)	Rank in 1951 (2)	Male Daily Wage Rates in 1938 (3)	Rank in 1938 (4)	Net Immigration[1] (thousands) (5)	Per Cent Net Immigration[2] (thousands) (6)
Tolima	3.75	1	1.00	1	+ 6.7	+ 4.6
Norte de Santander	3.45	2	.60	10	- 2.6	- 3.6
Huila	3.40	3	.70	7	+ 0.2	+ 0.3
Valle	3.30	4	1.00	1	+89.2	+48.3
Caldas	3.20	5	.80	3	+20.7	+ 9.7
Magdalena	3.20	5	.80	3	+14.6	+16.8
Cundinamarca	2.90	7	.60	10	-24.3	-11.5
Antioquia	2.80	8	.70	7	-55.1	-22.7
Santander	2.65	9	.80	3	2.9	1.9
Bolivar	2.60	10	.80	3	- 7.4	- 4.4
Atlantico	2.50	11	.70	7	- 2.7	- 9.9
Boyaca	2.40	12	.50	12	-36.5	-20.3
Cauca	2.15	13	.50	12	-12.5	-13.3
Nariño	1.35	14	.30	14	-13.1	-11.1

[1]Active population working in a given department in agriculture, minus active population born in that department and working in agriculture (in any department).

[2]The relation between the figure in Column 5 and the total active population engaged in agriculture in 1951.

SOURCE: Wage rates are from the Annuario General de Estadistica and the migration figures from the 1951 Population Census.



the 1937-1938 to 1951 period (as most of it probably did), then the same calculations would suggest that it accounted for about 1 1/2 per cent of the increase in output occurring within that period.[1] In the proportion that the migration occurred before 1937-1938, the figure would be reduced below 1 1/2 per cent. If we assume that the migrants had the average output per man of their respective departments (figures are presented in Table II-3)[2] then the gain from the migration would be considerably larger, approximating 1 per cent of the value added in agriculture in 1951 or 3 per cent of the increase in output between 1938-1939 and 1951. This is still small. About 7 per cent of the rural population had migrated between departments during their lives with the average increase in income as a result being apparently about 15 per cent under the assumption that both before and after migration each had an average productivity for the department he was in. Unless

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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 received a wage rate typical of their new department after migration. If anything, this may constitute a downward bias on the calculation. But perhaps the major source of downward bias is simply the fact that we have assumed that all the migrants were 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).

[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.

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

the migrants tended to come from areas where productivity was much below the average for the department and go to areas with productivity above average for the new department, or they brought with them factors whose productivity increased by considerably more than 15 per cent as a result of the move, it seems unlikely that more than 2 or 3 per cent of the total output in 1951 was accounted for by this inter-departmental migration. And it seems unlikely that intra-departmental migrations would add more than 1 or 2 per cent to the total gain. The proportion of the output increase between 1937-1938 and 1951 accounted for by population movements could be as high as 10 or 12 per cent, or as low as 2 or 3 per cent.

Probably partly as a result of the labor movements there has been some trend towards equalization of agricultural wages among departments over time. Some of the big gainers of labor, in particular Valle and Caldas, showed relatively slow increases or actual decreases in real wages (according to the periods chosen), while Antioquia, the biggest loser, showed quite rapid gains.[1] This narrowing of wage differentials indicates that the labor market is working with at least some efficiency. Chapter V discusses these matters in greater detail.

D. The Demand Side: The Effects of Price Changes

Section B considered the direct sources of output growth--the increases in broad categories of inputs (land, labor, capital and other) which made the

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[1] Note that the comparison we are making is not very appropriate as we have been unable to allow for migration which has occurred since 1951. Rough guesses based on the early published results of the 1964 census suggest that some of the earlier migration trends may have been reversed. We can only await the census results.

output increase possible. Such a classification does 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). If the relative price of agricultural goods did not change, it could be deduced that both curves shifted to the right. If price increased, the demand curve must have shifted, and if quantity increased very fast and price only moderately, then the supply curve probably did too; but in any case some increase in price was necessary to bring about the full increase in output which occurred. In the long run one might expect variations in the rate of rural to urban migration to help to maintain the relative outputs of agricultural and non-agricultural products such that their relative prices would stay about the same. But if technological change occurred at different rates in the two sectors, this relative price would probably change. It is therefore of interest to know the movements of the relative price of agricultural as opposed to non-agricultural products, both to know whether the increase in agricultural output which occurred required relative price increases 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.[2] A related issue, the implications of price fluctuations, will be dealt with in Chapter V.

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[1] If relative prices stayed the same during the process of development, the quantity of food products purchased would rise more slowly than that of items more associated with modern living.

[2] Various theories of structural disequilibrium, most often applied to the Latin American scene, are based on the alleged inelasticity of supply of agricultural output.

There has been a sizeable upward drift of agricultural prices relative to other value added price series since 1925, judging from the crude series we have assembled in Table II-4, and plotted in Diagram II-2. Over the forty year period the ratio has just about doubled. The increase has been concentrated in the period since 1940 and has clearly been related to the dramatic increase of coffee prices. Nevertheless, a similar, if not so rapid movement, appears to have occurred both for non-coffee crops and for livestock. The first four series in Table II-4 are all based on prices to the farmer (as accurately as these could be determined) while the last one relates prices of food products to non-food products in the cities (based on a seven city sample since 1954, and on Bogota before that point). The movement of the last series is fairly closely related to the non-coffee crop series, a reasonable result.[1] 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.

Whether the price increases were responsible for a significant portion of the increases in output is not clear. On theoretical grounds one would expect a high price elasticity of supply of agricultural output if the marginal productivity of factor inputs was a high and not rapidly decreasing function of the quantity of the inputs and the cost of factors was not a rapidly increasing function of their quantities. In any situation where land was very scarce and labor's productivity was low, not much price elasticity could be expected.[2]

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[1]Since the two series are, I believe, estimated for the most part independently, they give mutual support.

[2]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.

TABLE II-4

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)	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				
1926	46.8 - 49.4	27.0 - 36.3				
1927	46.8 - 49.1	26.4 - 35.5				
1928	41.3 - 43.4	21.8 - 29.2				
1929	51.9 - 54.1	24.9 - 33.5				
1930	51.7	30.2 - 39.7				
1931	64.4	60.4				
1932	56.5	69.4				
1933	58.6	64.8				
1934	55.1	49.1				
1935	59.0	48.9				
1936	61.4	47.8				
1937	60.6	37.8			70.6	
1938	57.3	33.2	74.9	55.8	71.4	
1939	62.9	35.7	87.3	56.8	77.2	
1940	51.2	23.7	71.1	51.7	72.8	
1941	54.7	37.3	66.4	55.3	68.5	
1942	59.7	36.4	84.0	49.4	72.6	
1943	65.1	34.7	95.8	51.7	75.0	
1944	73.9	38.4	77.6	67.8	89.3	

(continued on following page)

TABLE II-4, continued

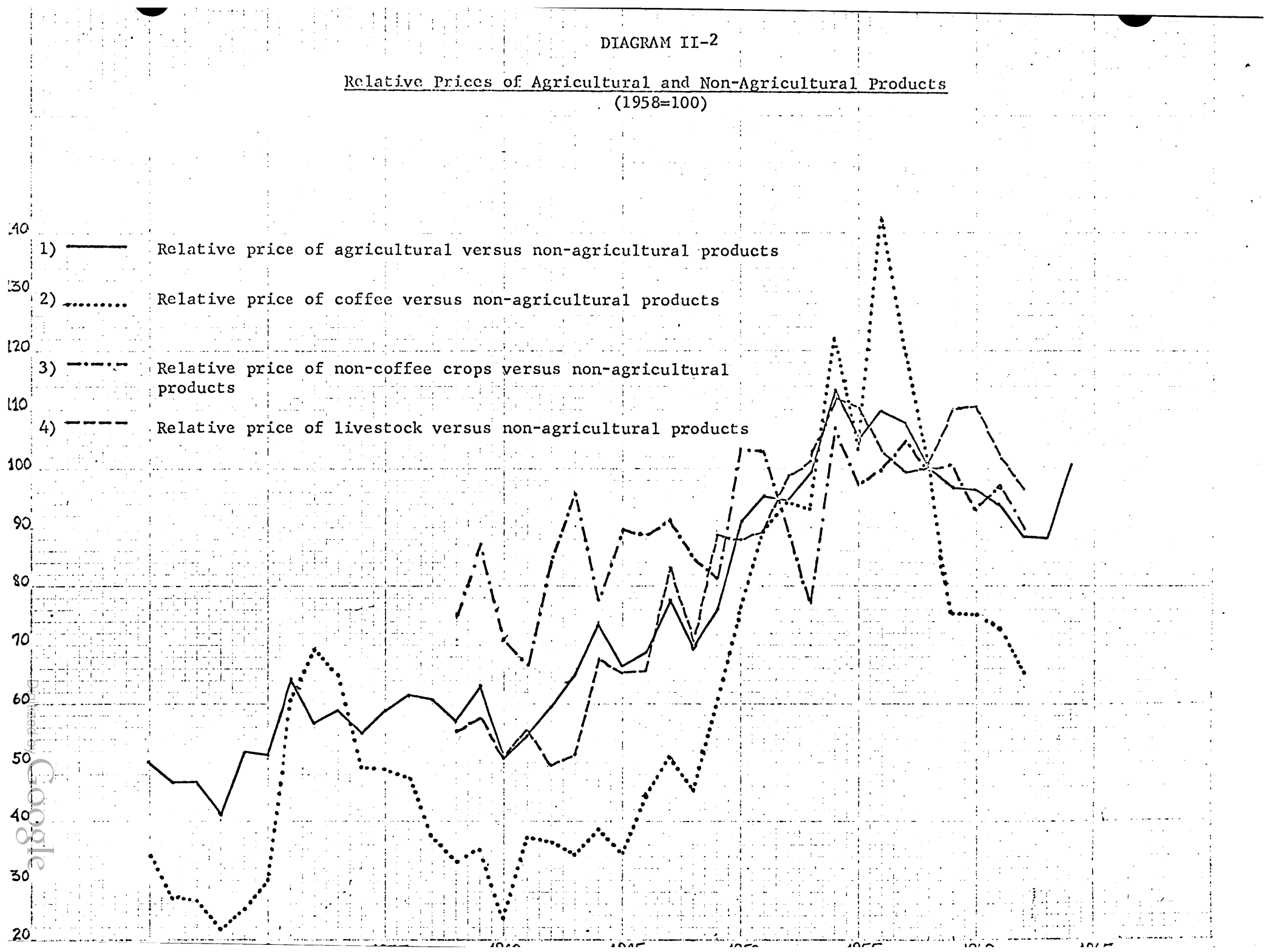
	Agricultural Prices	Coffee Prices	Prices of Crops Excluding Coffee	Livestock Prices	Food Prices	
	All Other Prices (GDP)[1]	Prices of Non-Agricultural Goods	Prices of Non-Agricultural Goods	Prices of Non-Agricultural Goods	Other Prices for Goods Entering the Cost of Living Index	
					Obrero	Empleado
1945	66.4	34.3	89.5	64.5	91.4	
1946	68.9	44.5	88.8	64.8	87.5	
1947	77.9	51.4	91.5	83.3	90.8	
1948	69.5	44.6	85.3	70.1	87.8	
1949	76.1	--	81.3	88.8	79.3	
1950	91.0	75.8	103.2	88.0	90.4	
1951	95.0	89.3	102.7	89.5	90.3	
1952	94.8	94.1	89.5	98.8	82.1	
1953	99.2	92.9	77.4	101.2	87.2	
1954	112.9	122.0	107.1	112.0	94.9	
1955	104.7	103.5	97.1	110.3	91.0	
1956	109.6	142.3	100.0	103.0	94.0	
1957	107.4	120.1	104.5	99.9	101.7	
1958	100.0	100.0	100.0	100.0	100.0	
1959	97.1	75.5	100.2	110.2	98.7	
1960	96.7	75.4	93.2	110.5	97.2	
1961	93.9	72.9	97.3	102.1	101.2	
1962	88.4	65.3	89.7	96.2	94.9	
1963	88.1	--	--	--	102.4	
1964	100.6	--	--	--	102.3	

SOURCES AND METHODOLOGY: The price series used as the numerators in Columns 1 - 4 are from Table A-2. The price series for "other products" was calculated by the author on the basis of the ECLA and National Accounts GDP deflators. The figures used in the calculation of Column 5 come from the Revista del Banco de la Republica. Since 1954 the cost of living series is for seven cities; before that for Bogota alone.

NOTE: A calculation of the terms of trade, such as we have carried out here, is not a calculation of the purchasing power of the agricultural sector; it is a measure of the relative production prices or costs.

DIAGRAM II-2

Relative Prices of Agricultural and Non-Agricultural Products
(1958=100)



If output responded quickly to rising prices the relationship might be seen (despite the inevitable fluctuations in output due to natural conditions) in a chart or a simple lag regression. The failure of a relationship to show itself this way would not imply its absence, since a longer or more complex (distributed) lag relationship might exist. In fact, no simple connection is apparent from the price and quantity series for livestock, or for non-coffee crops. In the case of livestock, the average rate of growth of output from 1925 to 1962 appears to have been about 2.6 per cent. A quite sizeable increase in relative price accompanied this but the year to year price and output pattern does not offer any evidence of a high short-run price elasticity of supply (see Diagram II-3). The price-quantity relationship may be especially complex in the case of cattle due to the gestation period involved. Non-coffee crops display a similar lack of short-run relationship, but again, no clear interpretation of this is possible.

E. Summary

Colombian agriculture has many of the characteristics of inefficiency which mark an underdeveloped country. While coffee, the export crop, is hardly produced technically, it does provide most growers with an above average income, and has provided the motive force for growth in the economy as a whole.

Mechanization is a characteristic of the post-World War II era in Colombia, and technological progress seems to have occurred more rapidly in the last ten or fifteen years than earlier, judging from a crude production function analysis and from direct observation. Migration between departments has contributed to growth but probably not more than 5 or 10 per cent of the total increase in output.

DIAGRAM II-3

Indices of Output and Relative Price of Livestock, 1938-1962
(1958=100)

Agricultural prices have shown a secular rise during the post-1925 period for which we have figures, but seem to have levelled off in the last ten or fifteen years. The amount of 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 very low, or the supply curve even backward.

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CHAPTER III

Process of Growth of Specific Inputs: Evidence on Their Contribution to Growth of Output

In Chapter II tentative guesses were made as to the relative contributions to increasing output of increasing quantities of land, increasing fixed capital stock, and improved organization or technology. The division of the output increase among these direct causal factors is only the first step in any analysis of agricultural change. The other step involves the analysis of the mechanism bringing about changes in each of the factors or changes in technology. In other words, we need to know the determinants of increases in land under cultivation, of investment in agriculture, and of technological change. This chapter attempts to decompose these broad input classifications somewhat, to bring to bear the small amount of evidence (usually of a micro nature) on the productivities of the more narrowly defined inputs, and to discuss the mechanism by which the amount of the inputs grows. Virtually no studies have been done on these matters, so many comments made here will be somewhat speculative.

A. Capital Formation: The Savings-Investment Process

Private Capital Formation

Most of the capital formation is done by the private sector. The factors which determine the rate of investment are among the least understood aspects of agriculture in Colombia. The only form of investment which can be fairly accurately measured is that in machinery and equipment (since 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 only one fairly serious attempt has, to my knowledge, been made.[1] Investment in livestock is somewhat easier to measure, but estimates are still imprecise. The fact that most farming is carried on by small-scale farmers in whom economists and politicians have typically shown little interest is in part responsible for our lack of information.

1. Investment propensities by size and type of farm

The savings-investment process probably differs considerably for different sizes and types of farm. Most small-scale farmers, whether they own or rent their land, receive very little institutional credit, and probably little from individuals or other sources. Whatever investment they undertake must be financed from their own savings. Since their productive capacity is quite low to begin with and they are living close to the subsistence level, their savings capacity is very small. While the typical small farm in Colombia could perhaps not sustain a great amount of investment,[2] it is still true that there is an excess demand for credit at these farm sizes, and that the marginal productivity may be quite high.[3] Share-croppers, whose

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[1]This formed part of Analyses and Projections of Economic Development; The Economic Development of Colombia, United Nations, Geneva, 1957.

[2]In a number of countries, however, small-scale agriculture is quite capital intensive. See T. Schultz, Transforming Traditional Agriculture (Yale University Press), 1965, p. 88, where he 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 gradually built up (or if, before population became so dense, savings and capital formation were easier). And on small plots of a densely populated region there may be surplus labor. Sometimes this can be transformed into capital stock whereas it could not easily be used to produce more goods which could be either sold or consumed. In such a case the savings are made possible only because the investment can be done on the farm by the farmer.

[3]The excess demand is not, according to some observers, solid evidence of high productivity as the small poor farmer may not be a good manager and may use loans for current (possibly emergency) consumption.

ratio of credit received to value of output produced is the lowest of all the tenure forms (see Table III-11) engage in this institution partly and perhaps mainly to ease their credit shortage.

Even if adequate data were available, one could probably not generalize about the propensity to save of the small-scale farmer in Colombia, since the cultural background varies a great deal from region to region. A number of sociologists and anthropologists have noted the strong pressures on the farmer with a little surplus cash to treat his friends to alcohol or otherwise engage in culturally dictated spending on the group.[1]

The coffee sector includes many small farmers (either owners or renters); most of them earn an income well above the subsistence level so they provide a perhaps more interesting test of desire and ability to save than the very poorest farmers. Investment on coffee farms takes the form primarily of plantations, and in lesser degree some fairly simple machinery for pulping, etc., and small tools. The rapidly increasing incomes from coffee in the early fifties provide a good framework for an analysis of savings, although a problem arises in that an increase in savings 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. Limited available information indicates a definite increase in investment in new coffee plantations

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[1] See, for example, Orlando Fals Borda, Peasant Society in the Colombian Andes, circa p. 145 . Too few studies of the Colombian farmer have been done to generalize, however. According to production figures, about 4 percent of the disposable income of families is spent on alcoholic beverages; if chicha and other outlawed beverages are included, the figure would be a little higher. This is not a high share of income, although it is high relative to the savings rate within the agricultural sector.

in the fifties.

Crude estimates of annual new plantings and net increases in total planted area are shown in Table A-110 of the appendix. These reveal a definite responsiveness of new plantings and total coffee area to the relative price of coffee.[1] As a proportion of gross or net income from coffee production, however, the investment does not loom particularly large. The survey done by FAO-ECLA in 1955-1956 indicated that 5.7 per cent of the gross value of coffee production was reinvested in that year with a view to expanding or improving the farm.[2] Of this, 3.4 per cent was invested in coffee operations and 2.3 per cent in other agricultural activities. Investment as a proportion of net income on the farms in question was between 5 and 7 per cent.[3] It is possible that the ratio of savings to income was higher (or lower) than this, but we have no evidence on this. The share of investment going to non-coffee activities (40 per cent) indicates that coffee (which at the time produced over 80 per cent of the income of the farms studied) was providing the capital for other lines of production within agriculture. It seems quite possible that a limited flow was moving to the non-

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[1]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 sources and is not so solid.

[2]United Nations, Food and Agricultural Organization, Coffee in Latin America: Colombia and El Salvador, United Nations, New York, 1958, p. 69.

[3]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 per cent.

agricultural sectors of the economy. If the coffee sector had even a fairly high marginal propensity to save out of increased income, a savings rate of 10 per cent or more would seem very reasonable during this very high income period. But empirical work would be required to prove such a point.

The small coffee farmer responded much more vigorously than the large-scale operator to the higher 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.[1]

Size of adult coffee planting	Percentage of new plantings to adult plantings
≤ hectare	30
1 - 10 hectares	10
10- 50 hectares	7
50-100 hectares	3

ECLA-FAO present the plausible explanation that investment for the small farmer involves largely just his own labor (and little cash outlay) while that on the large farm (where labor must be hired) is much more expensive in terms of cash. Carrying the argument one step farther, one could argue that the large-scale farmer would wait longer to see if the new higher price would remain high before committing himself to a costly investment.

But a perhaps more plausible explanation is simply that the small farms were more diversified as the coffee price rise began in the early fifties and thus had more room to substitute coffee for other products. As of

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[1] See ECLA-FAO, op. cit., p. 25.

1955-1956 the relative importance of other products as compared to coffee decreased very rapidly with the size of coffee planting (see Table III-1).[1] In any case, whatever the reason for the high responsiveness on the part of the smaller farmer, it does suggest that the same phenomenon may well have continued during the late fifties.[2]

The large farms, whether crop or livestock, are at least potentially and often in fact quite profitable, so that there would be no shortage of funds for investment purposes if the operator were so inclined. But often this is not the case. It is true that large-scale crop farms are becoming more and more mechanized. But mechanization itself does not imply a high investment rate.[3] Other forms of investment are unlikely if, as if often

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[1] 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), 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.

[2] This would imply 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 (see the discussion in Sources and Methodology for Table A-110.

[3] The ratio of installed value of newly imported machinery to the value of crops in the years 1950-1962 ranged between 2 per cent and 5 per cent. 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 is probably higher on larger crop farms than on smaller ones. Table IV-12 presents figures on the estimated ratio of owned capital stock to value of product for different farm sizes.

TABLE III-1

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 (p. 35) of ECLA-FAO study, op. cit.

the case, the operator is only renting the land on a short-term basis. There may even be a running down of soil fertility in such cases. Renting is probably not the norm for these farms, however.[1] The ratio of total investment on the farm to value of output might be as much as 15 per cent, but more likely would not be above 10 per cent.[2]

Since apart from the ECLA-FAO study of the coffee sector no attempts have been made to measure investment occurring by size or type of farm

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[1]The 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 run by the owner or renter or by an administrator). It seems likely, however, that few large farms are rented for purposes of raising livestock. If this is the case, one can get some idea of the importance of rented land in large-scale crop production. The figures of Table A-28 indicate that, for the country as a whole, even if all the rented farms were crop farms, the per cent rented would not be as high as 30 per cent up to the upper two size categories. 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 per cent of farms in the category 100-200 hectares would be rented and about 40 per cent in the category 500-1000 hectares. Column 12 gives something close to a lower limit estimate of the importance of rented farms among cropped farms. (It would be strictly a lower limit only if no rented farms were used large 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 per cent were rented, the "rented/total" ratio for crop farms would remain below 25 per cent and perhaps below 20 per cent.

In Tolima, one of the areas more noted for commercial agriculture, the ratio of farms rented to all agricultural farms is higher than for Colombia as a whole (see Table A-29). It appears almost certain that something over 20 per cent of crop farms in some size categories are rented, but again it seems unlikely that the figure is above 30 or 35 per cent.

[2]This allows for a ratio of investing in machinery to output well above the average for all crop farms, but also takes account of the fact that investment in irrigation works, plantations, etc., is not likely to occur on these farms.

the only way to derive approximations of investment coefficients is to try to relate the current capital stock by type of farm to the probable past income. ECLA calculations (reproduced in Table III-2) suggested that the capital output ratio in 1953 was about 2.5 (2.14 for fixed capital alone). It was about 5 in the livestock sector and only a little over one in the crop sector. If these figures are correct, and if the capital/output ratios have been more or less constant over time, one can calculate the net investment coefficients over previous periods. These appear to have ranged between as low as about 2 or 3 per cent (non-coffee crops) to as high as 12 per cent (livestock).[1] Perhaps some savings has flowed out of the sector net but it

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[1] If all prices had been constant over the relevant period this calculation would be possible, so that

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

If ECLA figures are correct (see p. 203) the livestock themselves were by far the major form of capital in that industry. Presumably the capital output ratio would not be rising--with improved practices it should have fallen but since these improvements did not occur it probably remained about constant. It seems not unlikely that some savings from this sector went elsewhere in the economy, as the savings potential must have been high indeed.

In the case of crops the possibility that the capital output ratio gradually rose is there. ECLA estimated that the output/capital ratio for agriculture as a whole rose from about .32 (1925-1928) to about .345 (1950-1953), 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 per cent, 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.

These figures should be adjusted to allow for relative price changes as between agricultural products and agricultural capital goods. Thus, if at some earlier period the price of capital goods had been twice as high

(continued on following page)

TABLE III-2

Capital, Output and Investment in Various Sectors of Colombian Agriculture.

Sector	Total Capital 1953 Millions of 1953 pesos	Total 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 stock figure for active population engaged in livestock raising appears much too high to me. By implication, one or both of the other two 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.

seems unlikely that this could have been high enough to imply a net savings rate much above 10 per cent for the sector as a whole. Ten per cent is not a really low rate (the gross savings rate might be 15 per cent); the gross domestic savings rate in Colombia since 1950 has been between 15 and 20 per cent between 1950 and 1964, and the net domestic savings rate between 5 and 10.

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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 saved to effect the same amount of real investment; when the analysis is done in constant prices, there is no evidence that such a high savings ratio had been achieved. We have unfortunately, no series which would throw light on the prices of capital goods purchased within agriculture (except for machinery). Most of the investment would involve the use of the agricultural labor force (as in the case of coffee plantations); in the case of livestock it simply involves an expansion of operations (so that the stock is increased with sales constant) or a decrease in sales. In the case of livestock a change in the relative price of the capital compared to the output would occur if the future price of animal products was expected to be different from the current price. In the case of something like coffee plantations, an important consideration would be whether the same increase in production of labor occurred 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 (as seems often to be the case) its opportunity cost in terms of agricultural output foregone could rise or fall according to whether the labor surplus was falling or rising over time. In this situation even the concept of an investment to income ratio becomes hazy since some of the income is generated only because the investment could be done using surplus labor.

It appears impossible at the moment to quantify enough of these variables to be able to guess at what happened to the relative price in question. The relative price of imported machinery as compared to agricultural output can be found, but this is a very small proportion of capital formation in agriculture.

Even if the figures were available to enable one to estimate the ratio of investment in current prices to income (value of goods and services sold) in current prices, only under certain circumstances would this enable us to deduce a meaningful behavioral savings propensity for the agricultural sector. Transfers of savings to other sectors can occur. But also, whenever a change in the interest rate or in the expected future price of goods being produced changes the value of the capital stock this changes the wealth of the owner; it has the same effect on his wealth as a change in income; it may or may not affect his liquidity, depending on how easy it would be to sell the capital. One would expect his savings to depend on such changes in his capital stock as well as on his current income in money and in kind.

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2. The trend toward mechanization

The traditional implements of cultivation in Colombia have been the hoe and machete; they are still used on a large scale (whereas animal traction plays only a small role). But a sizeable increase in mechanization, pushed strongly by the Caja de Credito Agraria has occurred in the "commercial sector" since the Second World War.[1] Mechanization did not occur to a significant extent before World War II; at this time machines were less advanced and productive than later models. This, coupled with the tight balance of payments situation in this period, and the probably small interest of farmers ("commercial" farming is largely a post-World War II phenomenon) prevented substantial change. During the war imports of machinery became almost unavailable. When the industrialized countries again began to produce agricultural machinery, Colombia's balance of payments situation was easier and the inflow of machinery began (see Table III-3). An added boost was given in

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This difficulty in estimating a behaviorally meaningful savings rate is general for agriculture as a whole. The price of agricultural products as a whole relative to prices of non-agricultural goods rose very substantially from 1925 to 1953 (about doubling). As related to the price of the bundle of goods which would be consumed by the representative farmer, they rose considerably less, however. If 75 per cent of all his expenditures were for agricultural goods, then the relative price improvement would increase the purchasing power of his capital by only 16.7 per cent (if his consumption was done in fixed proportions). The fact that the farmer does consume mainly agricultural products does, then, diminish the seriousness of the problem at hand. The problem could, however, be very important in looking at such sectors as coffee.

[1] Whether mechanization should be pushed further than it has been to date, when the social goals of high output, high employment, and not too uneven distribution of income are taken into account, is a difficult question, to be discussed a little in Chapter VIII. For the moment we limit ourselves to the history of the trend in this direction and the question of which farms are mechanizing most rapidly.

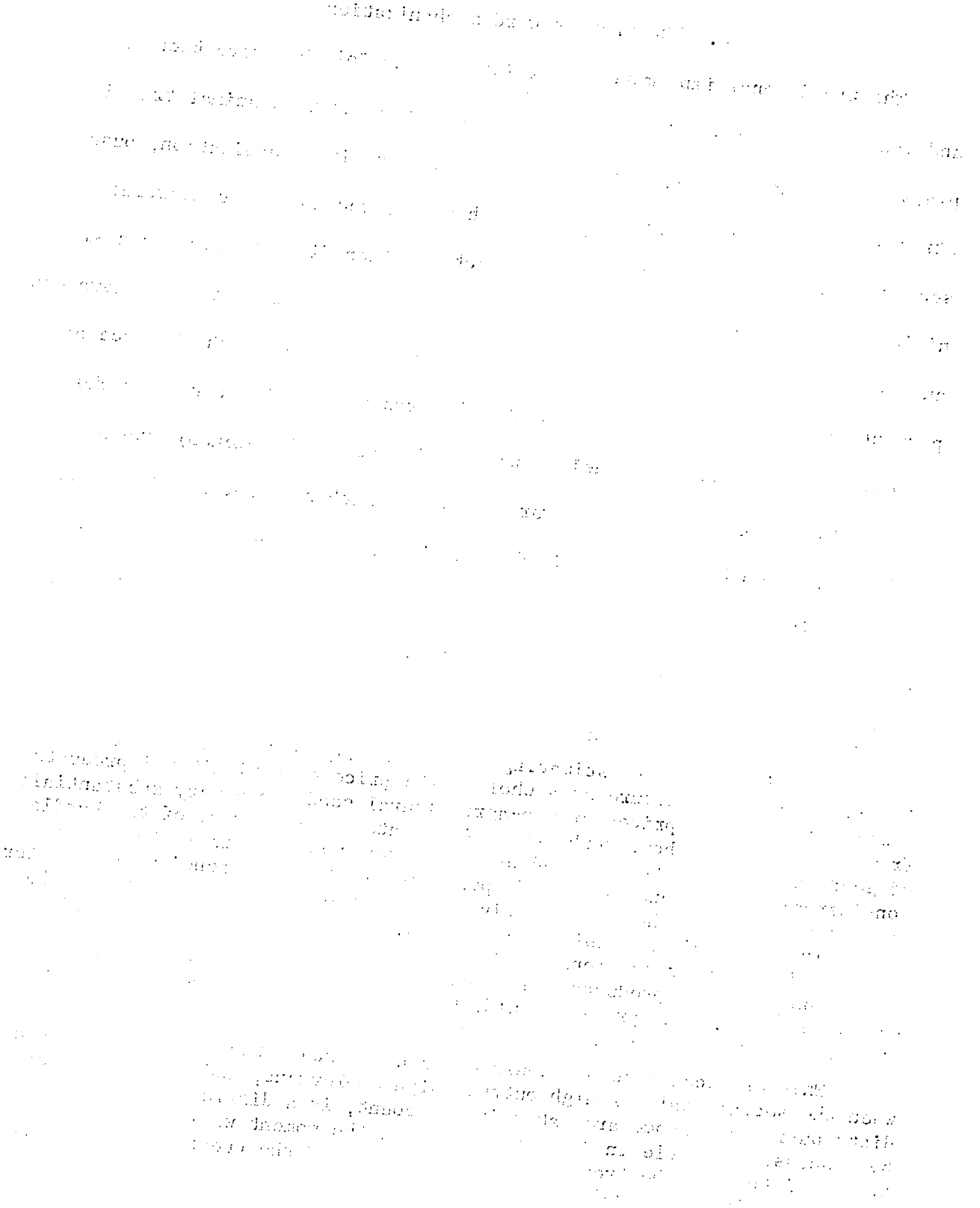

TABLE III-3

Prices of Inputs to Agriculture Over Time:
New Investment and Capital Stock in Machinery

	New Investment in Machinery (millions of 1950 pesos)		Capital Stock in Machinery (millions of 1950 pesos)	
	Estimate A	Estimate B	Estimate A	Estimate B
	(1)	(2)	(3)	(4)
1925	34.9	27.4	231.1	181.1
1926	33.1	26.0	237.8	186.3
1927	42.3	33.2	253.3	198.5
1928	49.6	38.9	273.3	214.1
1929	46.0	36.0	286.6	224.6
1930	38.6	30.3	291.1	228.1
1931	25.7	20.2	282.2	221.1
1932	27.6	21.6	275.5	215.9
1933	22.1	17.3	264.4	207.2
1934	27.6	21.6	260.0	203.7
1935	23.9	18.7	253.3	198.5
1936	27.6	21.6	251.1	196.7
1937	25.7	20.2	253.7	198.7
1938	27.6	21.6	246.4	193.1
1939	29.4	23.1	241.8	189.8
1940	22.1	17.3	231.2	181.2
1941	23.9	18.7	223.6	175.2
1942	14.7	11.5	209.1	163.8
1943	16.5	13.0	198.0	155.2
1944	20.2	15.9	192.3	150.8
1945	23.9	18.7	190.4	149.3
1946	29.4	23.1	195.4	153.2
1947	36.8	28.8	208.3	163.3
1948	36.8	28.8	221.9	174.0
1949	44.1	34.6	242.8	190.4
1950	58.0	49.5	275.9	221.6
1951	47.8	49.2	300.9	251.6
1952	47.4	28.1	322.9	259.8
1953	57.6	38.6	353.6	277.4
1954	94.9	56.7	418.1	309.8
1955	107.3	67.4	492.6	349.9
1956	83.7	59.9	540.2	380.8
1957	47.4	26.7	547.4	376.0
1958	39.2	31.0	538.9	371.4
1959	42.8	32.2	525.7	363.1
1960	49.9	40.4	514.2	359.4
1961	56.8	38.9	508.5	354.3
1962	46.1	40.0	491.8	350.1
1963	42.6		471.8	

(continued on following page)

TABLE III-3, continued

	Estimated Current Peso Price of Imported Machinery (from U.S.) (5)	Prices of Current Inputs Besides Labor: Inputs for Crops and Livestock (6)	Prices of Current Inputs Besides Labor: Inputs for Crops Only (7)	Price of Labor: Average Daily Wage of Agricultural Workers (8)	Price of Machinery / Price of Labor (9)
1925					
1926					
1927					
1928					
1929	63.5				
1930	64.4				
1931	64.4				
1932	64.2				
1933	84.0				
1934	106.1				
1935	107.0			.68	15.74
1936	105.8			.67	15.97
1937	110.5			.72	15.35
1938	112.5			.72	15.63
1939	110.0			.74	14.86
1940	108.9			.78	13.96
1941	110.0			.71	15.49
1942	113.8			.72	15.81
1943	114.1			.73	15.63
1944	114.6			.94	12.19
1945	115.3			1.09	10.58
1946	123.6			1.25	9.89
1947	142.8			1.62	8.81
1948	161.2			2.02	7.98
1949	191.7			2.03	9.44
1950	196.0	58.6	51.9	2.52	7.78
1951	272.3	59.7	53.4	2.84	9.59
1952	275.6	53.3	51.0	2.81	9.81
1953	277.4	59.3	57.4	2.92	9.50
1954	277.1	64.1	56.0	3.27	8.47
1955	279.4	61.1	54.0	3.46	8.08
1956	289.4	64.6	56.6	3.54	8.18
1957	610.7	80.8	72.5	3.89	15.69
1958	805.7	100.0	100.0	4.55	17.71
1959	828.8	113.1	104.4	5.00	16.58
1960	877.8			5.51	15.93
1961	901.2			6.29	14.28
1962	946.0			6.92	13.67
1963				8.99	

(continued on following page)

TABLE III-3, continued

SOURCES AND METHODOLOGY: Columns 1 and 2 have been based, respectively, on the post-1950 estimates of Planeacion and the Banco de la Republica for imports of agricultural machinery (see Table A-15). Both of these were originally in current dollars, were converted to 1950 dollars using a price series for exports of agricultural machinery from the United States (found in various issues of the Survey of Current Business and Business Statistics) and then to 1950 pesos using the exchange rate of 1.96 pesos to the dollar. To these have been added a series for domestic production, based on figures published in the Annuario General de Estadistica, and deflated by the price series for domestically produced capital goods used by the Banco de la Republica. Each series was then spliced to the ECLA series to give estimates for the years 1925-1950. The ECLA estimates were lower for the overlapping years and the whole series (1925-1950) was inflated in the same proportion.

The capital stock series of Columns 3 and 4 were based, respectively, on the investment series of Columns 1 and 2, using an assumed length of life ranging between 4 and 12 years. (For various implements guesses at the typical years of service can be based on the number imported over the years as compared to the number in existence in 1959 or 1960 according to the Agricultural Census.) There was a good deal of uncertainty for a lot of implements but less in the case of tractors whose life seems to be 8 to 10 years; tractors account for over half of the value of the capital stock, so it seems unlikely that our length of life assumption is too far off the mark. The depreciation or wearing out rule used was aimed more at measuring the current productive potential of the capital stock than its value (based on present and discounted future productivity); the number of implements still being used is a closer measure of current productive power than the value of the implements.

Column 5 is derived by converting the price series for the U.S. exports of agricultural machinery referred to above by the appropriate exchange rate to get a current peso price. Columns 6 and 7 are based on unpublished current price and constant price series of the Bank of the Republic. These are used in national accounts estimates of value added in agriculture. Column 8 comes from the author's national agricultural wage series based on a weighting of the departmental wage series published in the Annuario General de Estadistica. Column 9 is based on Columns 5 and 8.

1949 by a five million dollar loan for agricultural machinery from the International Bank. In 1954 the bank, along with two other private United States banking institutions, lent another 5 million dollars, administered, as in the case of the previous loan, by the Caja de Credito Agraria. Probably more important than these loans was the decline in the relative price of machinery relative to that of labor; in the decade 1946-1956 it was about half as high as in earlier and later years (see Table III-3). Between 1942 and 1956, for example, the price of imported machinery probably rose by about 150 per cent, while the wage rate was rising almost 400 per cent. But between 1956 and 1957 the devaluation sent the price of machinery up very fast again while that of labor rose more slowly. The prices of other inputs (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. Table III-3 presents, along with the price indices for capital, labor and current material inputs, estimates of the annual imports of machinery and of the total capital stock in machinery.

The import figures suggest that the rate of mechanization has slowed down very perceptibly since the years of balance of payments ease in the early and mid-fifties.[1] There was still a very heavy importation of manual tools up to and probably through the year 1953, and it is possible that import substitution has taken place along these lines in more recent years.

That mechanization was occurring rapidly in the ten or twelve years after World War II is clear. The current rate is more open to doubt; with

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[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 (see Table III-2).

no more information than the new investment series one cannot deduce with any precision the movements of the total capital stock. However, with any plausible (and constant) length of life, the stock must have fallen since the mid-fifties. Only if length of life increased substantially in response to the higher price would the stock not have decreased.

Only in two recent years have partial surveys of the stock of machinery been made; in Table III-4 the figures from the agricultural census of 1959 and from a Caja Agraria survey of 1962 are compared with ECLA's estimates for 1953 of the stock of various implements (derived by using import figures and by using arbitrary life-expectancy assumptions).[1] 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 really only overlap in the case of tractors, so only here can one get some idea as to what happened between 1959 and 1962.[2]

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. The figures

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[1]The stock estimates made by ECLA in 1953 are much more likely to be accurate than would estimates based on the same methodology ten or more years later; in 1953 most of the machinery which had ever been imported had been imported in the preceding eight years so the capital stock estimate would be insensitive to the assumption made about length of life; by 1960 the estimate would be quite sensitive to that assumption.

[2]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.

TABLE III-4

Estimated Stocks of Some Machines, Various Dates

	1953 (ECLA)[1]	1959 (agricultural census)	1962 (Caja Agraria survey)
Tractors	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.

of Table III-3, which do not take account of this phenomenon would probably be an overestimate of the decrease in the number of units of machinery being used. One can be sure, however, that no substantial increase has occurred. It appears that tractors per hectare cultivated in major crops may have fallen since about 1957; certainly there has been no significant rise (see Table III-5).[1]

How far could mechanization go in Colombia? The question is important since the greater the extent of mechanizeable land the higher the labor productivity which could be achieved in the long run, but also the greater displacement of labor which might occur in the short or middle run, with the attendant social problems. With respect to the latter problem, the most relevant figures might be the per cent of currently cultivated area which is mechanized as compared to the per cent which could be mechanized.[2] Two guesses of this ratio are known to the author.

ECLA made estimates in 1953, after large inflows of machinery had been going on for several years, of the per cent of land sown to crops, or to crops and artificial pasture (whichever comparison was relevant) on which various types of machinery were used. Although mechanization in an overall

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[1]The two estimates of tractors per cropped hectare shown in Table III-5 have post-1955 movements which probably bound the true path of the variable, assuming the cropped area figures are not too inaccurate. One would expect length of life to increase after the mid-fifties, implying a downward bias in Estimate B; but Estimate A is almost certainly upward biased.

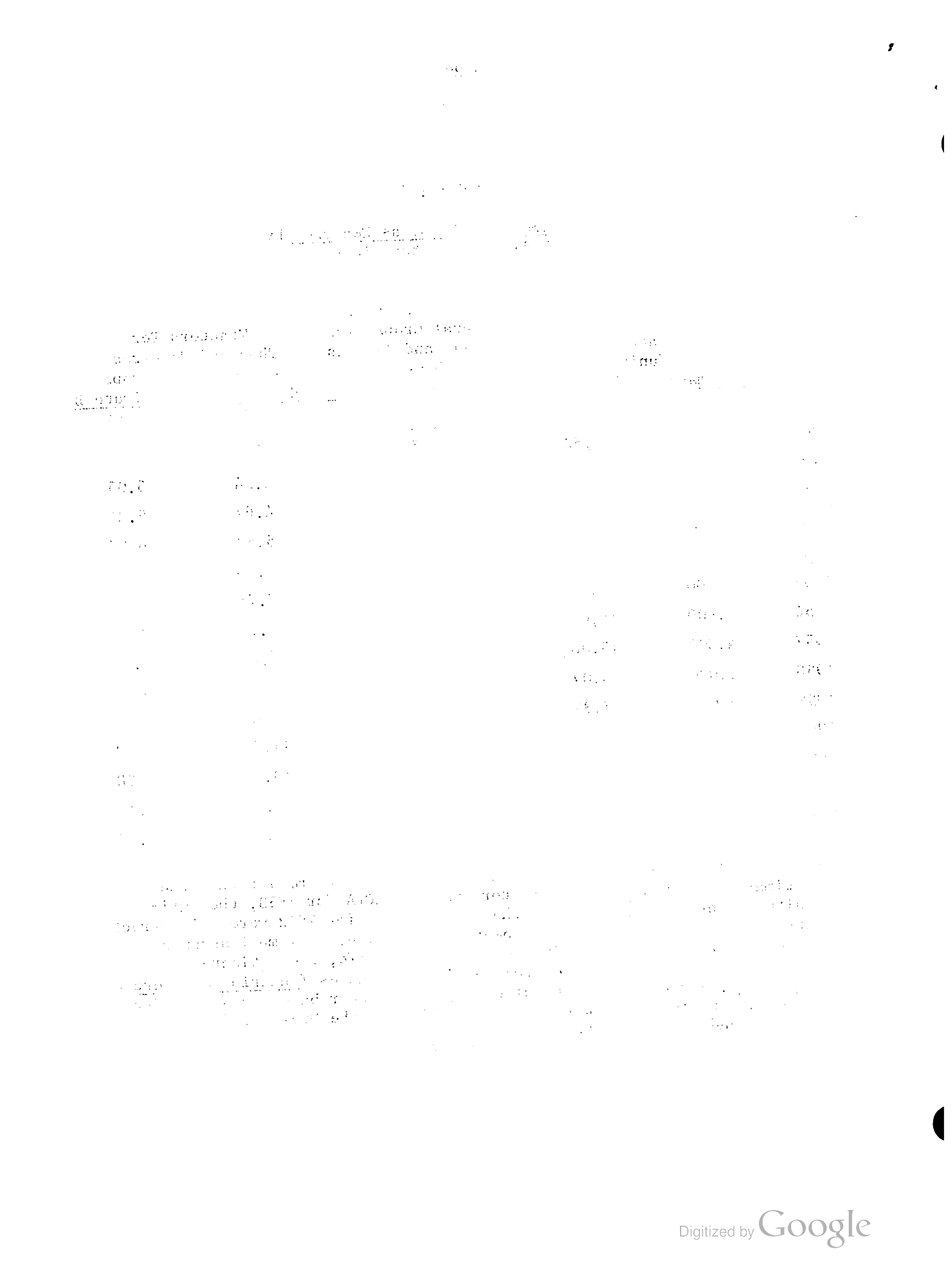
[2]Since the amount of easily mechanizeable area is a prime determinant of the number of workers who might actually be displaced. A further necessary piece of information would be the extent to which the land was owned in large plots; if this were not the case no one would have to worry about losing a job. But in Colombia much of the good flat lands are owned in large plots. Land not now cultivated but which could be mechanized would be relevant to the small farmer or landless worker only in the sense that its mechanization would probably lower agricultural prices (or keep them from rising) and hurt him in that indirect way. But at least he would still have a job.

TABLE III-5

Extent of Mechanization, as Measured by the Number of Tractors in Use

	Tractors (units)		Land in Major Annual Crops Plus Sugar and Bananas (thousands of hectares)	Tractors Per Thousand Hectares of Indicated Crops	
	Estimate A (1)	Estimate B (2)	(3)	Estimate A (4)	Estimate B (5)
1950	6,300	6,823			
1951	7,500	8,340	1,653	4.54	5.05
1952	8,200	9,202	1,755	4.67	5.24
1953	9,000	10,213	1,628	5.53	6.27
1954	10,800	11,811	1,692	6.38	6.98
1955	12,900	13,688	1,673	7.71	8.18
1956	14,600	15,007	1,671	8.73	8.98
1957	14,800	15,083	1,507	9.83	10.01
1958	15,000	15,072	1,684	8.91	8.95
1959	17,000	15,326	1,731	9.82	8.85
1960	18,000	16,139	1,594	11.29	10.12
1961	19,000	17,090	1,821	10.43	9.38
1962	20,000	17,626	1,932	10.35	9.13
1963	19,500	16,569	1,884	10.35	8.79

SOURCES AND METHODOLOGY: Column 1 is based on the assumption that the estimates of the stocks of tractors made by ECLA for 1953, the Agricultural Census for 1959, and the Caja Agraria for 1962 were all correct. Intermediate year figures have been interpolated. Column 1 assumes that all tractors have a nine year length of life; the estimates of additions to the stock come from the import figures (Anuario de Comercio Exterior). Column 3 is a tabulation by the author based on area under cultivation figures from the American Embassy, the Ministry of Agriculture and other sources.



sense was perhaps little advanced, there was surprisingly high usage of some machinery (if ECLA's figures were reasonably accurate); tractors, for example, were estimated to be used on 47 per cent of the area occupied by annual crops and sugar cane, plows of one type or another on 53 per cent of the relevant area, and harrows on 60 per cent.[1]

No estimate of this type appears to have been made for more recent years.[2] Judging from the fact that many of the new lands to be cropped in the last decades have been in the flat low areas suitable for mechanization, one would have guessed that the per cent of crop land[3] mechanized would have risen. But we have seen that the capital stock has probably fallen, so only if it is now more fully utilized than before could such a result have occurred. More intensive utilization would be a natural result of the higher price, so this is a possibility.

ECLA estimated (Table A-21) that only 7 per cent of the mechanizeable area of the country had been mechanized as of 1953. Subsequent guesses have been less bullish about the possibilities, but there seems little doubt that a great deal of pasture land could be brought under cultivation.

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[1] See Table A-20, reproduced from ECLA (p. 181). Some of these figures do seem suspiciously high. ECLA further estimated that harvesting work in 34 per cent of the area grown with cereals, except corn, was mechanized or semi-mechanized. It was pointed out that much more could be done to mechanize such crops as wheat, barley and rice on small and medium scale farms by using light machinery for the sorting and cleaning of the grain, and that good possibilities appeared to exist for the use of smaller medium size carts with animal traction (p. 182).

[2] Lauchlin Currie, Accelerating Development: The Necessity and the Means (McGraw-Hill), 1966. Currie made estimates of the per cent of land under various crops which was mechanized as of 1960 (reproduced here as Table A-53). These are not comparable with the ECLA estimates since the two measure different things; there is in any case no simple line which divides mechanized land from unmechanized. Currie did not attempt to measure the mechanizeable land.

[3] The figures of Table III-5 refer to tractors per hectare in certain crops. It is possible that there is a downward bias over time if the share of all tractors used on cropped land (as opposed to artificial pasture, etc.) has risen over time.

According to these same figures the degree of mechanization varies a great deal by department. Valle, Cauca and Cundinamarca were the leaders in terms of the per cent of mechanizeable land actually mechanized. Some departments, such as Antioquia, Bolivar and Cordoba, were at that time almost completely unmechanized in terms of the larger type machines;[1] when a comparison between cultivated land and machines (rather than mechanizeable land and machines) was made the lowland departments (characterized by extensive livestock raising) came high on the list (and still do). The most highly mechanized zones in this sense are those in which agricultural labor is relatively scarce, and/or expensive, i.e., Tolima, Magdalena, Valle, Cordoba, etc. The relative positions of the departments in terms of the extent of mechanization has not changed substantially since 1953. Estimates of the value of machines relative to agricultural output and cropped land for 1959 are presented in appendix Table A-23.

3. Real institutional credit to agriculture over time

While not a physical input itself, credit makes possible capital formation or technological change which might not otherwise occur. It is thus an indirect source of increases in output. Its possible contribution should be especially great in a labor surplus agricultural sector where capital might be the major bottleneck and the rate of return on such capital could

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[1]The 7 per cent overall mechanized/mechanizeable ratio is surprisingly low given the high ratios indicated for some types of implements. It is biased downward somewhat by the apparent inclusion of some of the llanos of Nariño as mechanizeable land (or by a typographical error), although it is not clear why this does not similarly affect the mechanization ratios for different implements. The area of mechanizeable land may have been overestimated for the country in general.

be very high indeed, given the zero or low marginal social cost of labor.

Institutional agricultural credit in Colombia is disbursed by the commercial banks and the Caja de Credito Agrario. The latter 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.[1] The existence of this institution has been an important factor in increasing the ratio of agricultural credit to the value of agricultural output quite rapidly through time. In 1937 the Caja distributed about two-thirds of the new loans to agriculture; this ratio fell to less than half during the forties and fifties, but recently reached the 50 per cent level again. In terms of credit outstanding, the Caja's share is more impressive, due to the longer average period of its loans; this share was about two-thirds in 1964. Table III-6 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-1 portrays the movements of real credit and output.

The ratio of new loans to agricultural output has stabilized in the last decade, after more than doubling in the period 1940 to 1955. The ratio of loans outstanding to value of output, which has probably more economic significance, has gone up at least somewhat since 1955, but in this case too, most

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[1] 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 in passing decrees forcing the commercial banks to give no less than a certain minimum percentage of their loans to agriculture. The net effect of these laws, after a good deal of avoidance occurs, is unknown.

TABLE III-6

Historical Series on Agricultural Credit

	New Loans (millions of current pesos)	New Loans (millions of 1958 pesos)	New Loans / Value Added in Agriculture	Credit Outstanding / Value Added in Agriculture	Credit Outstanding (millions of pesos)	Credit Outstanding (millions of pesos)
1940	42.45	225.40	7.7			
1941	45.05	247.94	8.0			
1942	49.42	266.56	7.3			
1943	59.85	273.92	7.3			
1944	93.70	383.54	8.7			
1945	119.39	414.98	9.4			
1946	170.99	538.04	11.6			
1947	210.97	578.63	11.1			
1948	226.94	550.42	11.4			
1949	245.33	548.21	9.9			
1950	317.03	613.20	10.9			
1951	383.90	656.24	11.7			
1952	526.72	886.73	14.8	14.8	512.18	862.26
1953	584.50	964.54	15.1	16.1	612.28	982.83
1954	821.29	1,259.61	17.3	14.0	646.39	991.37
1955	889.96	1,322.39	19.3	17.8	795.92	1,182.66
1956	932.98	1,288.63	17.5	17.0	877.17	1,211.55
1957	935.83	1,090.71	14.2	18.9	889.73	1,036.98
1958	1,104.19	1,104.19	15.1,	14.9	1,053.80	1,053.80
1959	1,381.91	1,289.05	17.2	17.2	1,333.82	1,244.19
1960	1,332.46	1,141.79	15.6	17.9	1,506.88	1,291.25
1961	1,659.89	1,300.86	17.3	19.6	1,830.40	1,434.48
1962	1,800.12	1,312.11	17.5	21.1	2,093.84	1,526.20
1963	2,446.72[2]	1,405.15	15.4[1]	22.4	2,739.20	1,573.12
1964	2,755.00[2]	1,376.12	17.3[1]		3,119.30	1,558.09

(continued on following page)

TABLE III-6, continued

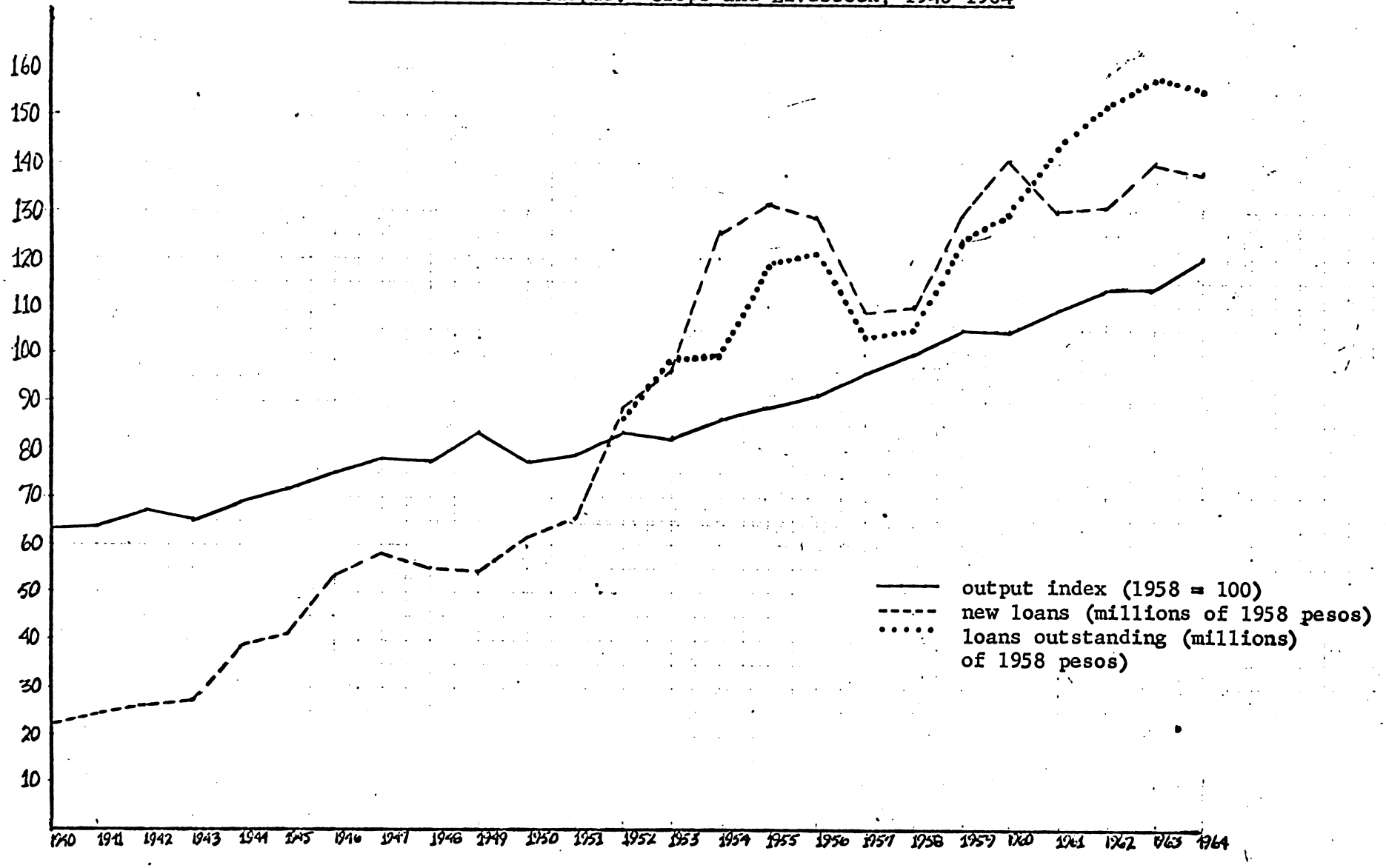
[1]Based on preliminary output figures.
[2]Guess.

SOURCES AND METHODOLOGY: Figures on new loans and loans outstanding are taken from various issues of the Revista del Banco de la Republica. Agricultural value added for 1950-1964 is from the National Accounts published by the Banco de la Republica and for years before 1950 it is based on a series developed by the author using the current peso series in the statistical appendix of the World Bank Study (International Bank for Reconstruction and Development, The Basis of a Development Program for Colombia, Baltimore, 1950) and the constant peso series presented by ECLA (United Nations, Analyses and Projections of Economic Development: The Economic Development of Colombia, United Nations, Geneva, 1957) (see also Table A-3).

The deflation to obtain loans in constant pesos was done by the GNP price series. This is not necessarily a good deflator to use; it measures the opportunity cost to the rest of the economy of the loans to agriculture. More relevant might be a price series of the goods and services typically purchased by the funds received as credit (if one wants to measure how much the credit is likely to help the farmer). But I was unable to obtain the data which would be needed to construct such an index.

DIAGRAM III-1

Real Credit and Output: Crops and Livestock, 1940-1964



of the increase was prior to that year.[1] It seems unlikely that the leveling off was a result of a decreasing need for credit. The fast rate of growth from 1950 through 1955 suggests a relationship with the coffee boom. The relation is not direct in the sense of resulting largely from increases in credit to the coffee sector, as indicated in Table III-7, where the new loan/output ratio is seen to rise also for livestock and for non-coffee crops. To the extent, then, that it was a result of that boom, it must have been through the general credit ease stimulated by the increased savings and purchasing power of that period. Table III-8 shows the movements for the economy as a whole of the ratio of credit to value added; they are very similar to those for agriculture. This suggests too that the recent leveling off is due to a general scarcity of credit in the economy, rather than to the credit level to agriculture having reached some sort of equilibrium level, or agriculture having been discriminated against. In fact, the share of all loans going to agriculture has risen since the mid-fifties. 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 coffee (although this ratio has fluctuated a great deal), and a decrease in the ratio for livestock.

One test for the adequacy of institutional credit to agriculture is to compare Colombia with other countries. In Table III-9, amount of credit is

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[1] CIDA [Comite Interamericano de Desarrollo Agricola, Tenencia de la Tierra y Desarrollo Socio-Economico del Sector Agricola: Colombia (Union Panamericana), 1966, p. 184] makes the interesting point that the traditional systems of loans from one individual to another and anticipation payments linked to coming harvests are apparently disappearing. This could mean that the increase in institutional credit has been sufficient to make these alternative sources considerably less necessary; it could also imply some change on the supply side too, of course.

TABLE III-7

Ratio of Loans to Value of Output; Agricultural Subsectors
(absolute figures in millions of pesos)

	Coffee			Non-Coffee Crops			Livestock		
			Loans			New Loans			New Loans
	Value of Output	New Loans	Value of Output	Value of Output	New Loans	Value of Output	Value of Output	New Loans	Value of Output
1938	67.0	--	--	268.8	--	--	194.1	--	--
1939	70.7	--	--	320.2	--	--	192.8	--	--
1940	51.5	4.156	8.07	324.0	6.914	2.13	188.7	16.4	8.6
1941	80.9	5.228	6.46	264.9	6.108	2.31	196.4	19.1	9.7
1942	97.0	5.654	5.83	349.4	7.001	2.00	194.1	21.9	11.2
1943	101.7	8.842	8.69	425.7	9.445	2.22	248.1	31.0	12.4
1944	128.8	15.953	12.39	532.2	15.277	2.87	375.8	58.5	15.6
1945	142.3	15.387	10.81	618.8	24.112	3.90	457.1	67.8	14.8
1946	207.6	23.581	11.36	716.9	37.055	5.17	509.0	101.2	19.8
1947	283.8	29.025	10.23	841.8	48.231	5.73	748.1	120.2	16.1
1948	261.7	31.546	12.05	945.3	51.918	5.49	732.7	128.4	17.5
1949	281.0	23.695	8.43	1,122.4	61.131	5.45	994.9	142.3	14.3
1950	609.0	39.939	6.56	1,091.4	69.659	6.38	1,087.4	182.2	16.7
1951	848.1	60.713	7.16	1,360.0	101.728	7.48	1,033.4	194.6	18.8
1952	1,010.4	84.422	8.36	1,274.4	111.105	8.72	1,187.6	299.5	25.2
1953	1,063	95.576	8.99	1,442.1	114.395	7.93	1,285.4	346.4	26.9
1954	1,413	138.719	9.82	1,767.5	151.634	8.58	1,509.0	474.6	31.4
1955	1,122	141.331	12.60	1,708.8	158.759	9.29	1,709.5	534.9	31.2
1956	1,612	161.694	10.03	1,875.1	141.584	7.55	1,796.9	555.8	30.9
1957	2,127	181.223	8.52	2,298.9	171.386	7.46	2,159.4	516.7	23.9
1958	2,064	200.922	9.73	2,725.9	228.736	8.39	2,570.7	595.8	23.1
1959	1,762	138.463	7.86	3,162.0	492.826	15.59	3,108.0	638.0	20.5
1960	1,748	169.033	9.67	3,314.9	381.759	11.52	3,599.0	687.0	19.1
1961	2,031	229.728	11.31	3,745.6	474.178	12.66	3,712.1	850.9	22.9
1962	1,884	192.883	10.24	4,156.1	--	--	4,030.9	902.1	22.4
1963	--	--	--	--	--	--	--	1,213.5	--

SOURCES AND METHODOLOGY: Estimates of new loans by sub-sector are from issues of the Revista del Banco de la Republica and the Anuario General de Estadistica. Discrepancies among different sources for what appeared to be the same series (judging by the definitions given) were sometimes substantial so none of the figures can be assumed to be precise. Errors, however, would be very unlikely so great as to invalidate the general trends found. The value of output series are from Table A-3, where the sources and methodology are described.

TABLE III-8

Total Loans Outstanding (Cartera) of the Banking System

(absolute figures in millions)

	Loans Outstanding	Value of Output at Market Prices (G.D.P.)	Loans Value of Output	Loans in Constant 1958 Pesos	Loans Outstanding Agriculture	Agricultural Loans All Loans
1940						
1941						
1942						
1943						
1944	262.2	2,776.5	9.44	64.06		
1945	333.1	3,480.3	9.56	95.83		
1946	454.0	4,143.0	10.96	144.28		
1947	556.8	4,992.3	11.15	203.01		
1948	624.6	5,849.0	10.68	257.52		
1949	690.3	6,850.0	10.08	308.91		
1950	883.4	7,860.5	11.24	456.72		
1951	1,046.4	8,940.9	11.70	612.14		
1952	1,258.3	9,650.9	13.04	747.43	512.18	.407
1953	1,468.4	10,734.7	13.68	889.85	612.28	.420
1954	1,854.4	12,758.8	14.53	1,209.07	646.39	.349
1955	2,285.2	13,249.8	17.25	1,537.94	795.92	.348
1956	2,771.9	14,862.8	18.65	2,006.86	877.17	.316
1957	2,956.7	17,810.6	16.60	2,536.85	889.73	.301
1958	3,258.2	20,682.5	15.75	3,258.20	1,053.80	.323
1959	3,759.7	23,472.1	16.02	4,030.40	1,333.82	.355
1960	4,444.4	26,417.6	16.82	5,186.61	1,506.88	.339
1961	5,369.7	30,067.0	17.86	6,851.74	1,830.40	.341
1962	6,109.5	33,578.4	18.19	8,382.23	2,093.84	.343
1963	7,670.0	42,707.3	17.96	13,353.47	2,739.20	.357
1964	8,386.4	52,699.7	15.91	16,789.57	3,119.30	.372

SOURCES AND METHODOLOGY: Figures on total loans outstanding and loans to agriculture (Columns 1 and 5) come from the Revista del Banco do la Republica. Value of output (Column 2) comes from the National Accounts for 1950 and on and is based on the constant price output series and the GDP price series of ECLA for earlier years. The current price series based on these two sources is spliced to the National Accounts series. Column 4 is based on the deflation of Column 1 by the GNP deflator. Agricultural loans are from Table III-6.

TABLE III-9

Amount of Institutional Credit per Ton of Agricultural Output Measured in Wheat Equivalents, Specified Countries, Selected Years
(in U.S. dollars)

Country[1]	1953	1955	1957	1959	1961
Group I					
Israel	--	33.8	42.4	41.8	42.2
Sudan	--	--	--	3.4	3.2
Mexico	16.6	12.7	13.8	17.6	21.5
Philippines	13.6	14.1	17.6	30.7	34.7
Turkey	15.4	19.2	22.8	--	7.7
Venezuela	20.7	5.9	5.7	32.0	22.2
Thailand	0.4	0.2	0.3	0.2	--
Brazil	4.7	4.8	5.8	5.1	7.4
Greece	--	16.0	21.9	22.9	24.0
Group II					
India	1.4	1.5	2.9	3.4	3.7
Chile	14.5	9.8	16.0	19.7	39.0
Japan	--	15.8	21.7	27.2	42.0
Spain	--	1.7	1.4	1.3	1.8
Colombia	8.1	10.5	6.4	7.8	7.8
UAR	4.6	2.7	3.7	5.1	7.7
Pakistan	1.7	1.5	1.9	1.8	--
Tunisia	6.1	12.6	--	--	8.4

[1]Countries are arranged by rate of increase in crop output.

SOURCE: U.S. Department of Agriculture, Economic Research Service, Changes in Agriculture in 26 Developing Nations, 1948 to 1963, p. 87. Originally from FAO data on agricultural production as expressed in wheat equivalent units.

related to tons of agricultural output measured in wheat equivalents. Colombia ranks more or less in the middle of the underdeveloped countries, although strikingly far below such countries as Mexico and Venezuela within Latin America in the year 1961, and even farther behind Chile. The methodology involved in these comparisons is, however, not so sound as to warrant much faith.

It is interesting to note that American AID mission reports suggest that of all the factors such as land tenure, market conditions, etc., which affect the farmer, Colombia compares most favorably to other countries in the realm of credit (see Table III-10). There is substantial impressionistic evidence to the effect that credit is still very scarce (and therefore presumably productive) in the agriculture sector. To my knowledge, no general studies have been done to attempt to measure its productivity. On a priori grounds of the degree of poverty in such a country and especially within the agricultural sector where a large portion of output comes from relatively small producers, it would seem very likely that it has a high productivity. Examples of small land owners who are not able to use some land even for cattle grazing because of lack of capital are frequent. Medium and large-scale farmers usually have relatively large amounts of capital and their profits usually leave ample margin for subsequent investment if they decide to intensify production. Nevertheless, the most ambitious among these large farmers often are not able to carry out their plans for improvement as rapidly as desired.[1]

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[1] CIDA, op. cit., p. 183, also suggests that the small-scale farmer who receives credit with no supervison, often simply turns it into a temporary increase in consumption, and on occasion into small improvements in housing, with the resulting problem of repayment later on.

TABLE III-10

Ratings of Specified Countries on Selected Aspects of Their Economic Development Foundations[1]

Country	Conditioning Factors				Production Factors			
	Land Tenure	Farm Prices	Markets	Consumer Goods	Knowledge	Production Requisites	Credit	Investments in Land Development
Latin America								
Argentina	2	2	2	1	2	1	2	2
Brazil	3	3	3	2	3	2	2	1
Chile	3	3	3	3	3	3	3	3
Colombia	2	3	3	2	3	3	1	3
Costa Rica	1	2	2	1	2	2	1	2
Mexico	1	1	1	2	2	1	2	2
Africa								
Nigeria	2	2	2	2	2	3	3	3
Sudan	3	3	2	3	1	3	1	1
Tanganyika	3	2	3	3	2	3	3	2
Tunisia	1	1	1	1	1	2	1	1
Near East and South Asia								
Egypt	1	1	1	2	3	2	1	1
India	2	3	3	3	3	2	2	2
Iran	-	-	-	-	-	-	-	-
Jordan	1	3	3	1	2	1	2	3
Pakistan	2	2	3	3	2	3	2	1
Turkey	2	2	2	2	2	3	1	3
Far East								
Philippines	2	3	3	2	2	2	3	1
Taiwan	1	2	1	1	1	1	1	1
Thailand	1	3	2	1	3	2	2	1

SOURCE: U.S. Department of Agriculture, Economic Research Service, Changes in Agriculture in 26 Developing Nations, 1948 to 1963, p. 134. Originally from questionnaire replies by U.S. AID Mission in reporting countries.

[1]The ratings of 1, 2 and 3 mean favorable, moderately favorable and unfavorable, respectively. These ratings have been made by AID Missions for their respective countries.

Judging by this still observable shortage of credit in agriculture, the very rapid increase which occurred between 1940 and 1955 must have been a significant contributing factor to the growth of output in that period. As in the case of mechanization, it is relevant to ask how important further increases might be in the future.

The credit/output ratio for agriculture moves so similarly to that for the economy as a whole as to suggest that overall tightness on the supply side was the only important explanatory variable for the changes which occurred over time. Another possible explanation would be that "credit worthiness" has decreased in recent years.[1] While there is always a considerable residual of unfulfilled demands for credit, it could be that such loans would be too risky for the lending institution, i.e., to make them would mean going beyond the usual security bounds set by such institutions. The real question is whether a large decrease in the security of the loans, or in the interest rate which could be charged, would be necessary in order to increase the loans/output ratio substantially. If this were the case new institutions might be required, or credit might simply have to be written off as a potential tool for increasing agricultural output. And to the extent that an improved distribution of income within the agricultural sector is sought along with increased output, the more stringent condition of whether the existing institutions can increase their loans to the smaller farmers is the relevant one. This leads us to ask whether the increase in the overall

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[1]The decreasingly buoyant conditions of the late fifties and early sixties as contrasted to the preceding years make this a reasonable hypothesis.

credit/output ratio which has occurred in the last twenty-five years has gotten as far down as this group or whether the changes in the overall ratio camouflage constancy in the ratio for different groups, or, if not for all groups, at least for the small farmers. Not enough data is available to provide good clues to this question. The commercial farmers, increasingly important in the last fifteen or twenty years, do have a high credit/output ratio, so even if it stayed constant the overall credit/output ratio would rise.[1] While the proportion of all credit going to such farmers is unknown, Table III-11 sheds some light on the distribution of Caja loans; the most striking feature is the very high credit/output ratio going to "other" renters, a category which includes many of the commercial farmers. The table is very consistent with the hypothesis that a disproportionate amount of Caja loans go to fairly large operators.[2] Commercial bank loans must go

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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 increasing relative importance of the commercial sector within agriculture. 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 output did. Unless the livestock sector was also becoming more commercial at this time, this disaggregation suggests the presence of other factors.

If commercialization can be accurately indicated by the imports of machinery, the credit/output ratio was rising substantially well before commercialization really got under way, and rose no more rapidly than usual during the wave of machinery imports. The evidence in the opposite direction comes from the fact that the credit/output ratio in non-coffee crops (most of the commercial farming falls in this category) has continued to rise during the last decade and the fact that between 1955 and 1964 the share of Caja loans going to renters showed a substantial increase. While there is no proof that the recipients were mainly commercial farmers, it seems highly plausible.

[2]CIDA, op. cit., in criticizing the Caja Agraria notes that although almost all its activities are the 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

(continued on following page)

TABLE III-11

Credit/Value Output by Tenancy of Producer, 1959

(absolute figures in millions)

	Credit, Loans--Caja Agraria (1959-1960)	Value of Output	Credit/Output	% of Total Output
Owners	4,456.5	5,132.8	8.68	60.36
Renters	976.4	965.1	10.12	11.35
Share-croppers	137.6	544.5	2.53	6.40
Other	738.8	371.1	19.91	4.36
Settlers	393.4	684.8	5.74	6.75
Other[1]	159.2	803.4	19.82	9.45[1]

SOURCES AND METHODOLOGY: The credit figures of the Caja come from various of its "Informes de Gerencia." The output breakdown is based on the very crude assumption that at each farm size the yields of crops and the output of livestock per animal in the stock are the same regardless of the form of tenure. In fact, yields are also assumed to be the same for different farm sizes. The extent of error in these assumptions would not likely be sufficient to change the relations seen in the Table.

[1]Because of some uncertainties with respect to definitions used in the breakdown of credit the comparability of credit and value added included here is highly dubious. Co-ops and joint owners are included as recipients of credit.

much more exclusively to the large-scale farmers.[1]

As with almost any credit system, the group most severely discriminated against are those most seriously in need of credit, i.e., the small farmers who have to rent their land and hence have no security to put up in order to receive loans. In terms of the per cent of farmers in each category receiving credit, the other renters fare the best.

Table III-12 shows the distribution of Caja Agraria loans by tenancy of borrower for selected years during the decade 1955 to 1965. It appears to suggest some improvement in distribution, at least in the sense that the concentration of loans on farm owners has decreased; the per cent of all new loans going to this group fell from 82 per cent in 1955 to 71 per cent in 1965. The substantially increased share going to renters probably reflects primarily the increased share received by the commercial renters; whether the small-scale renter is any better off remains to be discovered. Settlers and share-croppers both increased their shares a little, but hardly dramatically. The average size of loans to owners was larger than to any other group,

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(continued from preceding page)

expenditures in the programs of supervised credit. CIDA claims 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 placed 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 the guarantee offered and to study the possibilities and needs of the borrowers, which they do in very limited degree, and to control the effective destination of the loan, which they essentially do not do.

[1]Some official entities and private ones furnish annual credit in the form of inputs for particular crops with the term of one crop--a third source of credit. Examples are the Cotton Growers' Federation, the Breweries, and the Tobacco 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.

TABLE III-12

New Loans of the Caja Agraria by Tenure Status of Farmer

Year	Total New Loans	Per Cent Distribution						
		Owners	Renters	Settlers	Share-croppers	Joint-owners	Co-op	Other
By Value of Loan	Thousands of Current Pesos							
1955	382,006	81.78	9.80	4.48	1.07	1.13	1.21	.04
1957-1958	431,649	83.58	9.49	3.54	1.38		1.00	1.01[1]
1959-1960	585,466	76.12	12.62	6.72	2.35	1.06	.54	1.12
1962	939,319	74.80	14.28	7.39	2.05	.98		.50[2]
1964-1965 (July 1 - June 30)	1,284,508	70.76	17.65	6.64	2.44	1.04		1.46[2]
By Number of Loans								
1955	208,532	78.72	9.89	5.48	3.52	1.89	.27	.23
1959-1960	227,504	72.27	12.41	8.03	4.92	1.96	.13	.41
1962	288,582	68.88	15.03	9.24	4.77	1.86		.34[2]
1964-1965	287,437	67.08	16.08	8.33	5.31	1.95		1.25[2]

(continued on following page)

TABLE III-12, continued

Year	Total Loans	Owners	Renters	Settlers	Share-croppers	Joint-owners	Co-ops	Other
Average Size of Loan (current pesos)								
1955	1,832	1,908	1,814	1,496	557	1,096	8,317	718
1959-1960	2,573	2,913	2,811	2,313	1,322	1,495	1,067	1,450
1962	3,254	3,534	3,093	2,602	1,400	1,715	--	4,863[2]
1964-1965	4,469	4,714	4,904	3,562	2,053	2,383		5,220[2]
Per Cent of All Farms Receiving Credit								
1959-1960: a) assuming no duplication[3]	18.81	21.77	20.56[5]	38.90[6]	7.71	n.a.	n.a.	n.a.
1959-1960: b) duplication[4]	11.3	13.1						

[1] Including joint-owners.

[2] Including co-ops.

[3] That is, assuming that no farm received more than one loan.

[4] Assuming, as suggested by CIDA, that 40 per cent of each years loans go to people who have already received one loan. The figures thus calculated become minimum estimates, and are underestimates to the extent that some farmers have received more than two loans.

[5] We assume that the Caja includes as renters all producers who must make some payment to the owner of the land, with the exception of share-croppers.

[6] The figure for settlers seem surprisingly high, probably a result of a census under-enumeration of farmers in this category. The true ratio may be rather high since many "settlers" hold large tracts of land.

SOURCE: Based primarily on a paper done at Yale University by Marli Schenck, "Agricultural Credit in Colombia."

however, and this difference would probably become larger if commercial loans were included. A breakdown by tenancy of borrower is not available for the commercial banks, but probably over 90 per cent of their loans are to owners and commercial farmers, some of whom rent.

CIDA estimates that two-fifths of the Caja's new loans are made to persons who have already received a loan during that year; hence, 11.3 per cent of all farmers received Caja loans: 13.1 per cent of owner-operators, 12.3 per cent of renters, and 23.3 per cent of all others.[1] If no operator had received more than one commercial bank loan, then 4.2 per cent 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 per cent of a year's loans to be duplicated.[2]

> Groups which receive little credit, then, appear to be sharecroppers, joint owners, and small renters. The first two of these are among the most common forms of tenancy in Colombia, especially on small farms. One of the main reasons for their frequency is the shortage of working capital--farmers with land would rather share the risks of seed and fertilizer purchase with another person. Those who furnish fertilizer and seed for such operators probably do not borrow from the Caja under another category, at least among small holders and their partners. Tenants who sharecrop on larger landholdings may receive some credit indirectly, through the owners of these holdings. Still, the tenancy systems devised to circumvent the shortage of working capital seem to be least included in its wider distribution in recent years. In part, their needs for credit may be lower than those in

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[1] 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, Directorio Nacional de Explotaciones Agropecuarias [Censo Agropecuario], 1960, Resumen Nacional, Bogota, 1964), p. 22.

[2] There is probably little overlap between recipients of commercial bank loans and recipients of Caja loans, so about 14 or 15 per cent of farmers probably received one or the other in 1959-1960.

> other forms of tenancy; however, neglect of this share of the country's farming operations appear sizeable.[1]

Since the credit statistics are not classified directly by size of recipient, we have no solid evidence as to whether the small-scale farmer is getting more than before.

A recent and interesting innovation of the Agrarian Reform Institute (INCORA) aimed largely at the smaller farmer is the "supervised credit" program. Recipients of credit are expected to carry out certain technological improvements as part of the bargain--for example, they might be required to plant a better variety of corn seed. While the program is very young, having been started only in 1963, by mid-1965 it was reaching about 8,000 families and seemed to be helping to bring about some desired changes. (A fuller discussion of the program is presented in Chapter VIII.)

Productivity and Adequacy of Credit. There is, in general, an excess demand for agricultural credit in Colombia, so on this basis one could judge the social rate of return on credit extended is somewhat greater than the rate of interest charged. The nominal rate of interest charged by the Caja is below 10 per cent, and the real rate has thus, in most recent years, been negative. Commercial banks charge a somewhat higher rate of interest; but even here the real rate is often negative.[2]

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[1] Paper done at Yale University by Marli Schenck entitled, Agricultural Credit in Colombia, pp. 34-35.

[2] Another possible indication of the yield on loans to agriculture might be the rates charged by the "prestamistas," who loan on less security (or no security at all) than the Caja Agraria and for short-term periods. Their interest rates often are in the neighborhood of 40 per cent per year or even higher for very short-run periods. In some regions most of the loans are by prestamistas rather than by institutional credit givers like the Caja Agraria and the commercial banks (see the study by Robert E. Nesbitt). It is true that a large proportion of these loans probably are not for productive purposes, so that the interest rate the borrower can afford to pay is not a measure of the productivity of any project.

Due to problems of two-way causation, it is difficult if not impossible 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 would suggest the hypothesis that it was important. In Diagram III-2 we have plotted agricultural output in constant pesos against agricultural credit in constant pesos, for the years 1940 to 1964. The diagram does not suggest a tight relation between the two variables.

A more disaggregated approach comparing credit to specific crops and the output path of the crops can also be presented. In Diagram III-3 we present output and credit, both in real terms, for crops and livestock separately. It does not suggest any really clear relationship in either case; the credit figures depend a great deal on the overall buoyancy of the economy, and the output figures for crops can be affected a good deal by weather conditions, etc., so the lack of a relation is not surprising.

Unfortunately, data on the "by crop" distribution of credit from the commercial banks is not readily available; hence it is only possible to use Caja Agraria figures at this level of disaggregation. The distribution of credit to crop farming is shown in Diagram III-4. There is a fairly close relationship between the amount of real credit given by crop and the output path of the crop as illustrated in Diagrams A-1 - A-6. In the case of a

DIAGRAM III-2

Real Credit and Output: Crops and Livestock, 1940-1964

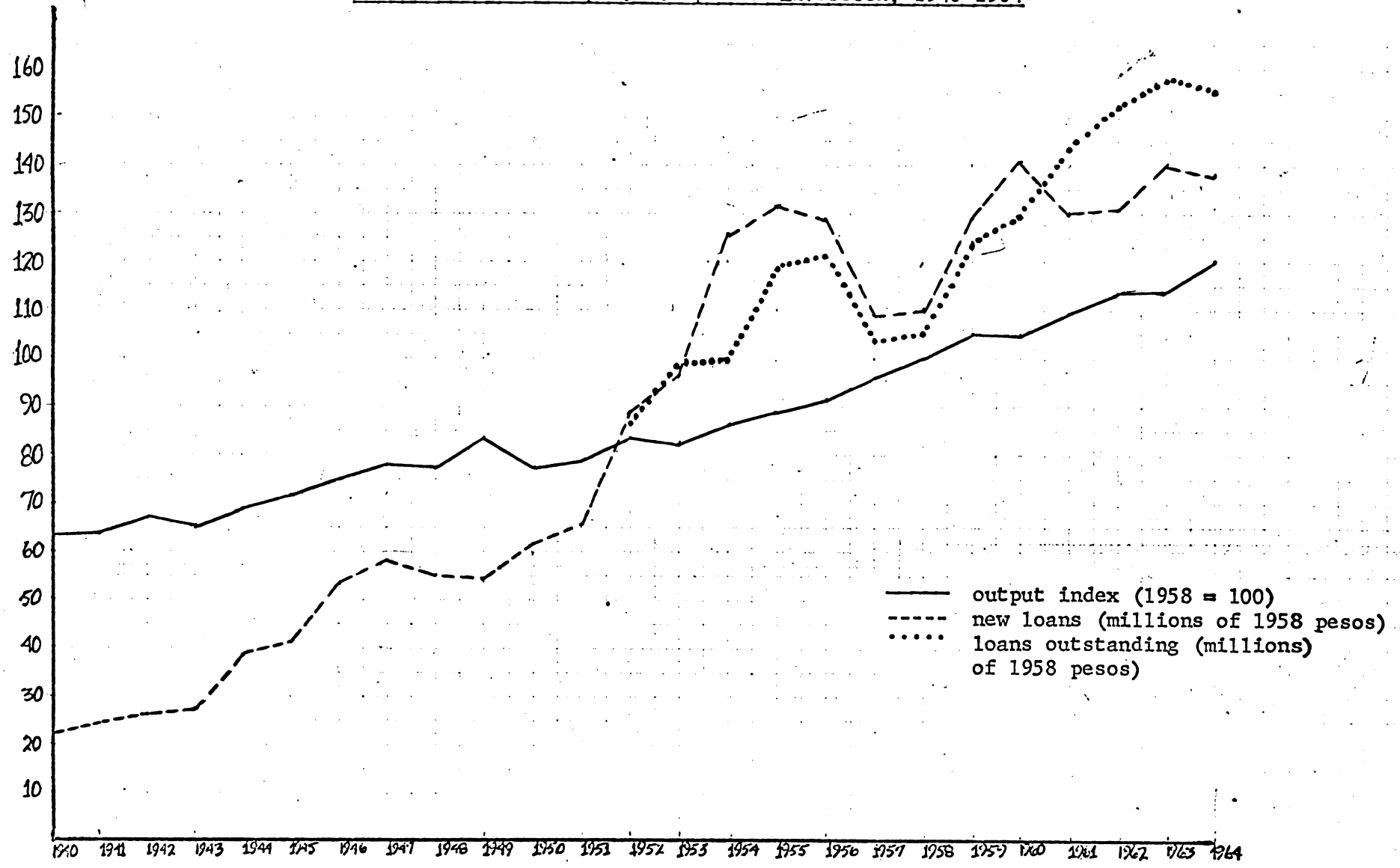


DIAGRAM III-3

Output and Real Credit Series: Crops and Livestock

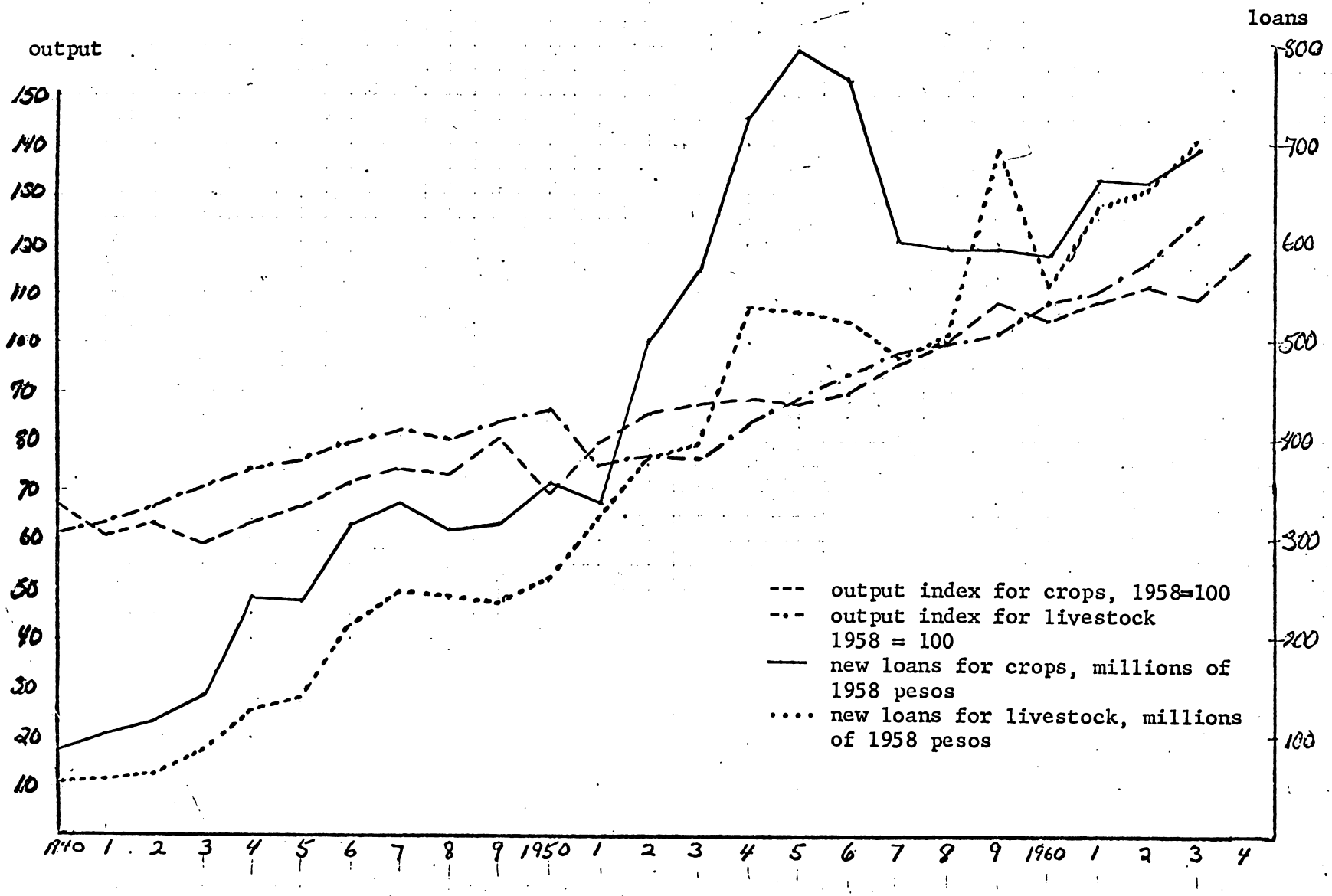
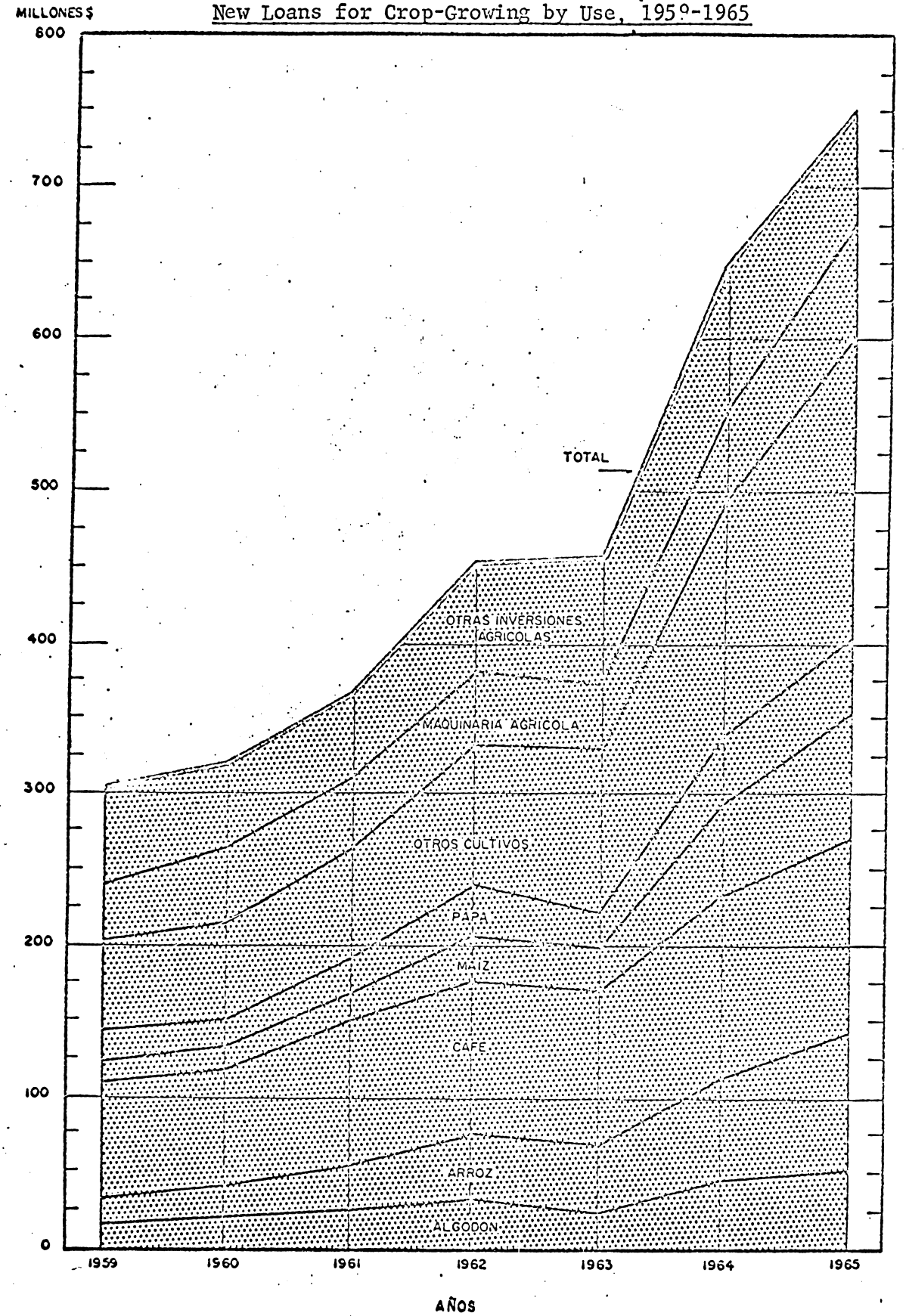


DIAGRAM III-4

New Loans for Crop-Growing by Use, 1959-1965



couple of crops there seems if anything to be a lag of credit behind output, although in general, there is no evidence of either a lead or a lag.[1]

Distribution of Credit. Given that it is difficult to judge the overall productivity of agricultural credit, one can make some observations which suggest that it has not always been distributed in the best possible manner. The evidence is purely circumstantial but probably still of interest. Table III-7 presented the credit and output figures for coffee, other crops, and livestock. Not surprisingly, we see that the ratio of new loans to output is much higher in the case of livestock than in the case of crops. A part of this differential might be accounted for by the often-mentioned fact that a good deal of credit which, according to the figures, goes to livestock, is actually diverted to various urban uses, such as construction by large-scale farmers who own land in the cities as well. But it seems very unlikely that a difference of such magnitude could be completely explained in this way. The share of new loans to crops out of the total to crops and livestock has been rising gradually through time (see Table III-13), 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 and, as late as 1957, were still giving about 60 per cent of their

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[1]Either a lead or a lag would still leave the overall question of the productivity of credit rather open, although a lead would certainly have been more persuasive than a lag. In the case of coffee, the credit seems seems to have followed up to the year 1961 a reasonable pattern of what one would guess was the planting profile during these years; due to the gestation period required in coffee production, the output series naturally has a lag after planting.

TABLE III-13

The Relationship Between Loans and Value of Output: Agriculture and Livestock

	Crop-Growing				
	New Loans (1)	Outstanding (2)	Value of Output (3)	New Loans Value Added (4)	Outstanding Loans Value Added (5)
1938			335.8	--	
1939			390.9	--	
1940	10.0	8,379	375.5	2.7	2.2
1941	11.3	9,585	345.8	3.3	2.8
1942	12.6	10,600	446.4	2.8	2.4
1943	18.3	14,949	527.4	3.5	2.8
1944	31.2	26,102	661.0	4.7	4.0
1945	39.5	35,167	761.1	5.2	4.6
1946	69.8	63,995	924.5	7.6	6.9
1947	90.7	82,055	1,125.6	8.1	7.3
1948	98.4	90,584	1,207.0	8.2	7.5
1949	102.9	90,005	1,403.4	7.3	6.4
1950	134.8	124,372	1,700.4	7.9	7.3
1951	189.3	174,569	2,208.1	8.6	7.9
1952	227.2	211,393	2,284.8	9.9	9.3
1953	238.1	259,273	2,505.1	9.5	10.4
1954	346.7	289,004	3,180.5	10.9	9.1
1955	354.9	338,279	2,830.8	12.5	12.0
1956	377.2	372,208	3,487.1	10.8	10.7
1957	419.2	407,873	4,425.9	9.5	9.2
1958	508.4	478,122	4,789.9	10.6	10.0
1959	743.9	662,733	4,924.0	15.1	13.5
1960	645.4	693,764	5,062.9	12.7	13.7
1961	808.9	816,569	5,776.6	14.0	14.1
1962	897.9	907,776	6,040.1	14.9	15.0
1963	1,233.2	1,243,313			
1964					

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TABLE III-13, continued

	Livestock						% of Cre Outstand to
	New Loans (6)	Outstanding (7)	Value of Output (8)	New Loans Value Added (9)	Outstanding Loans Value Added (10)	% of New Loans to Agriculture (11)	Agricultu (12)
1938			194.1				
1939			192.8				
1940	16.4	13,529	188.7	8.6	7.2	23.5	38.2
1941	19.1	15,949	196.4	9.7	8.1	25.1	37.5
1942	21.9	18,384	194.1	11.2	10.0	25.5	36.6
1943	31.0	25,812	248.1	12.4	10.4	30.6	36.7
1944	58.5	56,084	375.8	15.6	14.9	33.2	31.8
1945	67.8	61,203	457.1	14.8	13.9	33.0	36.5
1946	101.2	93,731	509.0	19.8	18.4	10.8	40.6
1947	120.2	111,575	748.1	16.1	14.9	42.9	42.4
1948	128.4	121,721	732.7	17.5	16.6	43.3	42.7
1949	142.3	136,995	994.9	14.3	13.8	42.0	39.6
1950	182.2	176,968	1,087.4	16.7	16.3	42.5	41.3
1951	194.6	190,830	1,033.4	18.8	18.5	49.2	47.8
1952	299.5	298,408	1,187.6	25.2	25.1	43.1	41.5
1953	346.4	351,571	1,285.4	26.9	27.4	40.7	42.4
1954	474.6	354,802	1,509.0	31.4	23.5	42.2	44.9
1955	534.9	454,598	1,709.5	31.2	26.6	39.9	42.7
1956	555.8	499,978	1,796.9	30.9	27.8	40.3	42.7
1957	516.7	474,008	2,159.4	23.9	22.0	44.7	46.3
1958	595.8	566,387	2,570.7	23.1	22.0	46.1	45.7
1959	638.0	653,298	3,108.0	20.5	21.0	53.8	50.4
1960	687.0	800,292	3,599.0	19.1	22.2	48.4	46.4
1961	850.9	1,002,495	3,712.1	22.9	27.0	48.7	44.9
1962	902.1	1,177,684	4,030.9	22.4	29.2	50.4	43.5
1963	1,213.5	1,475,058					

SOURCES AND METHODOLOGY: New loans to agriculture and crop growing (Columns 1 and 6) are from the Revista del Banco de la Republica. Loans outstanding for the commercial banks are from the same source, but only as far back as 1952. Loans outstanding from the Caja Agraria were available but were not classified by whether directed to crop growing or to livestock raising. An arbitrary assumption was made that the average period of a loan is somewhat longer for cattle than for crops (consistent with the tables in the Anuario de Estadistica General which, while not giving the figures desired, did indicate that a greater per cent of loans for livestock raising were medium or long term than those to crop growing). Arbitrary assumptions were also used as to the credit outstanding to new loans ratio for commercial bank loans in the period before 1952.

loans to cattle raising, but by 1964 were giving about the same amount to each of the two uses (according to the official figures). The meaning of the higher credit/output ratio for livestock than for crops is confused somewhat by the fact that, at least according to ECLA estimates of 1953, the capital/output ratio is much higher in the livestock sector than in the crop sector. Thus the credit/capital (fixed and working) ratios as of 1953 would have been

coffee	5.84
other crops	5.78
all crops	5.82
livestock	4.87
crops and livestock	5.34

There is certainly some reason to believe that, as in the case of Chile, the large-scale farmer consumes a high proportion of his income;[1] thus the allocation of credit to livestock is very likely too high. It is of course true that administrative costs for this form of credit are less than those in crops. From the point of view of total production in the economy, it is also true that the question of whether the livestock producer could save or not is irrelevant, but rather whether he would be forced to save if he did not receive the credit.[2]

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[1] See the study in El Trimestre Economico entitled "La Estructura Agraria en siete piesas de America Latina" by Solon L. Baraclough and Arthur L. Domicke.

[2] Thus one dollar of credit may lead to less than one dollar more investment than otherwise would have occurred (with the assumption that the borrower would have invested more of his own money if he had not received the credit) or it may even imply an increase in investment and decrease in consumption of more than one dollar; this would be the situation where the

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The investment process in these so-called "commercial" sectors of agriculture is probably markedly different and markedly more parallel to that in the manufacturing sector than is true for the other branches of agriculture. This sector, as suggested in Table III-11 has a much higher credit to value added ratio than any other part of agriculture (if the farms which are rented but not share-cropped are typical of commercial agriculture as a whole). Much of the sector operates on a sufficiently large scale so that credit is quite available; and since these farms are usually productive and large, the savings capacity of the owner is also quite high; one might therefore expect a marginal productivity of credit more or less the same as that in the rest of the economy.

The distribution of credit by region and by crop is also of very considerable interest. Table III-14 presents some data on the distribution by departments, but it tends, unfortunately, to tell very little about the evenness of credit distribution, since not all the credit conceded in a given department is used in it. Cundinamarca and Atlantico 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 from these figures that Nariño and Cauca are the most credit-poor departments; Huila appears to be well off. Most of the rest are indeterminate due to the difficulty just cited.

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borrower would not be able to undertake the project unless he received the credit, but if he is able to undertake the project he will contribute some of his own money which would otherwise have been spent in consumption. 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.

TABLE III-14

Loan Distribution by Departments

Department	Agricultural Output, 1959 (1)	New Loans, 1960 (2)	% Distribution of New Loans (3)	New Loans Value of Agricultural Ouput in 1959 (4)	Loans Outstanding October, 1960 (5)	% Distribution of Loans Outstanding (6)	Loans Outstanding Value of Agricultural Output in 1959 (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
Nariño	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 loans and loans outstanding (Cols. (2) and (5)) are from issues of the Boletin de la Superintendencia Bancaria.

Social Infrastructure

Of the government's 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 is another. In line with its general policy of niggardly spending on the agricultural sector, the Colombian government has spent little on either. In the category of social infrastructure one could place irrigation works, large-scale drainage operations, flood control, and above all, feeder roads. The United States missions rank Colombia as having an "unfavorable" situation with respect to this sort of infrastructure (see Table III-10, under the title "investments in Land Development").

Qualified observers usually agree that the shortage of roads is the most serious of the infrastructure gaps. Table III-15 presents a comparison between Colombia and other Latin American countries with respect to the density of roads per thousand inhabitants and per thousand kilometers squared. Colombia is relatively low on both scores, and if a weighted average of the scores on the two categories is taken (by multiplying them together) only Honduras is worse.[1] It seems very likely that the ratio of feeder roads to all roads is relatively low for Colombia compared to other

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[1] It is difficult to get valid measurements of the adequacy of roads in general or feeder roads in particular; comparisons of total distance of roads with either population or area can be given only vague interpretations at best, inasmuch as many other factors affect the need for roads besides these two. The measure used here has some intuitive appeal as it is consistent with the fact that with a given area, the need for roads rises less rapidly than the number of people, and that with a given number of people the need for roads very likely increases less rapidly than the area (it usually implies considerable unutilizable land, as in Colombia).

TABLE III-15

Relative Supplies of Roads: Colombia and other Latin American Countries

	Density: km. of roads per 1000 people	Km. of roads per 1000 km^2 area	Index of road availability	Persons per vehicle
Argentina	7.4	52.92	391.60	34
Bolivia	6.1	15.78	96.26	95
Brazil	8.8	61.54	541.55	72
Chile	7.6	74.70	567.62	54
Colombia	2.4	35.55	85.32	75
Costa Rica	9.4	184.67	1,735.80	36
Cuba	3.0	183.83	551.49	27
Ecuador	2.8	59.11	165.50	179
El Salvador	2.1	254.10	533.61	84
Guatemala	3.8	54.14	205.73	130
Haiti	1.0	117.40	117.40	420
Honduras	1.5	28.54	42.81	174
Mexico	4.4	69.47	305.66	44
Nicaragua	3.8	34.45	130.91	90
Panama	2.6	44.31	115.20	43
Paraguay	1.5	27.37	410.55	196
Peru	4.0	33.12	132.52	207
Dominican Republic	2.1	139.84	293.66	119
Uruguay	14.4	47.11	678.38	18
Venezuela	5.2	36.12	187.82	16
General Average	4.7	77.70	407.78	106

SOURCE: From Contraras, Victor, Financiacion Publica del Transporte: Carreteras Nacionales en Colombia, Monografia No. 12, Centro de Estudios Sobre Desarrollo Economico, Universidad de Los Andes, January 1962, p. 101.

countries, so that the difficulties of moving produce are even greater than would be suggested by Table III-15.[1] Table III-16 presents figures available for 1944 and 1959 on the number of kilometers of roads of varying qualities. It indicates the very substantial shortage of feeder roads, although the kilometers of these might easily be underestimated here.[2]

In the field of irrigation the Colombian government has done very little; most of the works have been constructed privately. This does not by itself suggest that there is misallocation of investment funds, since Colombia has had an ample supply of good agricultural land without irrigation. Nevertheless, the variability of rainfall in many regions, which makes farming less profitable overall and quite unstable at times, does suggest a potentially high payoff for irrigation in some areas.

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[1] But I have not been able to find figures on the ratio of feeder roads to all roads for other countries in order to form a basis of comparison with Colombia.

[2] The budget figures on relative expenditures on main roads and feeder roads are not very enlightening. According to the figures, less than one-half of 1 per cent of federal and departmental expenditures on roads are for feeder roads. This figure is so low as hardly to be credible. It might imply that the road building function is borne by the municipal government, but if so it is very inadequately performed. This is demonstrated by the fact that whereas the federal and departmental governments spent about 225 million pesos on roads in 1957, only about 1 million was listed as having been spent on "caminos" (which I interpret to be feeder roads). And if we take the whole amount of "fomento economico" expenditures of municipal governments excluding capital cities, this is only 10 million pesos. Probably only a small portion of this would be spent on feeder roads in rural areas if these were a municipal responsibility, so it could not possibly constitute a significant portion of all funds spent on roads. Nevertheless, it is true that a good number of small feeder roads are built by the municipalities themselves. But we do not have detailed statistics with respect to the direction of the expenditures of the municipal governments or to the extent of cooperative road building. It seems that either (a) government expenditures of feeder roads are abysmally low, or (b) I am misinterpreting the term camino, and a lot of expenditure on feeder roads is under the title of "carreteras."

TABLE LII-16

Feeder Roads in Colombia

(kilometers)

	Paved, Cement Asphalt	Improved		Passable
1944	900	14,140 (McAdam)		4,455 (land not stabilized)
1959	3,000	21,218		7,700
		4,576 (stone, gravel or stabilized soil)	16,642 (drained land)	

SOURCES: 1944 figures are from the Anuario General de Estadistica. 1959 figures are from the four-year plan for government investment, Plan Cuatrienal del Sector Publico.

In its study, ECLA pointed to a number of difficulties which had already arisen in the land irrigated under public auspices, owing to ignorance of the technical methods needed for farming with irrigation. Among the difficulties cited were the excessive use of water, failure of irrigation and drainage canals to follow contour lines, and lack of rotation between crops and pasture. At that time, however, calculations of the costs of finished works in operation, as well as the economic surveys which were the basis of other projects, showed that these could be easily borne by the farmers as the result of the increased yields. The irrigation works at Saldaña enabled this previously livestock growing area to switch heavily into the production of rice. The total cost of the works per hectare presented about 50 per cent of the value of the gross production obtained annually, and was practically equal to the net income in one farming year. Rice yields were more than three times the average for the country.[1]

It may be that high benefit cost ratios could be achieved by further investments in irrigation. This is implied by the study carried out by Bethke,[2] but in the absence of detailed information, one can make no criticism of the government for its lethargy here. Many other lines of investment also probably have very high payoffs.

Rural electrification has not proceeded far in Colombia. As of 1951, only 4.2 per cent of rural dwellings had electric lights.[3] The figure has probably increased somewhat by now, but not dramatically.

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[1] ECLA, op. cit., p. 179.

[2] Klaus W. Bethke, Irrigation, A Means for Colonization (A Colombian Case Study), Cornell, 1966 (mimeograph).

[3] Based on figures from Departamento Administrativo Nacional de Estadistica, Censo de Edificios y Viviendas: 1951, Resumen General.

Government investment in rural construction and improvement was estimated by ECLA for the period 1925-1953. The figures are presented in Table III-17, along with estimates of private investment in construction and improvement, and total agricultural investment. Investment in feeder roads is presumably not included in the figures given here. It is interesting to note that the public sector seemed to be ignoring agriculture almost completely until about 1937, but then favored it with very heavy investment during the period 1940-1943. From then until 1953 it fluctuated at somewhat lower levels. No figures are available since 1953 to my knowledge.

B. The Rate of Technological Change in Colombian Agriculture

No generalizations can be made about the rapidity of technological change in Colombian agriculture, since the growing commercialized segment already makes use of quite advanced technologies, while the backward, or traditional part continues to use very outmoded implements and techniques in many cases. Unfortunately, there are few ascertainable indicators of the overall rate of technical change, nor of the variables which determine it.

In Chapter II we saw that the factors land, labor, and capital seemed to account for the bulk of and possibly almost all of the increases in output registered before the Second World War, but probably a smaller proportion since the war. But since the analysis of the agricultural production function is too imprecise to give much indication of the rate of technological change,[1] it is worthwhile to measure this change directly whenever possible.

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[1] In some cases, also, there is difficulty in sorting out, even in a theoretical sense, the difference between an improvement in technology and an increase in capital stock. When a farmer is already aware of the advan-

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TABLE III-17

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
1925	183	144.0	-	-
1926	184	145.4	0.6	0.33
1927	192	148.1	0.9	0.47
1928	204	156.0	1.0	0.49
1929	200	152.4	1.6	0.80
1930	206	162.0	2.0	0.97
1931	201	163.5	2.5	1.24
1932	273	234.7	2.3	0.84
1933	197	160.1	3.9	1.98
1934	203	163.8	3.2	1.58
1935	217	179.1	3.9	1.80
1936	226	186.5	2.5	1.11
1937	229	178.4	14.6	6.38
1938	233	167.1	28.9	12.40
1939	242	177.7	26.3	10.87
1940	258	154.0	70.0	27.13
1941	262	138.0	89.0	33.97
1942	280	133.3	116.7	41.68
1943	299	179.6	88.4	29.57
1944	342	275.0	34.0	9.94
1945	348	297.1	15.9	4.57
1946	362	290.9	32.1	8.87
1947	330	237.7	49.3	14.94
1948	370	281.4	45.6	12.32
1949	226	147.2	31.8	14.07
1950	256	173.6	27.4	10.70
1951	272	164.2	56.8	20.88
1952	295	187.2	60.8	20.61
1953	411	302.5	59.5	14.48

SOURCE: The ECLA study, statistical appendix, pages 9 and 28.

Major forms of technical change are improved implements and machinery, better cropping practices, better varieties of seeds, and greater use of material inputs such as fertilizers, pesticides, etc. Also, improved technology sometimes implies large-scale public investment, as in the case of irrigation.

Some Determinants of the Rate of Technical Change

Technological advance has been retarded in Colombia, as in most underdeveloped countries. Earlier times did see the advent of a few notable changes, such as the introduction of improved pastures in the nineteenth century, and the introduction of wire fences,[1] but these were not frequent.

A number of factors have conspired against significant technological gains. Among these is the fact that a considerable part of the agricultural produce comes from tropical and subtropical regions, and relatively little experimental work has been done anywhere in the world on tropical agriculture. Even within Colombia, much of the recent burst of experimental work fostered by the Rockefeller Foundation has been concentrated on the traditional temperate crops such as wheat, corn, potatoes, etc. Problems of pest and disease control tend to be more serious in tropical regions, partly because the lack

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tages 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.

[2]Note, however, that wire fences are still not widespread in much of the country.

of a cold season cuts out the possibility that some germs, seeds, etc., will be killed during that part of the year.

Although coffee is an important crop in Colombia, the facts that she is without difficulty able to supply as much as she can sell on the world market, and that the land used for coffee is not particularly good for other crops, mean that there is no great need for or stimulus to technological improvement in the production of this crop. Such improvement would release labor, but the agricultural sector already has a labor surplus in some areas.

The way in which much of Colombia's beef is raised is not conducive to great technological advances; a considerable per cent of all cattle are grown on very large farms, sometimes with absentee owners, but certainly with owners whose income levels are already sufficiently high so that they are not particularly worried about losing a high per cent of their cattle through disease, by carrying their cattle for four years before marketing them, etc. There is some uncertainty as to the extent to which these large-scale farmers would adopt improved technology if it were available; the incentives would probably have to be greater than for serious farmers.

Research and extension have simply not been pushed by the government.[1] Expenditures of the federal and departmental governments on research, extension and related activities have been less than one-half of 1 per cent of value added in agriculture for almost every year from 1939 to 1959 (see Table III-18). There has been no upward trend in the ratio. It is interesting

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[1] It is interesting to note that the United States Department of Agriculture field missions have rated Colombia's situation with respect to the knowledge of farmers as unfavorable (see Table III-10).

TABLE III-18

Expenditures on Agricultural Development by Federal and Departmental Governments

(millions of pesos)

	Strictly on Research and Extension (1)	Including Closely Related Activities (2)	On All Agricultural Development Expenditures (3)	On All Agricultural Development: Real Terms (1958 pesos) (4)	On All Agricultural Development: % of Current Value of Agricultural Output (5)	% of Gov't. Exhaustive Expends (6)
1965						
1964						
1963						
1962						
1961						
1960						
1959	18.24	32.88	41.48	41.18	.52	
1958	17.01	82.13	87.48	87.48	1.20	
1957	14.05	26.79	29.17	33.98	.44	
1956	13.15	20.99	25.91	35.78	.49	
1955	6.42	15.58	20.88	31.03	.45	
1954	5.30	13.76	16.74	25.58	.35	
1953	7.76	15.38	18.12	29.90	.47	1.43
1952	7.30	12.11	14.32	24.10	.40	1.31
1951	6.80	11.97	13.77	23.53	.42	1.40
1950	5.09	10.26	11.70	22.63	.40	1.64
1949	5.16	8.87	9.72	21.35	.39	1.64
1948	3.96	7.76	10.01	23.66	.50	1.72
1947	4.12	7.32	8.97	24.17	.47	1.72
1939	.50	4.61	6.36	37.42	1.04	3.67

Sources and Methodology: Figures on current peso expenditures (Cols. (1)-(3)) are from copies of Controleria General de La Republica, Estadistica Fiscal y Administriva up to 1956 and from DANE, Estadisticas Fiscales. 1957-9. Col. (4) is based on a deflation of Col. (3) by the G.D.P. price series.

to note that this is almost identical to the rate which prevailed in the United States during the fifties, i.e., a little less than 1/2 per cent.[1] Table III-18 also presents the ratio of expenditures on agricultural development to exhaustive government expenditures. Despite the small total expenditures on research, a wide variety of institutions is involved and a wide range of problems is attached. (See Table A-60 for a tabulation of expenditures on research by organization and by topic of research.)

1. Extension

The technological improvements made at the research stage are only the first step in effecting a significant change in the nature of agricultural production in Colombia. The dissemination of these advances is the second. It is a common complaint of the Colombian research and extension complex that the research has outrun the ability of the system to distribute information to farmers. A striking example cited by ECLA was the development of several good varieties of sugar cane which could have revolutionized the production of panela and molasses, but which had not done so through lack of extension. ECLA mentions that this was also the case in regard to developments in crop forage, cane, oil seed and fiber crops, fruit trees and cattle breeding.[2]

Even if the relevant information is disseminated to the farmer, he is often prevented from undertaking the suggested improvements because of either a lack of credit or the existence of a certain amount of risk with the new technology. Peasant farmers in many countries tend to be strong risk

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[1] See Zvi Griliches, "Research Expenditures, Education, and the Aggregate Agricultural Production Function," The American Economic Review, December 1964, p. 967. Griliches believed that a conservative estimate of the rate of return on public expenditures on research and extension would be 300 per cent.

[2] ECLA, op. cit., p. 173.

averters as a result of the fact that they live close to the subsistence margin. Coupled with the lack of credit is a frequent lack of knowledge and understanding of scientific principles, which brings with it a skepticism with respect to change of any sort. While it has been shown in a number of countries that this can be overcome fairly easily by a successful demonstration on other farms, there are some cases in which the technology is sufficiently complicated as to create difficulties. A prime example of this is the case of hybrid corn, where the 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 are then typically blamed on the agricultural extension workers, with subsequent skepticism with respect to any other programs they may suggest. The very low levels of education in the rural areas can certainly be blamed in part for this skepticism, and in general for the inability to comprehend scientific principles.

The wide gap between commercial farm yields and national average yields (see Table III-19) is evidence of the existence of problems of communication between agricultural research and the farmer, and/or the farmer's acceptance of and ability to implement the information received. While some of these figures are essentially guesswork, the gaps are still instructive, especially for certain crops.

The rapidity with which technological change occurs is certainly dependent (in a general sense) on the degree of "communication" in the economy. Forms of communication are the presence of extension workers, contacts with people from the outside of any sort--newspapers, etc. Judging from the

TABLE III-19

Average Yield and Commercial Farm Yields

Crop	Average Yield Kg/Hectare	Yield on Commercial Farms
Perennials		
Coffee	675	1,300
Sugar Cane	81,750	100,000
Panela Cane	42,000	90,000
Cacao	386	450
Fiber	600	1,000
Fruit	5,000	10,000
Platino and Banana	4,600	6,000
Banana for Export	9,995	10,000
Annuals		
Hot:		
Sesame	816	1,100
Cotton	1,170	1,800
Rice	1,895	3,000
Beans	473	1,000
Soybeans	1,500	1,600
Corn	1,186	4,000
Tobacco	1,780	3,500
Tomato	12,000	12,000
Yuca	5,000	10,000
Arracacho	6,250	10,000
Cold:		
Barley	2,000	3,000
Wheat	1,230	3,000
Potato	14,173	30,000
Onions, Garlic	1,500	1,800
Vegetables	3,000	4,000

SOURCE: Lauchlin Currie, Accelerating Development: The Necessity and the Means, McGraw Hill, 1966, pp. 169 and 178.

stories of the almost complete isolation of certain rural regions in Colombia even now, and much more, some twenty, thirty, or forty years ago, it is not hard to understand that new technological developments in one center would not spread quickly to another. As the market economy gradually encroached on the dominant subsistence economy, it no doubt brought with it, along with price incentives to produce cash crops for export to the rest of the economy,[1] new ideas on methods of production, etc. The dimunution of the "subsistence economy" is usually regarded as a key element of the development process. The degree of integration of a region with another larger region cannot be discreetly defined; it is best thought of as a continuum. Measures of the degree of integration include such things as (a) connections by road or other means of transportation to the outside world, (b) schools and churches, (c) the per cent of the farmers who grow some cash crop for sale outside the region and (d) the per cent of the farmers who deal habitually in terms of money. Limited evidence can be presented on some of these indicators for Colombia. The study of the transport system done by Parsons et. al.[2] in about 1962 estimated that about 5 per cent of the population had no access to any road (nor presumably to any other form of transportation); this would be about 10 per cent of the rural population. Another 14 per cent of the population (i.e., 28 per cent of the rural population, more or less)

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[1] It is worth noting that there seems to be not too much relationship between low levels of income and self-sufficiency in some rural areas of Colombia. Extremely poor farmers often engage to a very considerable extent 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.

[2] Parsons, Brinckerhorff, Quade and Douglas, Estudio del Transporte Nacional, Ministerio Obras Publicas, Colombia, 1962.

had access only to tertiary roads, some of which are little more than tracks or paths and would not be passable in the rainy season. It is nevertheless true that any road is usually considered to be much better than no road at all, and constitutes the first big step in getting access to the outside world. So at the present moment relatively few Colombians are completely barred from the market economy by lack of transportation. It would require a detailed study to go back in time and calculate similar percentages of "exclusion" for earlier periods.

The extent of integration as defined by the per cent of all farmers who are selling a significant amount of some crop is also difficult to judge. Some crops such as coffee, cacao, and so on are clearly cash crops and any farm which grows a substantial portion of these is definitely "integrated."[1] Other crops such as rice, corn, sugar, etc. are grown to a considerable extent for use on the farm but are also sold in local or more distant markets.

One measure of the extent of trade with areas outside the region is the per cent of the output of farms which is sold to the city. Unfortunately this is not a good indicator in situations where there are farms of very different sizes, and where the per cent of produce which eventually reaches the city would not be a good indicator of the per cent of the farms who sell to the city. However, since commercial scale farming in Colombia is a phenomenon of the last ten or fifteen years, such increases in this percentage

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[1] 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 certainly not a very precise technique.

as occurred before 1950 are probably fairly closely related to the per cent of farmers who had sufficient outside contacts to sell their produce to the city. Table III-20 indicates that as of 1925, about 45 per cent of agricultural goods produced were traded to a town of at least 1,500 people (or exported); in 1962 the comparable ratio is about 70 per cent, indicating a very substantial development.

Among the factors working to prevent a more successful spread of improved technology is the governmental disinterest displayed in the weakness of extension services, both in quantity[1] and quality. The agronomists and extension workers of Colombia are (as in many other underdeveloped countries) typically raised in the city (see Table III-21), are often second rate students who could not pass in other courses, and have only a marginal interest in agriculture. (These contrast to the very successful extension services in countries such as the United States and Canada, where most of the extension workers are originally farm boys, with a deep interest in and understanding of the soil, who then go on to study agriculture in college.) The extension workers are usually unable to convince the relatively uneducated and small-scale farmer of the worth of their programs, and are looked down on by the larger-scale and sometimes upper-class farmer as being his social inferior. They are poorly paid and poorly equiped.

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[1]Colombia ranks extremely badly in terms of the farming population/extension worker ratio. A calculation by CIDA (Comite Interamericano de Desarrollo Agricolo, Inventario de la Información Básica para la Programación del Desarrollo Agricola en la America Latina: Resumen (?), Washington, 1966) showed Venezuela had 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.

TABLE III-20

Extent of Trading of Agricultural Output Over Time

	Value of Agricultural Output (millions of current pesos)	Share of Agricultural Output Exported or Sold in Urban Areas	
		Estimate A	Estimate B
	(1)	(2)	(3)
1925	336.1	44.8	35.7
1926	403.0	44.9	38.0
1927	378.4	45.4	36.1
1928	419.5	45.9	36.5
1929	431.7	46.2	36.7
1930	355.2	48.4	38.4
1931	306.8	50.2	43.5
1932	252.0	55.5	47.3
1933	277.6	54.5	46.0
1934	417.5	51.0	41.6
1935	411.7	53.2	44.0
1936	472.5	52.9	43.6
1937	479.0	51.8	42.1
1938	546.8	51.6	41.8
1939	608.9	51.9	42.9
1940	552.7	51.2	41.1
1941	560.7	54.6	44.9
1942	676.0	55.0	45.3
1943	819.8	54.5	44.4
1944	1,076.1	54.9	38.9
1945	1,263.0	55.0	44.8
1946	1,467.4	57.0	47.1
1947	1,905.4	57.9	48.1
1948	1,993.0	57.7	47.6
1949	2,474.9	--	--
1950	2,891.0	63.6	53.5
1951	3,285.2	66.5	57.8
1952	3,555.3	68.3	59.9
1953	3,874.4	68.0	59.6
1954	4,738.0	70.1	61.9
1955	4,613.9	68.4	59.6
1956	5,332.1	71.5	63.4
1957	6,577.8	73.0	65.1
1958	7,300.5	71.7	63.4
1959	8,001.3	68.0	61.0
1960	8,541.6	70.4	61.3
1961	9,607.5	71.4	62.4
1962	10,286.4	71.2	61.9

(continued on following page)

Sources and Methodology

Column (1) is based on the national accounts estimates for 1950 and on, and primarily on the quantity series of ECLA (op. cit.) and the author's price series for earlier years.

Columns (2) and (3) are alternative estimates of the share 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 consumed by the representative urban dweller is twice as much as that of the representative rural dweller. This ratio is a little higher than that made 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 probably biased down, while Estimate A is probably biased up, so the two should bound a meaningful estimate of the ratio in question.

TABLE III-21

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 Agricolo (CIDA), Inventario de la Información Básica para la Programación del Desarrollo Agricola en la America Latina: Resumen (?), Washington, 1966, p. 89.

A breakdown of extension workers by organization and type is presented in Table III-22. CIDA notes, with respect to these services, that,

> Colombia...., has several different agencies enaged 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 Extensión of the Ministry of Agriculture. The largest number of extension workers, however, is employed by the Federación de Cafeteros. Extension work is also done by the Instituto de Fomento Algodonero (cotton), the Instituto de Fomento Tabacalero (tobacco), the Corporación Autónoma Regional del Cauca (CVC) and by 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-22] 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 that 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.

TABLE III-22

Colombia, Employment of Extension Personnel, 1962

	Administration and Specialists	Extension Agents	Home Demonstration Agents	Juvenile Club Assistants	Total
Ministerio de Agricultura	31	18	39	36	124
Federación de Cafeteros	27	66	88	302	483
Instituto de Fomento Algodonero	4	22	5	-	31
Instituto de Fomento Tabacalero	6	13	5	-	24
Secretaría de Agricultura de Antioquia	2	9	10	9	30
Corporación Autónoma 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 Información Básica para la Programación del Desarrollo Agricola en la America Latina: Resumen (?), Washington, 1966, p. 82 (originally from Dr. Luis Cruz Riascos.

Some Micro Measures of Technological Change

1. New varieties

The introduction of new varieties is one important form of technological improvement. When the variety is quickly spread, as has been the case with several specific crops in Colombia, it becomes possible to at least guess at the benefits accruing. If the spread is more rapid in some regions than others, clues may be given as to the mechanism of the dispersion of knowledge. Corn and barley are the best known cases in Colombia. In the case of barley, a dramatic change occurred in 1955 with the first distribution of the variety called Funza. Table III-23 shows, for the years 1950 and on, the per cent of all barley areas sown to Funza, the yield per hectare in kilograms, and the hectares planted to barley. The dramatic increase in yield is usually attributed to the advent of Funza.[1] Certainly other contributing factors, such as an increase in general extension services and increases in real credit (shown in Table III-23) have played a role.[2]

Whereas Funza barley has been successfully distributed in all of the important barley growing regions, corn presents a case of successful improvement (i.e., adoption of hybrids and improved varieties) in one department (Valle) but a relative failure elsewhere. The success is attested to by the

---

[1]Two yield series are presented in Table III-23, based on the two separate estimates of the area sown to barley. In one the yield rises sharply in 1959, in the other more gradually after 1955. The latter one is clearly more consistent with the hypothesis that Funza was primarily responsible for the increase.

[2]The credit series given here does not include credit from the commercial banks, nor does it include credit given by a beer company. I am unaware as to whether such credit was given and if so in what amounts.

TABLE III-23

Technical Change in Barley Growing

	% of All Area Sown to Funza (1)	Yield Per Hectare (2)	Thousands of Hectares (3)	Real Credit of the Caja Agraria (millions of 1958 pesos) (4)	Alternative Yield Series (5)	Alternative Area Estimate (thousands of hectares) (6)
1950	0	1,200				
1951	0	1,200	47		1,190	47
1952	0	1,200	51		1,200	51
1953	0	1,200	53		1,230	53
1954	0	1,225	53	.58	1,230	53
1955	1	1,200	43	.67	1,210	43
1956	20	1,140	50	.78	1,300	54
1957	50	1,250	48	1.16	1,250	48
1958	70	1,135	43	1.66	1,780	42
1959	90	1,900	61	3.96	2,020	57
1960	92	2,225	56	4.75	1,830	58
1961		2,065	48	3.82	1,840	55
1962				3.81	1,930	56
1963					2,000	55
1964					1,930	58
1965						

SOURCES: The data in Columns 1 to 3 are from an unpublished study prepared for the United States Department of Agriculture as part of overall supply and demand projections for agricultural products. Column 6 is from American Embassy estimates of area sown and the yield figures of Column 5 are based on the embassy output figures and these area estimates. The current peso credit statistics used to derive the Caja real credit series, Column 4, come from the Informes of the Caja Agraria.

sales of hybrid and improved seeds by the Caja Agraria; these have increased as follows:[1]

Crop Year	Tons of Seed Sold
1953-1954	115
1954-1955	262
1955-1956	488
1956-1957	624
1957-1958	739
1958-1959	463
1959-1960	823

In the Cauca valley 80 to 85 per cent of the acreage is planted with these better varieties; for the country as a whole the percentage is a very dismal 6 to 8 per cent. As of 1960 the Rockefeller Foundation calculated that the Colombian farmer had benefitted by about 175 million pesos as a result of the development of these seeds. This would have paid for the whole federal and departmental government expenditures on research, extension and related activities for the years 1956 through 1959.

Why the great difference in the reaction in the Cauca valley and elsewhere in the country? The fact that it is a more commercialized crop in Valle and is grown on larger farms than is typical for the country as a whole is suggestive of the fact that in such a case (hybrid corn) the idea is likely to catch much more easily for the large-scale commercial farmer.[2]

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[1] Rockefeller Foundation, Program in the Agricultural Sciences: Annual Report, 1959-1960.

[2] In Valle half the acreage is on farms of more than 40 hectares; in the country as a whole half is on farms of greater than about 15 hectares. The median farm size is about 4 hectares both in Valle and in the country as a whole.

2. Fertilizer use

A more general measure of changed cropping practices than the yield performances of specific crops is the adoption of fertilizer. Colombia still ranks low on this score. Cattle manure is used for growing potatoes and sometimes other vegetables but the fact that few farms combine crop and livestock production prevents more general use. Green fertilizers are used little if at all and the extensive fallow land is not usually planted to leguminous crops. The low usage of chemical fertilizers is strikingly demonstrated in Table III-24, where we make a comparison between the applications of phosphate, nitrogen, and potash for a variety of countries, including some European ones known to use relatively large amounts of fertilizer, the United States with its rather extensive agriculture, and a selection of Latin American countries. While these figures are not perfectly comparable between countries, the extreme variations are, nevertheless, sufficient to demonstrate the very low utilization in Colombia (and in several of the other Latin American countries) as compared with the United States, and even more so with the European countries. For example, Colombia's application of phosphate per acre of arable land was, for the year in question, only about one-fifth of 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 of the United States, and again much below all of the European figures; for potash it was about one-fourteenth the United States figure, and

TABLE III-24

Comparative Applications of Fertilizer: Colombia and Other Selected Countries, 1963-1964

(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	23.2	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*	2.11*
Colombia	1960	3.5*,[4]	.89*,[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]

*Unofficial figures for fertilizer.

[1]Fertilizer estimates for 1962-1963.

[2]Fertilizer census of 1959-1960.

[3]Fertilizer census of 1960-1961 (60 per cent lower in nitrogen than 1958-1959 census).

[4]Fertilizer estimates for 1958-1959.

SOURCES: 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.

less than one-fortyfifth of the lowest of the European countries, France.[1]

Despite the continued under-utilization of artificial fertilizer, the increases of the last couple of decades are quite noticeable in percentage terms. Although different sources of information diverge in their estimates of imports and utilization of fertilizers, Tables III-25 and III-26, coming respectively from the ECLA study and from a combination of sources, both illustrate the rapidity of the increase of use. Table III-26 includes an overall, although crude, index of fertilizer use between the years 1947 and 1963. Utilization appears to have been almost zero before 1935, so that between 1935 and 1950 there was a dramatic increase for all three types of fertilizers: the use of nitrogen increased by three-fold, and the other two elements by about ten-fold. Another ten-fold increase occurred between 1947 and 1957. The 1963 figures were again about 50 per cent above those of 1957, although during this period, as in previous ones, the increases were erratic, largely as a result of changing tightness in the balance of payments.

Changes in use do not necessarily signify changes in knowledge or modernity of farmers if such things as credit availability and prices change radically. We do not know how purchases of fertilizer have been affected by agricultural credit. We do know that Colombia has recently started an import substitution process in fertilizers. In a number of other countries, such domestic production has led to price increases which have discouraged

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[1] These comparisons are 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.

TABLE III-25

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 III-26

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)
1947		1,982	2,460	1,112	7.31
1948		2,006	970	1,583	5.89
1949		3,051	3,685	874	10.42
1950		3,429	1,786	889	8.70
1951		6,471	7,405	6,413	25.41
1952		4,449	5,062	3,697	16.84
1953		6,459	6,901	3,970	22.71
1954		10,471	14,256	12,466	45.71
1955		13,957	23,331	15,814	65.64
1956		14,684	15,628	10,160	64.96
1957	10,758	20,699	33,802	10,226	85.24
1958	10,071	17,682	24,916	20,173	77.49
1959	7,157	11,139	15,143	11,440	49.92
1960	10,881		24,580	13,907	74.91
1961	15,019		31,900	18,584	100.36
1962	15,267		29,350	20,110	99.21
1963	22,456		30,500	24,612	126.00

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.

consumption and acted as a deterrent to increasing agricultural output. Such a phenomenon is not apparent in Colombia, since (a) there has at least been no leveling off of fertilizer use (although this does not prove that it might not be higher with lower prices) and, more importantly, (b) the price of fertilizer--based on the wholesale price series which we have (see Table III-27)--seem to have been dominated by the import prices (at least until 1964, the last year for which we have figures) with those prices depending primarily on the exchange rate. The price has fluctuated a lot, but shows no trend since 1953, during which period the import substitution has gotten under way.[1]

Yields can still be increased considerably by the use of fertilizer. A decade ago ECLA cited the results of some experiments using fertilizers for selected crops; they generally indicated the possibility of a sizeable yield improvement.[2] The high cost of fertilizers, all of which were imported at the time, and which bore a heavy cost of freight from the market of origin to the farmer, was cited as being one factor contributing to the low use. Phosphorous and nitrogen were alleged to be the minerals most lacking in Colombian soils; around 1953 or 1954 the current applications of these compared to fairly conservative estimates of the requirements necessary to reach a satisfactory level suggested a deficiency of 88 per cent for phosphorous and 92 per cent for potassium.

Some more recent studies have suggested that the use of fertilizer is not economically advisable for all crops. There has arisen in the last few

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[1]The reason for the wide discrepancy between the price series calculated by the Banco de la Republica for all fertilizers (Column 3) and my own price series for nifoskal (Column 2) in the years 1950-1957 is unknown. In either case the point at issue (price effects of the recent import substitution policy) is unaffected by it.

[2]United Nations, Analyses and Projections of Economic Development: The Economic Development of Colombia, United Nations, Geneva, 1957, pp. 175-177.

TABLE III-27

Real Price Trend of Artificial Fertilizers and Their Use

	Index of Price of Nifoskal (1952=100) (1)	Index of Real Price of Nifoskal (2)	Real Price of Fertilizer (National Account) (3)	Index of Price of Fertilizer / Price of Value Added in Agriculture (4)	Index of Quantity of Fertilizer Used (5)
1945					
1946					
1947					
1948					
1949					
1950	77.4	86.7	30.76	88.0	11.2
1951	80.6	79.8	44.81	81.7	32.8
1952	100.0	97.1	48.45	100.0	21.7
1953	82.4	78.6	45.93	76.3	29.3
1954	71.3	63.0	37.63	55.0	59.0
1955	81.4	69.9	41.37	66.2	84.7
1956	87.2	69.4	40.16	63.3	83.8
1957	93.9	63.0	66.5	58.6	110.0
1958	172.6	100.0	100.0	100.0	100.0
1959	189.6	102.3	103.9	118.3	64.4
1960	189.2	93.6		98.0	96.7
1961	190.6	89.0		91.8	129.5
1962	193.7	81.5		90.6	128.0
1963	356.6	118.5		136.0	162.0
1964	410.1	118.5			

SOURCE: Figures in the first column are from Informes del Banco de la Republica. Columns 2 and 5 use deflators from the national accounts, with Column 2 using the G.N.P. deflator. Column 4 is from unpublished statistics of the Banco de la Republica. Column 5 is derived from Table III-26, Column 5.

years a good deal of criticism with respect to the quality of the domestically produced fertilizer and continued complaints about high prices. I am not aware of the validity of the criticism regarding quality, but given the risk averse 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 such problems, however, Colombia is gradually absorbing more fertilizer; applications are still low enough to suggest that the returns should be quite high.

The Diffusion of Technological Change

The variety of technological improvements available for Colombian agriculture at any time depend largely upon the research carried on in the experimental stations, and that borrowed from foreign countries. As we have already seen, expenditures by the Colombian government on agricultural research have been pitifully small; despite this, foreign expenditures during recent times have brought about considerable improvements in varieties and methods, but the poor extension system seems to have inhibited their diffusion throughout much of the economy. The process of the diffusion of new ideas and inventions through rural populations has been studies by anthropologists and sociologists in other countries, but only to a very limited extent in Colombia. Scattered pieces of evidence indicate the rate of diffusion under certain special conditions but do not add up to a very clear picture for the agricultural sector or various subsectors of it as a whole.

Diffusion appears to have been successful whenever efficient extension has been carried on: this has mot commonly occurred when there was a crop growers institution or, as in the case of barely, a using firm very interested

in the spread of appropriate varieties, techniques, etc. Thus, Funza barley had almost completely replaced the previous varieties only four or five years after its introduction. Judging from the relatively high yields of tobacco in Colombia compared to other countries (see Table IV-17), it appears that relatively good varieties are used. And a rapid increase in yields occurred in the 1950's with most of it coming, probably not coincidentally, after the formation of the Tobacco Growers Institute (Instituto Nacional de Fomento Tobacalero) in 1954.[1] By itself the high current yield, as compared to other countries, would not be convincing evidence of the use of improved varieties, since the labor/land ratio in tobacco growing is very high in Colombia.[2] But the very rapid yield increase does suggest technological change. Since most tobacco is grown by share-croppers it raises the issue of whether such change was able to occur, with the crop grown on very small plots, because 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, indicates the relative ease of diffusion in the large-scale, modern, commercial sector compared to the smaller farming areas. Cotton, a great success story in terms of the import substitution carried out over the last two decades, fits the same pattern. Average yield more than doubled over the period 1951-1963, (see crop annex); during this period output went up ten times. By 1960, 95 per cent of all the cotton was an improved

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[1] 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 (see the crop annex on tobacco).

[2] As of 1953 it was about three times as high as in the United States; see ECLA, op. cit., p. 200.

variety known as "T." Most varieties have come from the United States and have been tested in Colombia; less original research has been required than in the case of some other crops. The Cotton Development Institute (Instituto de Fomento Algodonero) began extension work only in 1959; I do not know how much, if any, extension had been done before this by other organizations. By 1959 the yields had already more than doubled from their levels of the early fifties. It seems likely that the cotton case demonstrates that not a great deal of extension work is required for crops grown largely by modern commercial farmers. 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 1962-1962 was rented. For smaller farm sizes the rented/owned ratio was higher.[1]

Growers producing commercial crops on a large scale are the ones most likely to form an organization in the first place.[2] The research and extension carried on by the organization then gives them a further advantage. Except in the case of tobacco, most of the farmers in the organizations just cited are fairly 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 the next chapter.

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[1] Instituto de Fomento Algodonero, Colombia: Su Desarrollo Agricola: Algodon y Oleaginosas, 1961-1962, Bogota, 1961, Table 17.

[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.

We saw in the last section that while use of fertilizer remains low by absolute standards the per cent increases of the last couple of decades have been impressive. It has been argued that the adoption of such an input is much more difficult for the small farmer (even after the information hurdle is crossed), since the credit and commerce systems are not designed to take care of him. But the information available on the use of inorganic fertilizer by region and by farm size (from the 1960 agricultural census) suggests as much acceptance by the small farmer of this modern input as by the large farmer--the per cent using it is small for all farm sizes.[1] The census gives figures only on whether organic or inorganic fertilizers are used on a given farm, but not the quantity used. In general, many more farms use organic than inorganic fertilizers (about 264,000 as compared to 130,000, according to the 1959 census). Table III-28 presents percentage figures relating the number of farms using inorganic fertilizer or organic fertilizer to the total number of farms by department.

As indicated in the last column, for the departments as a whole, excluding Valle (for which no data were available), only 11 per cent of farms applied inorganic fertilizer. The total for organic fertilizer of some sort is about 22 per cent (sum of Columns 2 and 3). It is clear from a comparison of the per cent figures for the different departments that the major users of inorganic fertilizers are the cereal producers, i.e., Boyaca, Cundinamarca

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[1] This could mean that the special obstacles that the small farmer faces are overestimated or that his desire to use fertilizer is greater than that of the large farmer, and only these obstacles bring the ex post figures down to rough equality.

TABLE III-28

Utilization of Fertilizers by Department, 1959
(per cent of farmers using fertilizers)

	Inorganic Only	Organic Only	Both	Inorganic
Antioquia	4.90	26.58	4.12	9.02
Atlantica	0.02	7.74	0.10	0.12
Bolivar	0.08	0.57	0.28	0.36
Boyaca	15.28	25.24	12.20	27.48
Caldas	3.51	32.18	2.56	6.07
Cauca	1.71	13.80	0.31	2.02
Cordoba	0.00	0.24	0.01	0.01
Cundinamarca	15.90	24.86	10.27	26.17
Huila	1.42	19.30	0.03	1.45
Magdalena	1.17	3.68	0.18	1.35
Meta	1.02	2.09	0.28	1.30
Nariño	5.07	16.50	8.93	14.00
Norte de Santander	6.54	15.71	0.45	6.99
Santander	6.77	11.63	1.53	8.30
Tolima	2.62	9.32	0.65	3.27
Valle	--	--	--	--
TOTAL	6.43	17.24	4.57	11.00

SOURCE: The fertilizer figures come from the Agricultural Census of 1960, op. cit., p. 35.

and Narino. Since Boyaca and Narino are among the poorest departments in the country, this suggests that although poverty of the farmers may be a factor in limiting the use of fertilizers, it is certainly not the only one.[1] In the departments specializing in the production of livestock, such as Bolivar, Cordoba, and Magdalena, there is virtually no application of fertilizer. The use of organic fertilizer is much more widespread, and all of the coffee producing departments, which often use the residue or pulp of the crop as a form of organic fertilizer, ranked very high,[2] with Caldas, for example, having about 35 per cent of all its farms using some form of organic fertilizer, and Cundinamarca having about the same per cent. Even here Boyaca ranks highest with about 37 per cent.

The agricultural census also presents data on fertilizer use by size of farm. Calculations based on these figures are presented in Table III-29. A strikingly small per cent of farmers on all farm sizes use inorganic fertilizers; for no size category is the per cent greater than 15. For some ranges of farm size, use seems to decrease with size of farm (this is much more characteristic of the use of organic fertilizer, which decreases very rapidly with increasing size of farm). Since there is naturally a tendency to use less fertilizer on pasture lands, and since larger farms tend to be used more for this purpose than for crops, a decrease in percentage as farm size increases may be somewhat misleading in the present context. An

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[1] It would be 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.

[2] The extension work of the Federacion de Cafeteros has been important in persuading more and more coffee growers to use their coffee pulp as fertilizer, thus adding both nitrogen and organic matter into the soil.

TABLE III-29

Use of Fertilizer by Farm Size

(in hectares)

Farm Size	(1) % of Plots on Which Organic Fertilizer Only is Used	(2) % of Plots on Which Inorganic Fertilizer Only is Used	(3) % of Plots on Which Both Types are Used	(4) % of Plots on Which Inorganic Fertilizer is Used	(5) % of Plots Using Fertilizer of Any Sor
less than 1/2	18.79	3.39	2.09	5.48	24.27
1/2 - 1	21.91	7.36	4.79	12.15	34.06
1 - 2	19.87	6.83	5.23	12.06	31.94
2 - 3	18.17	7.24	5.56	12.80	30.97
3 - 4	18.96	7.71	6.11	13.82	32.78
4 - 5	17.35	7.26	5.87	13.13	30.48
5 - 10	17.35	8.00	6.09	14.09	31.44
10 - 20	14.68	6.59	4.69	11.28	25.96
20 - 30	12.46	5.73	3.47	9.20	21.66
30 - 40	10.52	5.51	2.82	8.33	18.86
40 - 50	9.30	4.75	2.29	7.04	16.34
50 - 100	7.69	4.47	2.12	6.59	14.29
100 - 200	6.43	4.45	1.66	6.11	12.54
200 - 500	5.42	4.60	1.57	6.17	11.60
500 - 1000	6.37	4.73	1.32	6.05	12.44
1000 - 2500	4.91	5.52	1.36	6.88	11.80
more than 2500	3.43	6.11	1.39	7.50	10.94

SOURCE: Agricultural Census of 1960, op. cit., p. 58.

alternative calculation, based on the incorrect assumption that only farms primarily used to produce crops use fertilizer, yields inconclusive results (see Table III-30). Up to about 100 hectares, fertilizer use for crops definitely decreases with farm size, but the decreases are not so great that they might not be explained by, for example, different crop composition by size of farm.

2. Evidence from field studies of diffusion

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 Contadero, Nariño. The five correlates found to be related to innovativeness were "information seeking patterns," general knowledge, credit acceptance, income, and area exploited. These explained a little less than one-half of the total variance, so it is clear that the process is not fully understood. Of most relevance for policy purposes would be the relations with general knowledge and income and area. But 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. Various attempts were made to relate the direct correlates to other variables, with some success (see Diagram A-7). The authors had hypothesized a relation between education and innovativeness but it did not appear.[2]

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[1]Eugenio Maffee and Robert Whittenbarger, "Innovativeness and Related Factors in a Rural Colombian Community," Mimeograph No. 21 of the Land Tenure Center, University of Wisconsin.

[2]The authors explained the lack of relation between education and innovativeness in terms of the very small amount and poor quality of the education received. The variation in amount of education received by different individuals was very small. They hypothesized that the real effects

(continued on following page)

TABLE III-30

More on Fertilizer Use by Farm Size

(in hectares)

Farm Size	Farms Using Inorganic Fertilizer All Crop Farms	Farms Using Any Fertilizer All Crop Farms
less than 1/2	9.69	42.88
1/2 - 1	13.79	38.66
1 - 2	13.32	35.26
2 - 3	14.33	34.66
3 - 4	15.86	37.61
4 - 5	15.41	35.75
5 - 10	17.60	39.28
10 - 20	16.12	37.09
20 - 30	15.18	35.61
30 - 40	15.26	34.53
40 - 50	13.73	31.88
50 - 100	14.76	31.97
100 - 200	17.92	36.80
200 - 500	26.70	50.17
500 - 1000	45.22	92.79
1000 - 2500	93.79	160.68
more than 2500	173.52	252.94

SOURCE: Agricultural Census of 1960, op. cit., pp. 40 and 58.

Another study, that of Havens in the municipio of Tamesis, Antioquia,[1] attempted to discern the important variables determining the rate of adoption of new technology and showed that the most important sources of information about these were neighbors and friends. Studies in the United States have shown that neighbors and friends are important when a farmer is about to chose or adopt an innovation, but before this he looks for information in the mass communication means such as radio and newspapers. This does not seem to be so true in Tamesis. For the ten rural communities studied, the author notes that the radio is never mentioned as an important source of information with respect to innovations. In the particular case of the selection of a new coffee variety, extension agents were frequently mentioned. This was not true for other innovations.

The most important factors contributing to early adoption of an innovation (as opposed to eventual adoption) were observation of model systems, participation in voluntary associations, general knowledge, and number of sources of communication. Less related but still positively so, were the size of the farm, age of the farmer, and level of education.

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would become apparent only when more education was available. It seems reasonable to assume that education levels, as well as extent of communications, are related to innovative activity. They are generally also related to each other. The per cent literacy in the rural areas appears to have been constant at least since about 1938, due to selectivity by level of education of the out-migrants. Average educational levels have probably also been more or less stationary and at such a low level as to be of little help in spreading new ideas.

[1] A. Eugene Havens, Tamesis, Estructura y Cambio, Ediciones Tercer Mundo, y Facultad de Sociologia, Universidad Nacional de Colombia, 1966.

The author notes that in areas which are not characterized by semi-feudal latifundia systems, voluntary associations (one of the important determinants of adoption rates) have arisen or are now arising; the government should not try to create new groups but find the best way to help the existing ones. Five such voluntary associations were present in Tamesis, including Acción Communal and the Coffee Producers Cooperative. Since 1962, the budget of the Acción Communal department has been reduced so that it is difficult to start new activities. As a result of this situation, there has been a proliferation of local associations with few channels of communication with the national department. Since 1960, the activities of the Acción Communal in Tamesis have consisted of the construction of 14 kilometers of roads, building a school, and some other activities. The goals and achievements of the other societies are presented.

The question of innovativeness and willingness to accept or seek out technological improvements involves many sociological issues which lie outside the conventional boundaries of economics. Sociologists have done a number of studies of the determinants and effects of "achievement motivation" in the last few years. The results are useful in any attempt to understand the diffusion process, and doubly so if they show that some of the determinants of speed of diffusion can be affected by public policy

One of the early field analyses of achievement motivation in peasantry was carried out in Colombia in 1964.[1] It was found, in general, to be

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[1]Everett M. Rogers and Ralph E. Neil, Achievement Motivation Among Colombian Peasants, Diffusion of Innovations Research Report Number 5, Michigan State University. The study was plagued by a number of technical difficulties, and inconsistent results, due in part, no doubt, to the fact

(continued on following page)

positively correlated 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 therefore a higher level of living.[1]

In general, enough of the economically relevant indicators (such as agricultural innovativeness and home innovativeness) are positively related to achievement motivation to make its sources 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 the two communities in Nariño, explaining about half of the variance in each case.[2] If education and mass media exposure are important determinants of

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(continued from preceding page)

that it was a "first" of its type. A sophisticated statistical analysis proved very difficult, and they resorted to simple correlations between one independent variable and the dependent variable. The analysis was carried out in six different areas, coming from three widely separated regions of the country; this diversity represented an attempt to check for cross-cultural consistency.

[1]Demonstration of the existence of the relationship leaves the direction of causation 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 better than to have no knowledge of the relation.

[2]The range of results among the six communities is indicative of the need for more detailed research, as is the difficulty in finding the direction of causation between a number of the variables.

achievement motivation, there are clear implications for public policy.[1]

But the study was, in fact, less conclusive in sorting out the effects of achievement motivation than the causes. Some relationship was found between achievement motivation and a variety of indicators of individual excellence in farming; it was closest in the two most traditional communities (Nazate and La Canada). The authors interpreted this as a result of the fact that in these traditional communities the "range of talents" of the different farmers was much wider than in some of the other communities, and it was thus easier with measurements of a given level of precision, to come to specific conclusions.[2] The tendency to agricultural innovativeness, for example, was very closely related to achievement motivation in these two communities,[3] while in three of the other four communities it 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 Nariño.

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[1] 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 true effect is probably usually positive.

[2] Alternatively, one might argue that the advantages of having achievement motivation are greater in these communities. To the extent that imitation is less likely to occur the more backward a community is, then the greater will be the economic advantage relative to his neighbors' which accrues to the innovator. In a better off community he would be copied more quickly so his initial advantage would soon disappear.

[3] It was significant at the 5 per cent level in one and at the 1 per cent level in the other.

There was in general no relation between farm size and achievement motivation, even when farm size was measured in terms of labor inputs,[1] although the desire to increase farm size was positively related in the two Nariño communities where the test was made.[2] This is not inconsistent with the fact that achievement motivation helps a man to get more land, since historically large farms have been in the hands of people whose cultural orientations and high incomes did not lead them in the direction of serious farming. Their presence could prevent a relation from showing up.[3]

C. Summary

A more detailed look at the sources of growth is in general consistent with the conclusions reached in Chapter II. Before 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. This form of capital formation brought with it much technological change,[4] as starkly attested by a comparison between the old

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[1] 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 what land there is, and both of these would seem to be logical concomitants of achievement motivation. A relation with intensity of land use was tested for separately and none was found.

[2] In one community the relation was significant at the 1 per cent level.

[3] And its failure to show up gives a little circumstantial evidence to their presence in these communities. More detailed analyses of the ranges of farm size, and the extent to which farm size changes in the course of one man's life, would be necessary to solve this riddle.

[4] 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.

(hoe or machete) and the new (modern tractor and implements). Mechanization was accompanied (and aided) by a very 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, corn, barley and a few others.

Although the sources of output growth have changed in relative importance since about 1945, output has throughout grown at something not too far from 3 per cent. 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 doubtless some connection between the falling absolute contribution to the rate of growth of output by land and labor, and the rising absolute contribution by machines and technology,[1] 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

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[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.

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.

Within the post-war period, an analogous offset among sources may have occurred. The first decade (1945-1955) saw mechanization. Research, extension and technological change (except for that associated with the mechanization itself) were still in their infancy.[1] But they have matured considerably in the last decade. Several crops, including cotton, tobacco, barley, and potatoes have shown substantial and sometimes dramatic increases in yields. Meanwhile further mechanization has been stalled by the tightness of the balance of payments (with the fall of coffee prices).[2]

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[1] Research has usually been well ahead of extension, as it was at that time, but it is the weakest link which determines the effects.

[2] I do not have sufficient information to prove that part of the slowdown has not been due to a fall in demand but this seems less likely.

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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.

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:

$$\log O = -\log 0.397 + 0.356 \log C + 0.421 \log L + 0.497 \log Cap. \quad \text{(Equation 1)}$$
$$\qquad\qquad\qquad\qquad (0.129) \qquad\quad (0.209) \qquad\quad (0.136)$$
$$R^2 = .978 \quad 11 \text{ degrees of freedom}$$

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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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, Narino). 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:

$$O = - 72.22 - 0.014\,C - 0.191\,F + 0.035\,P + 1.586\,L + 3.483\,M + 0.255\,LS$$
$$(0.445) \quad (0.402) \quad (0.032) \quad (0.575) \quad (0.771) \quad (0.081)$$

$$+ 1.113\,PL$$
$$(0.310)$$

(Equation 3)

$R^2 = .990$ 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-40). 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 VI-6 or Table A-100). 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

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[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 (see Table III-5) 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 .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 hectaresper 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-41. 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 IV-5.

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 come 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.

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 mayerdomos, 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.

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

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[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-42 suggests a number of farms (using the agricultural census definition) of about 1,100,000. (This calculation is based on an assumed 1.3 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.

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 2,500 hectares and up. The agricultural census included 27.3 million hectares and the catastral survey 21.9 million, covering at least theoretically comparable areas. There is no self-evident inconsistency between these two figures since we know that the catastral 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 question 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 catastral 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 catastral 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 catastral figures of farms by size tend to underestimate the degree of concentration by owner quite seriously. We do not, unfortunately, 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 catastral figures indicate less than half the land in taxed plots of greater than 100 hectares.

Some evidence from other individual municipios may be added. Pupiales in Narino (see Table A-45) illustrates how the number of separate plots per owner rises with the size of farm. Presumably some of these separate plots are rented out. A comparison of the figures in Table A-45 with those of the agricultural census contrasts the 2,493 owners, farmers, 3,583 separately owned units, and separately operated units.

In terms of our 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 of Table IV-7.) 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	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)			
		Berry (13)	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

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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 (3) 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 much 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

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[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-10

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	0.138	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	0.190	11.1	0.232	16.7	10.7
Large Multi-Family	0.010	0.9	0.017	1.8	0.138	8.04	0.235	16.9	6.6
Averages	0.109	9.4	0.109	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

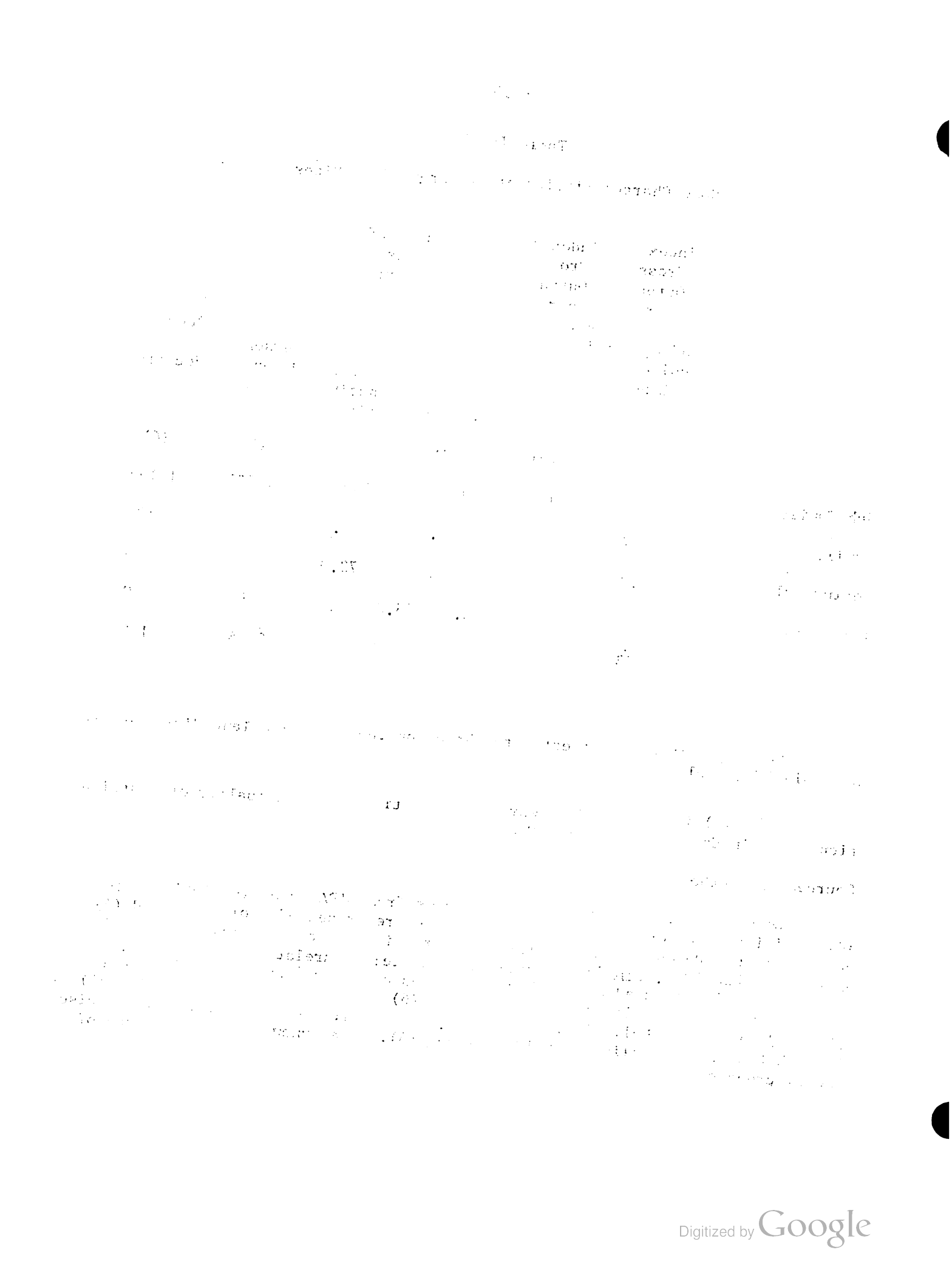
[1]Col. (3) gives a best estimate, based on the effective land distribution of Table IV-8, Col. (11).

[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 per cent of land on farms of each different size which is used in crops, pasture, etc.[1] (Table A-51 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

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[1] This table is based on the Agricultural Census of 1960. A similar table (A-50) showing the average amount of land going to the various uses, by farm size, is presented in the Appendix. Table A-51 shows crop patterns by the four CIDA size categories and separately for the Andean and Caribbean regions.

[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.

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-70, 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 lubricants, 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 (Table IV-10).

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
2,500 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 1,000 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 my revision 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, while 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 1.58 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-12. 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,

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[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. Assuming the adjustments to the assessed values carried out in Column 3 of Table IV-7, 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 Agricultural	Number of Farms Livestock	Farms Administered by Owner	Farms Administered by Hired Administrator	Farms Administered by Total	Per Cent Operated by an Administrator
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	42,470	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 20 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 inefficiencythan 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 of Table IV-7, Col. 3, 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-7 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 level 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 large 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 (7) 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 vary 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 Armero, 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-10). 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., p.), 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	9.6	2.8	5.9
Argentina	12.4	11.6[1]	12.5	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	7.0	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	10.0	2.0[2]	8.0
Peru	10.0	10.4[1]	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	9.2		

[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-70). 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-Tora 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 per Plaza
<1.5	22	0.8	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	604	878	1291
75.1 - 150.0	6	109.0	32.2	351	410	666
>1500	4	343.3	246.8	734	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 6,400 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 larger farms must have a higher 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 greater 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 farmers must work 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

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[1] This is, of course, a static conclusion, and the fact that labor inputs and quantity of outputs per hectare are not higher on the small farms than on the large ones, is in large 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 greater 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 scarely 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. Economies 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	540	684	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 on 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-71); these suggest that there is a substantial amount of renting out of implements especially to small farmers. It seems probable that the share of machines owned on small farms is less than the share of machine use 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-72 shows the relation between tractors owned per 100 hectares of arable (cropped plus fallow) land; the ratio decreases 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-71) with the per cent using only this form decreasing from about 70 per cent 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 investable funds. Only 18 per cent 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 mechanical power, we would conclude that about half of the farms (in this size range) growing substantial amounts of crops had any form of mechanical 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 "Pachuzo" prevails.

From the point of view of soil conservation this is fortunate, since only the absence of the mold board plow and the presence of permanent tree crops and shade trees explains the lack of erosion in a majority of the minifundio areas; exceptions to this rule are the Santanderes 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	118	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	878	308
40-50	27	128	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

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[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 negate the conclusion 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 on the farm irrigated rose with farm size in these two heavily irrigated regions (See Table A-75); this suggests our conclusion.

[2]The per cent of all farms (crop or livestock) where some form of irrigation is practiced is between 2 and 4 for almost all farm sizes, reaching about 4 per cent only for the top three farms sizes. Seventy per cent of the 226,000 hectares under irrigation in the country are in farms of 50 hectares or more and 50 per cent in farms of more than 200 hectares. The generally low level of irrigation in the country as a whole results from the lack of a tradition of such and the absence of public projects. CIDA suggests (p. 182) that there has been a tendency for 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 these lands and to increase enormously the commercial value of the land. But the payments required of the owners have not been adjusted 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-19.5). 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-19).

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 a 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 new technology to larger farms first, since extension workers are very scarce.

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-7 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.

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, mimeograph, pp. 64-65. The CIDA estimate suggested relative average productivities of ten to one. But some of the figures underlying the calculation 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 IV-11); 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 by the tables reproduced as A-77 to A-79.5 of the Appendix. 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, as we see in Table A-79, 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. (See Table A-76).

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 income, learn more about the improved technology available, and so on.

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.
3. the less the bias towards mechanization of those farms resulting from fear of labor troubles (possibly based on past experience).

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.

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 togehter with those having very little land, Colombia's relative position, especially vis a vis Chile, improving as a result. As shown in Table A-81 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.

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) (see Table A-83). The agricultural sector of Colombia is (along with Ecuador's and Guatemala's) the most important in terms of share in gross domestic product (see Table A-84). The growth of agricultural output in the period 1952-1960 was about average. Figures are given below in Table IV-24, (see also Table A-85).

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	1.3	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

*1950-1959.

Sources and Methodology:

Columns (1) and (2) are derived from United Nations, Boletin Estadistico 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 or 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

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 V-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 V-1 for alternative estimates).[1]

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[1] Table V-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.

(continued on following page)

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

(continued on following page)

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 V-1 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

(continued on following page)

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 V-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 V-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 V-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]

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[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 V-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 V-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 III-3), and the GNP deflator. The money wage series come originally, on a department by department basis, from Table A-100. Columns 9 and 10 are from Table V-3.

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		

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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.

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The case of the livestock sector differs from that of [illegible] 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

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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 V-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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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 V-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

National			
hot climate	99.8	84.3	77.2[1]
cold climate		91.4	82.0[1]

(continued on following page)

National
hot climate 99.8 84.3 77.2[1]
cold climate 91.4 82.0[1]

(continued on following page)

TABLE V-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-100.

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

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[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

(continued on following page)

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 V-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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(continued from preceding page)

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 V-2.

[3] Ryoshin Minami, "The Turning Point in the Japanese Economy," Center Discussion Paper No. 19, February 15, 1967.

DIAGRAM V-1

Indices of Output, Income and Wages in Agriculture, 1925-1964

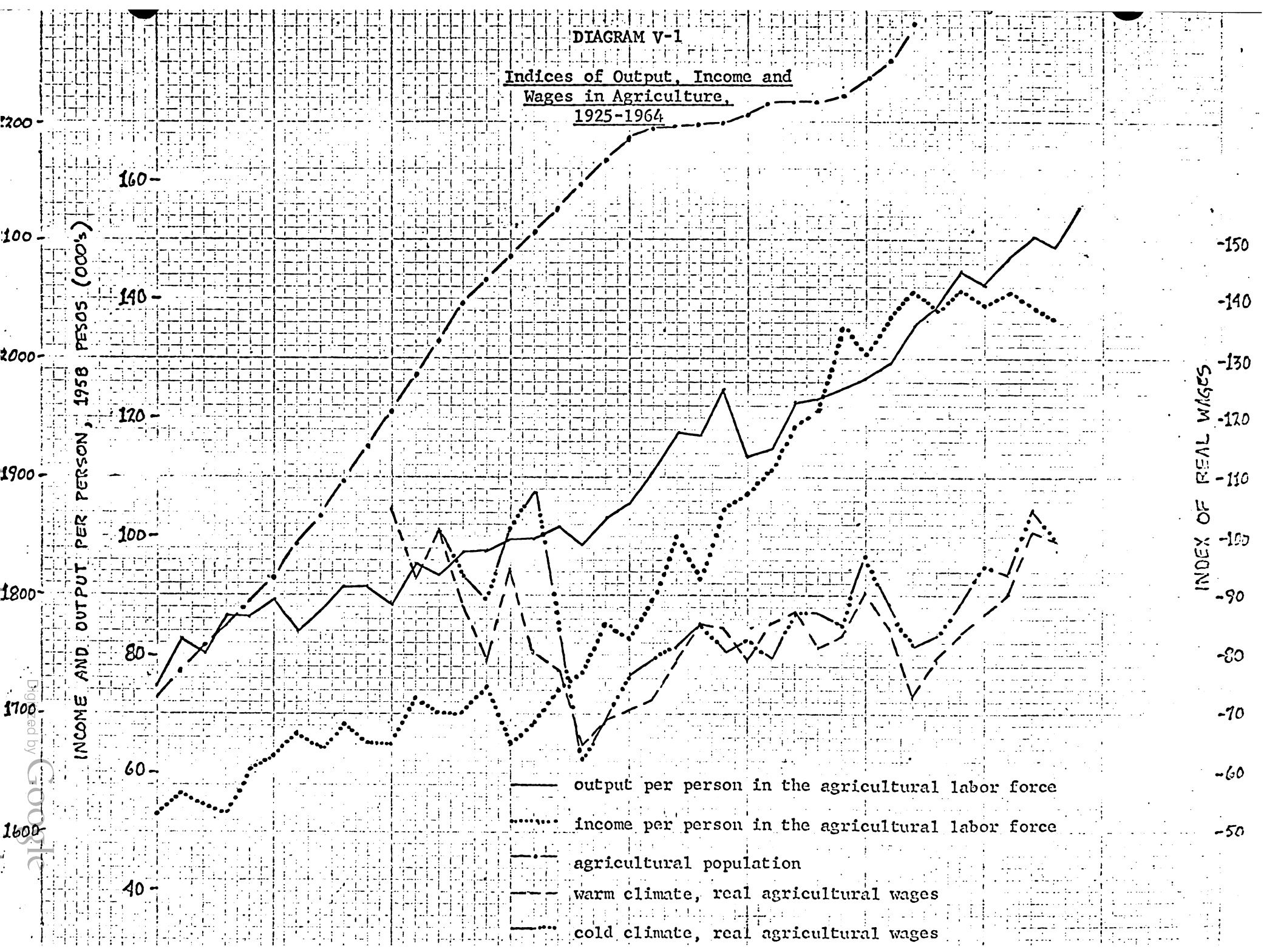
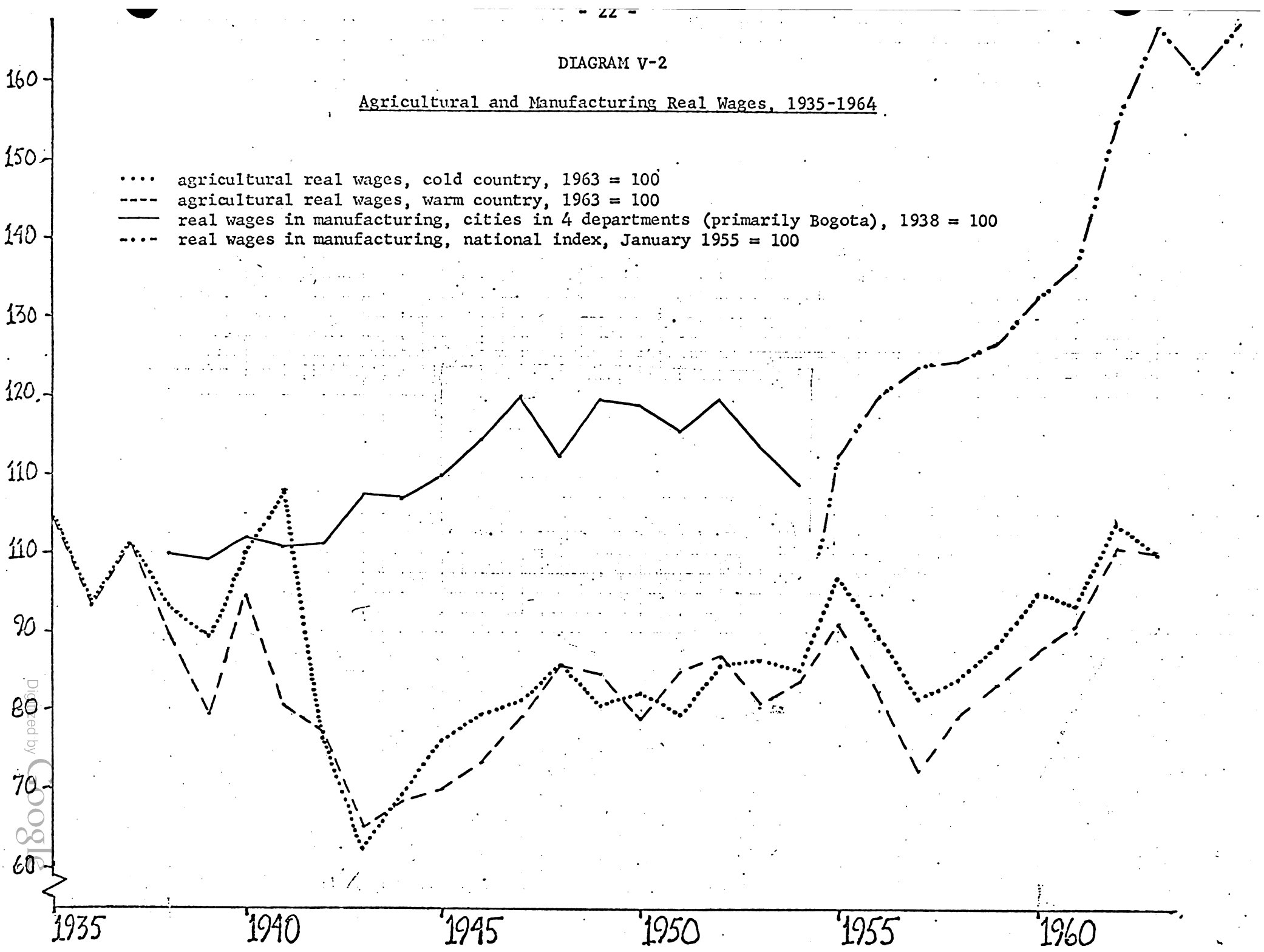


DIAGRAM V-2

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 V-3 - V-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

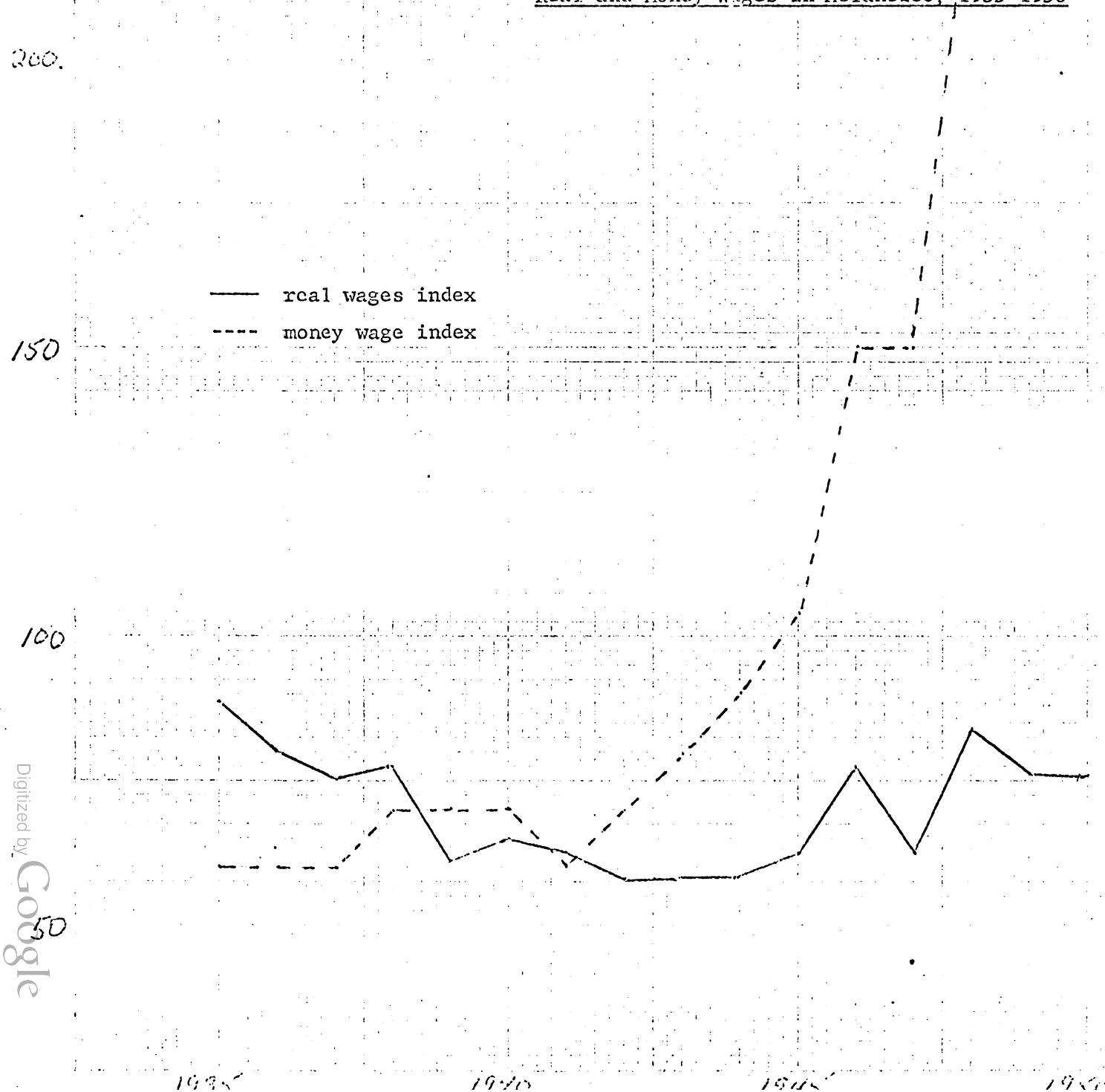
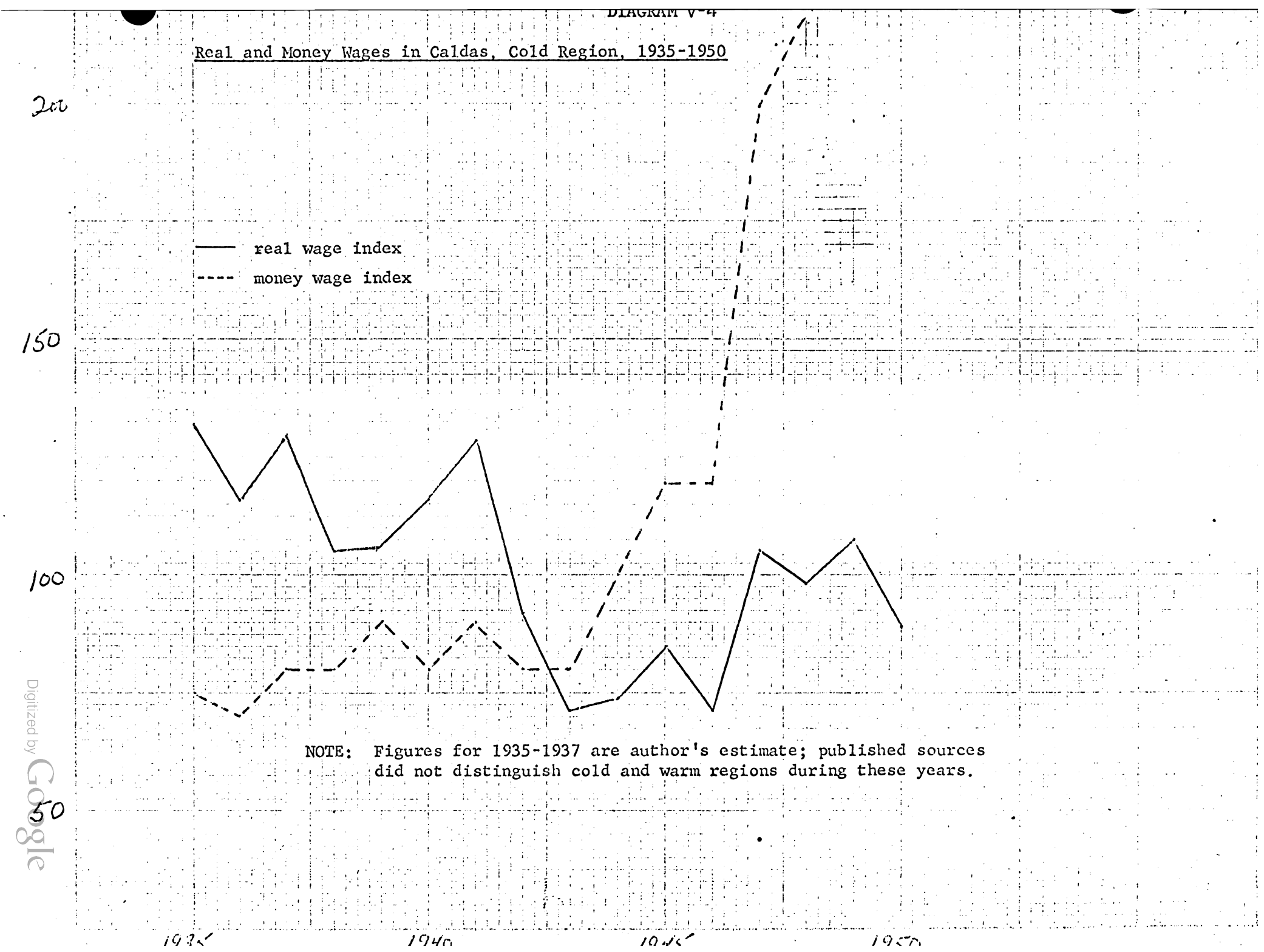


DIAGRAM V-4

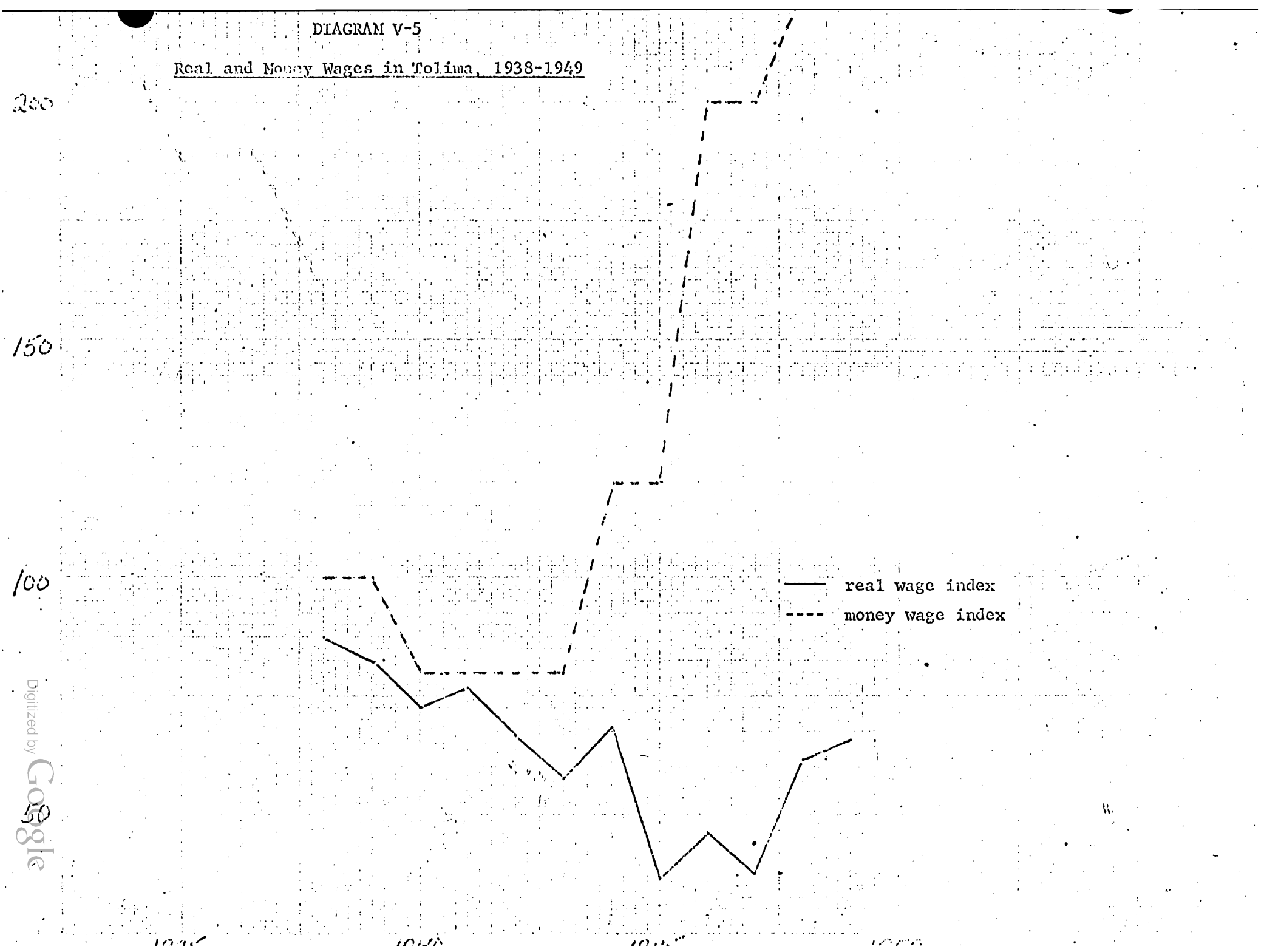
Real and Money Wages in Caldas, Cold Region, 1935-1950



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

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[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.

Dispersion of Agricultural Area Rates, Cauca, Selected Years

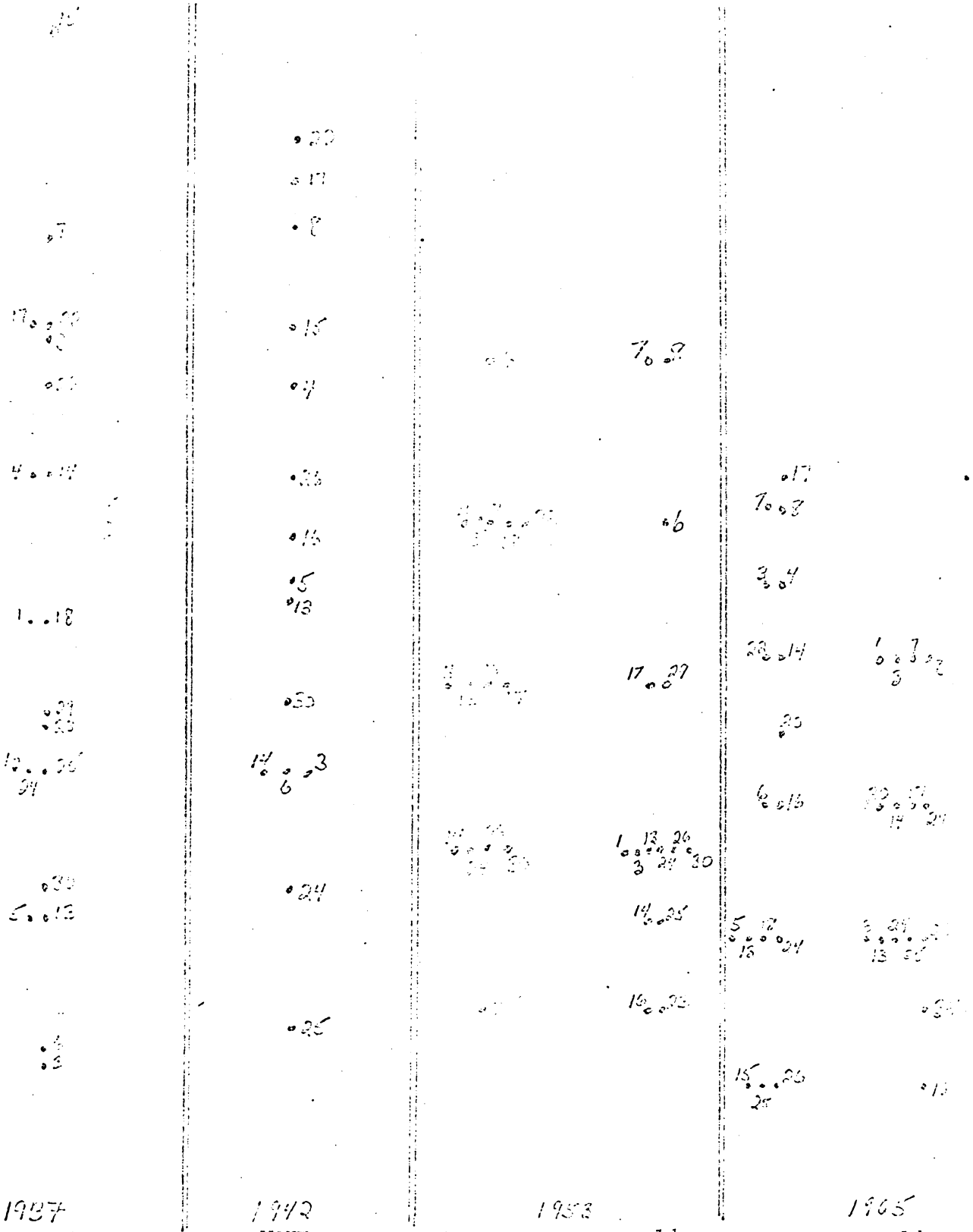


DIAGRAM V-6, continued

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.

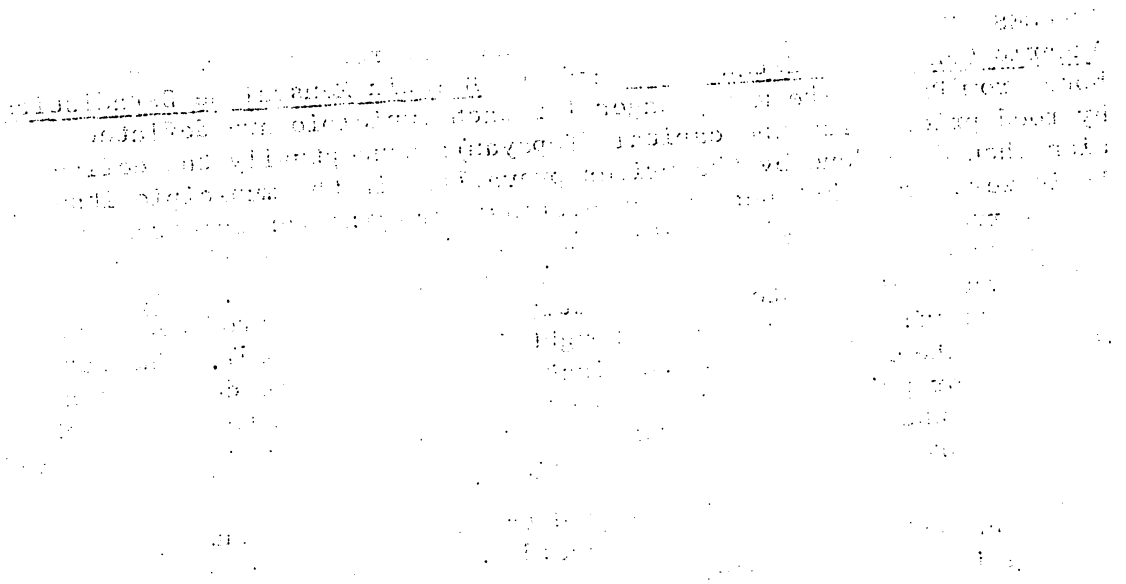
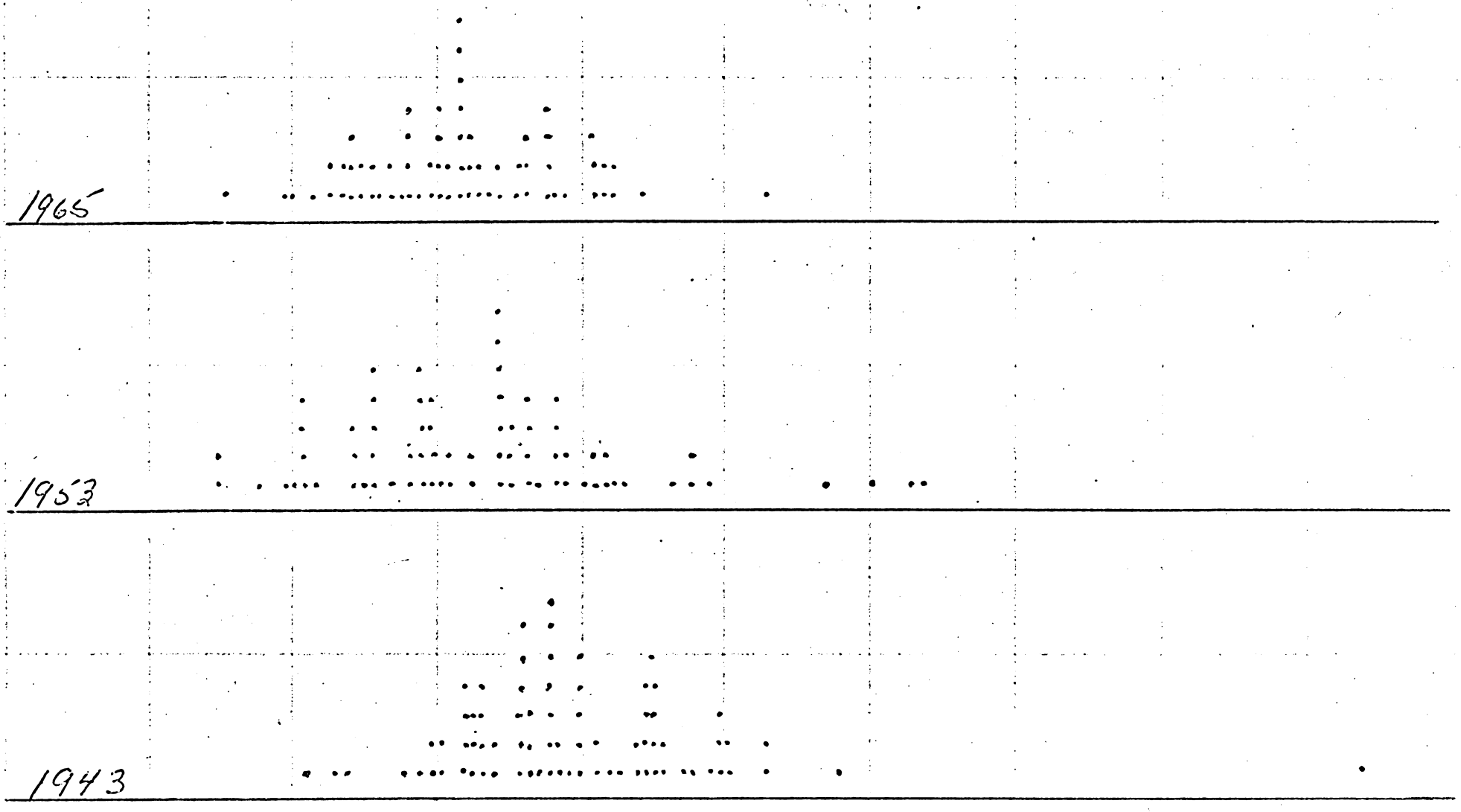


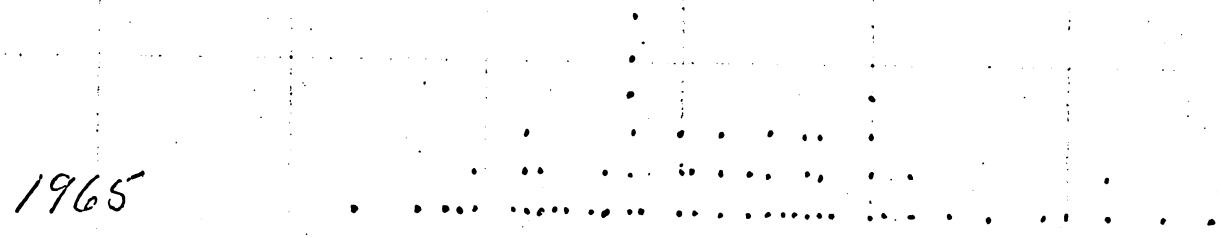
DIAGRAM V-7

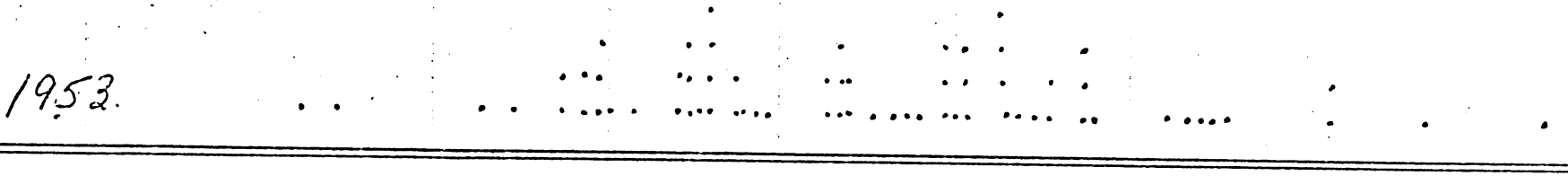
Dispersion of Agricultural Wage Rates, Antioquia, Selected Years

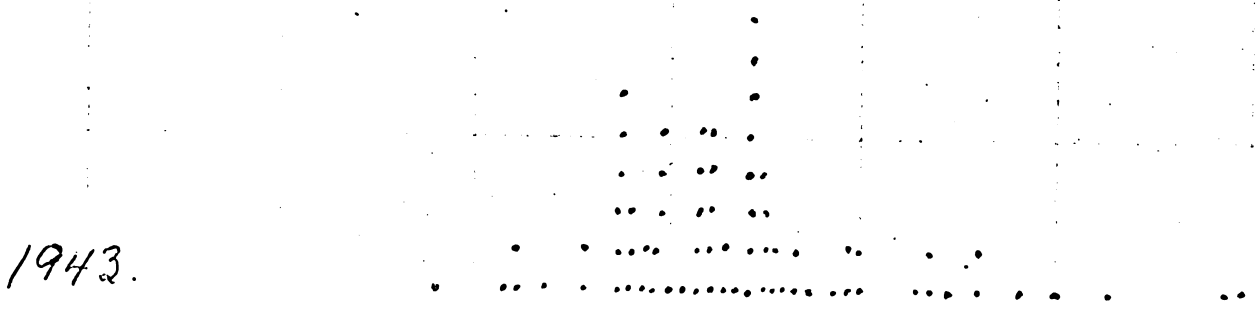
a) cold climate



b) warm climate







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 V-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 V-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

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[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 V-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

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[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 VI

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

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[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 VI-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 VI-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 VI-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 VI-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	

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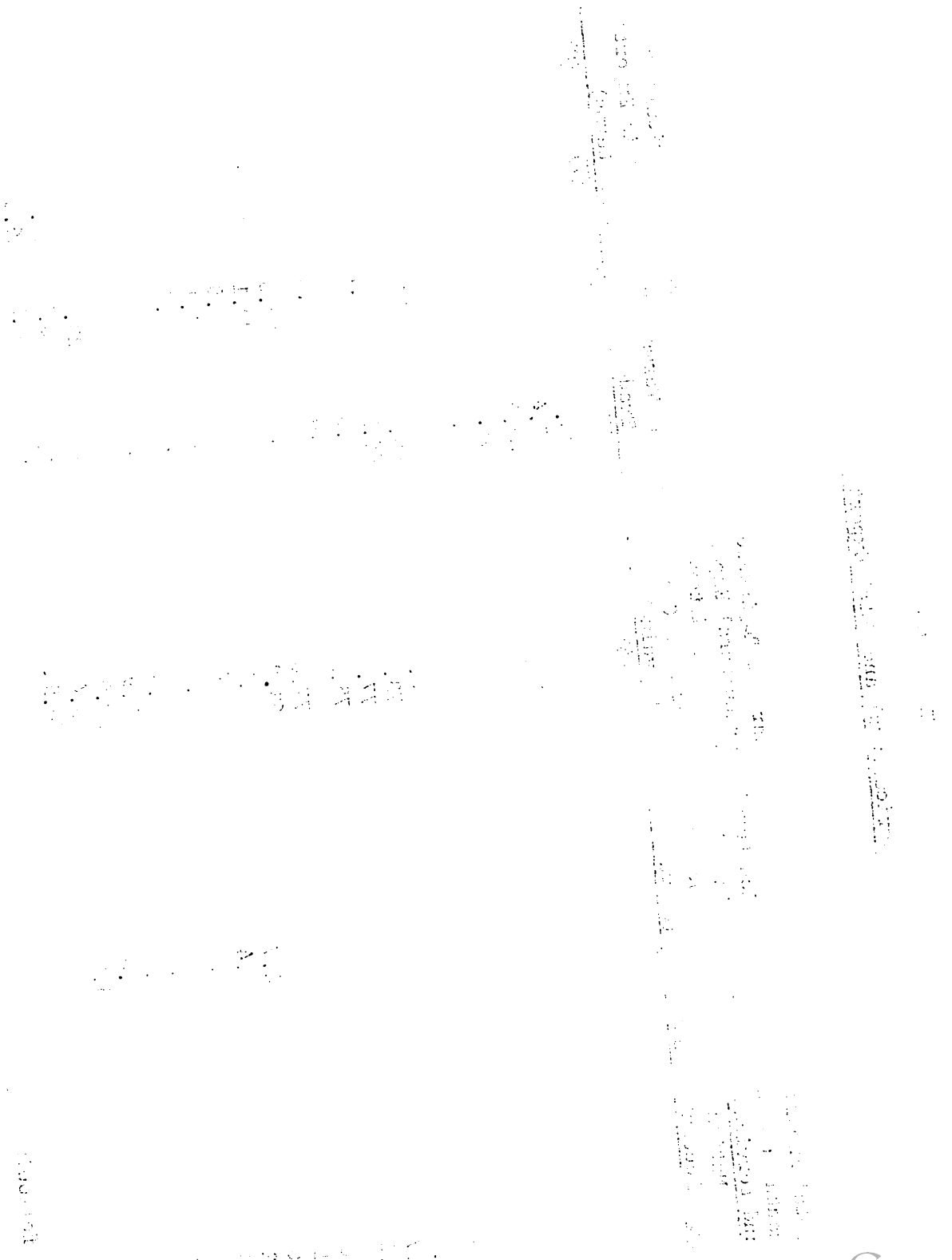

TABLE VI-1, continued

	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 VI-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.

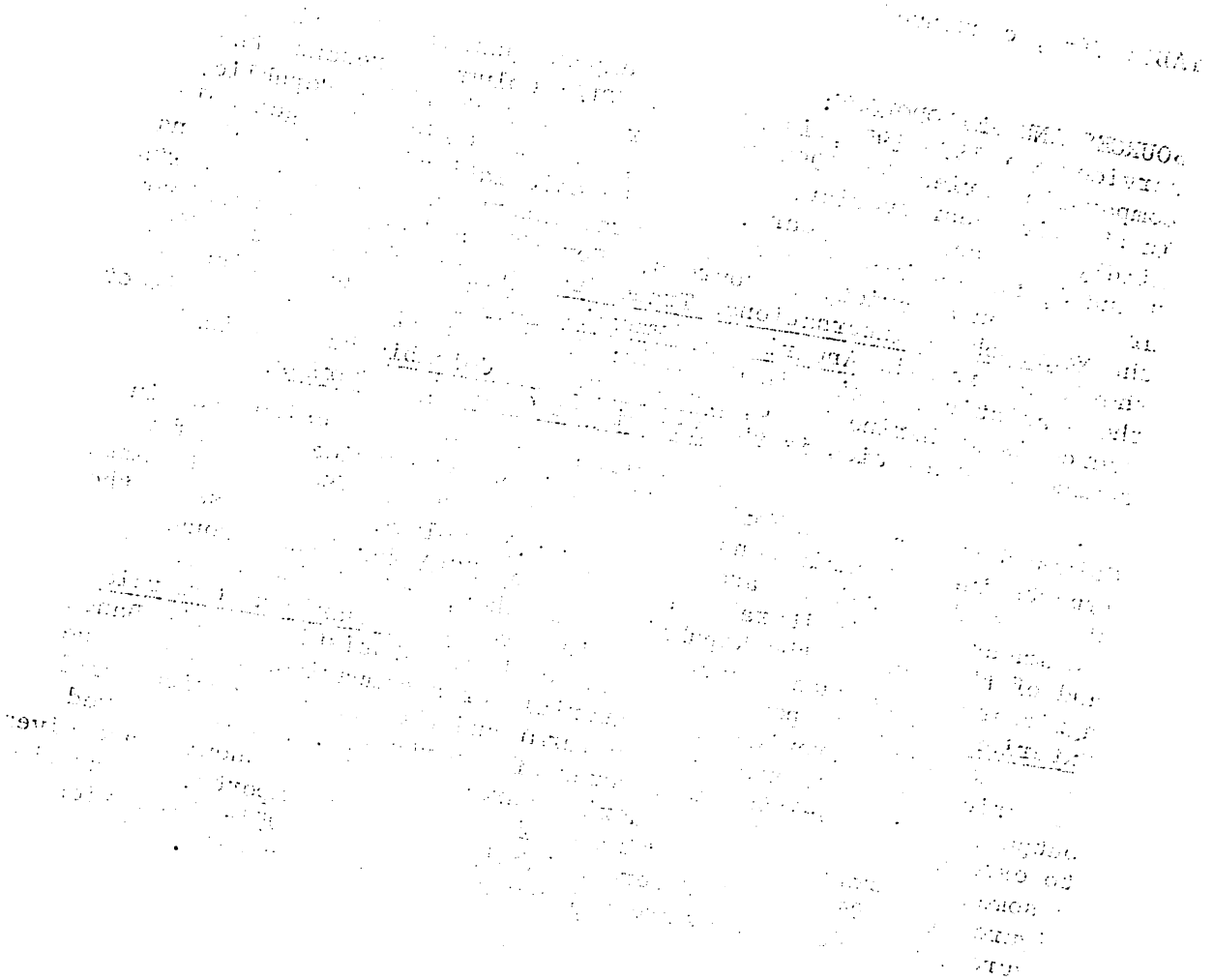

TABLE VI-2

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 VI-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	96.3	101.2	5.76
1962	9.2	12.0	11.5		93.0		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 VI-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 VI-3), we see that exports minus imports related to domestic agricultural output was rather

TABLE VI 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	18.81
1933	78.93	18.77	
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	16.87
1962	55.34	18.2	
1963	55.79	16.4	

[1] Defined as agricultural exports minus agricultural imports.

Sources and Methodology.
The figures are from tables A-150 through A-156.

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 VI-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 VI-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 VI-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 and Meslin	
Wheat				
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 VI-4 (continued)

	Colombian Peso Price to Farmer	Implied Dollar Price Using Free Exchange Rate	Average World Import Price	Average World Export Price
			Wheat and Meslin[1]	
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, raw, other than linters		
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	619	539
1965	3,506	2,083	5,401	674	619	499

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 VI-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 VI-6.) The second sharp jump in output occurred in 1912 and again

[1] Book on the overall development process in Colombia, forthcoming.

Coffee Output And Terms of Trade : 1918 - 1964

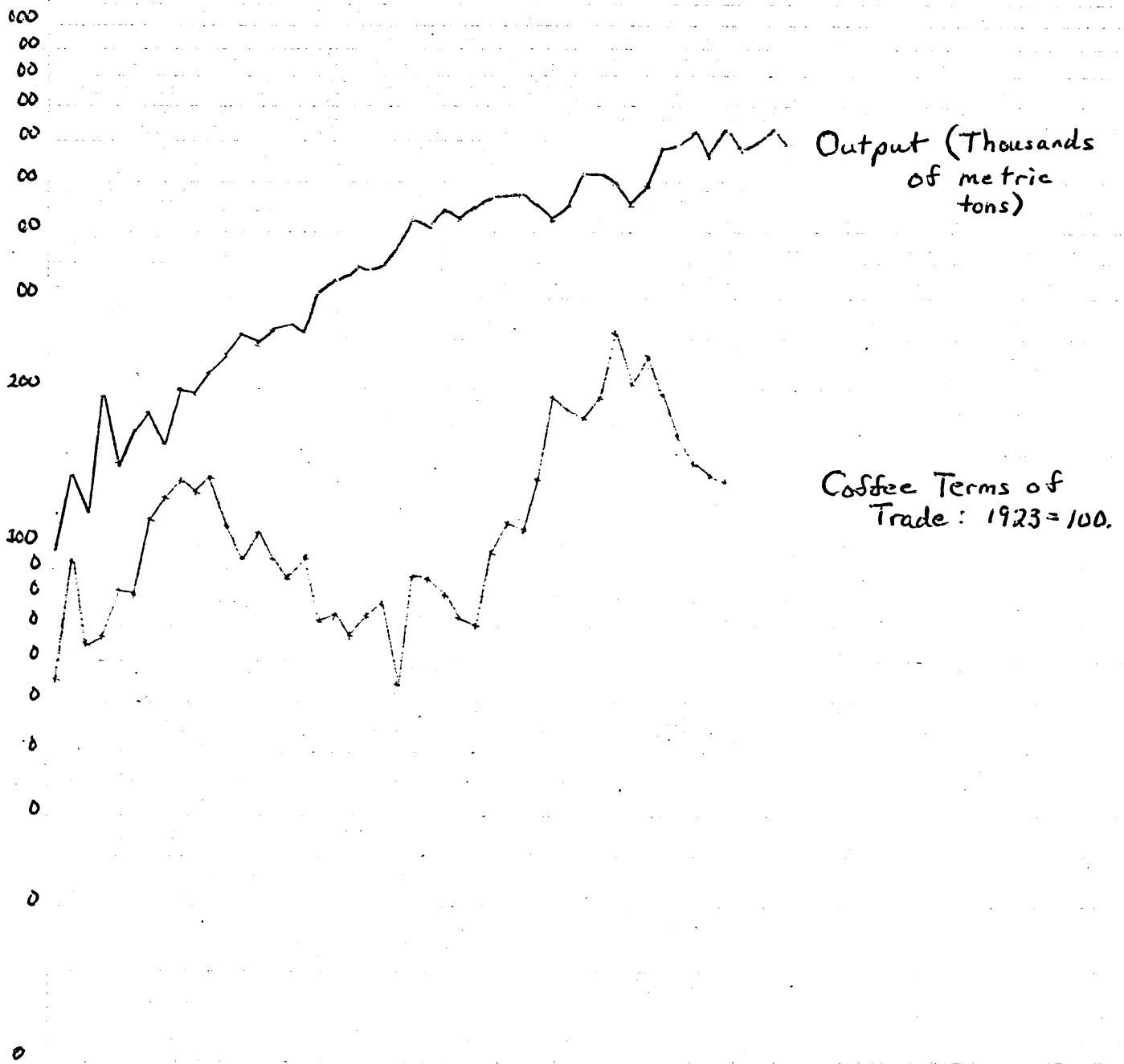


TABLE VI-6

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

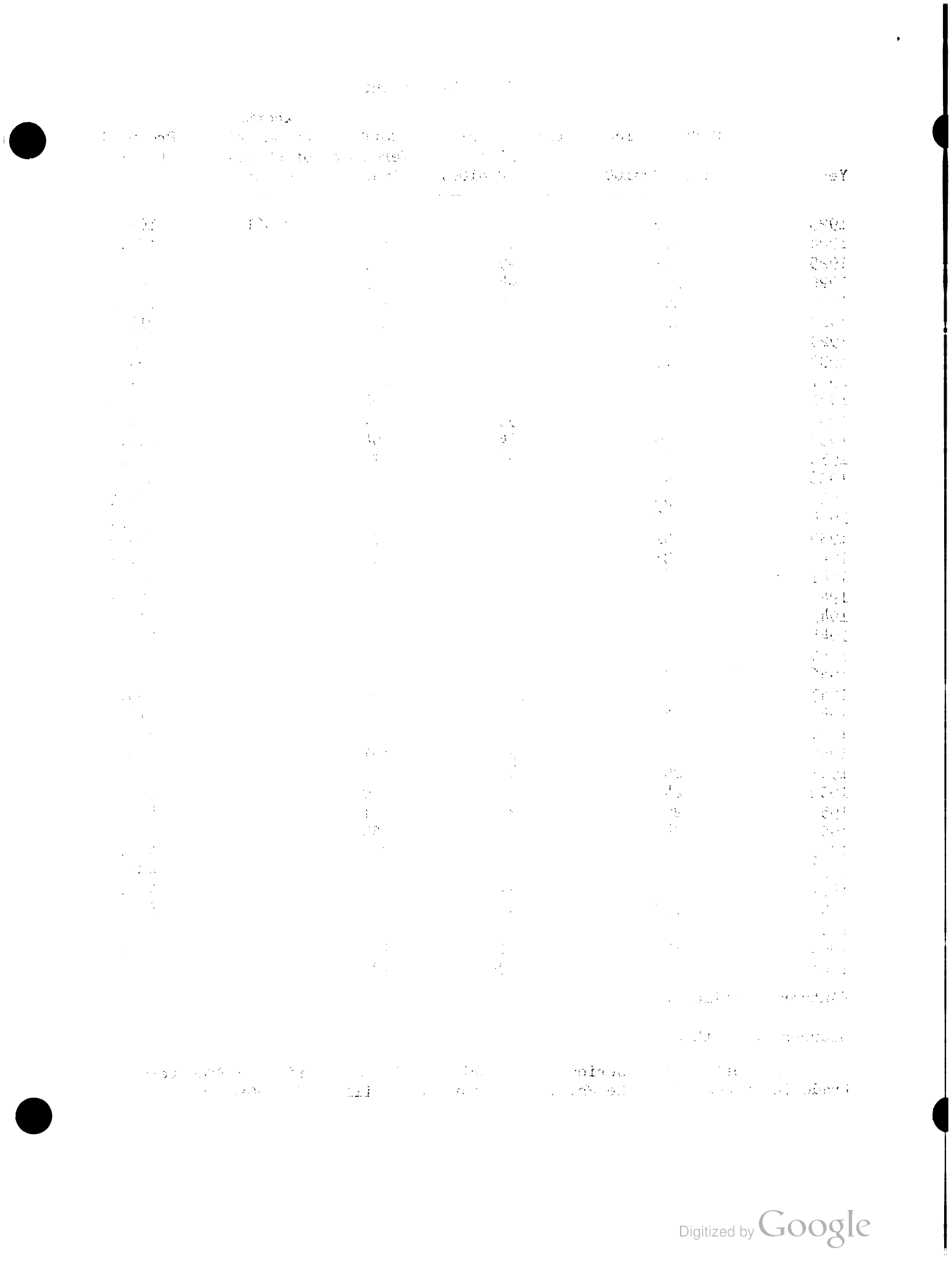
TABLE VI-6 (continued)

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 Revists 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-180.

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-106). 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 VI-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 A-106

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 Crops	All Crops	Coffee	Other Crops	Total	Coffee	Other Crops
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1930								
1935	467	120-132	2018-2185	392	1626-1793	300.0	84.0	216
1940								
1945								
1950						1701.8	609.0	1092.8
1951	1247	620	2869	680	2189	2205.5	848.1	1092.8
1952	1445	545	3037	699	2338	2285.0	1010.4	1274.6
1953	1481	658	2900	718	2182	2499.7	1063.2	1436.5
1954	1917	814	2908	737	2171	3180.1	1412.6	1767.5
1955	1525	784	2916	736	2180	2832.3	1122.5	1709.8
1956	2078	870	2925	776	2149	3481.9	1612.3	1869.6
1957	2668	1073	2933	797	2136	4419.0	2126.6	2292.4
1958	2523	1284	2941	818	2123	4789.9	2063.7	2726.2
1959	2044	1519	2950	840	2110	4922.5	1716.6	3205.9
1960	2068	1337	3318	845	2473	5053.6	1747.5	3306.1
1961	2418	1424	3467	840	2627	5771.3	2031.0	3740.3
1962	2243	1606	3421	840	2581	6028.6	1883.9	4144.7
1963	2796	2111	3379	835	2544	7705.4	2334.9	5370.5
1964	3735	2899	3578	840	2738	11074.4	3137.4	7937.0
1965	3518			845		10844.8	2972.4	7872.4

(Continued on next page)

SOURCES AND METHODOLOGY:

The figures on land under coffee and under other crops come from the 1965 and 1966 reports of the American attache in Bogota. The total figure for crops has been presented earlier in Table II-1. The Embassy figures were checked against various other sources to determine the degree of validity. The value of output figures for 1950 and on come from unpublished estimates used by the Central Bank in calculating the national accounts. The value of coffee output for the crop year 1937-38 was interpolated from the 1937 and 1938 figures in Table A-180. A similar procedure was used for the total value of crop output, using Table A-3. The 1937-38 estimate of land under coffee is based on a 10 per cent markup above the figure coming from the 1932 coffee census. This markup was used by Katherine Wiley in her book "The Agriculture of Colombia." The land under other crops is based on the same figures as Wiley used, which came originally from the Anuario General de Estadistica in the years 1937 and 1938.

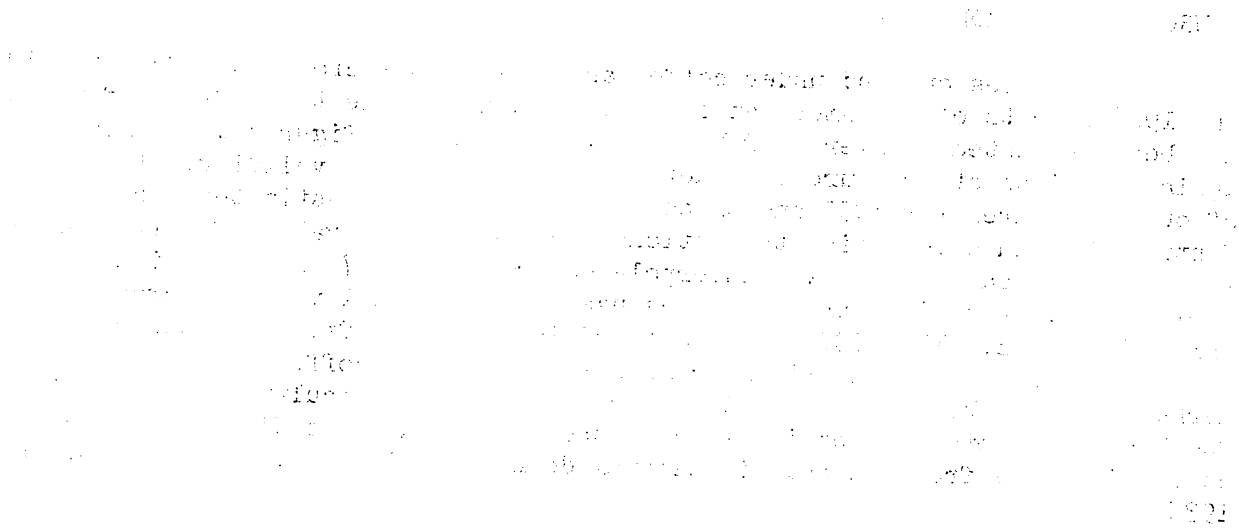


TABLE VI-1

Growth of the Coffee Sector Contrasted to Growth of Agriculture in General

Year	Agricultural Labor Force	Labor Force Involved in Coffee Production	Per Cent of Total Agricultural Labor Force Engaged in Coffee Production	Value of Coffee Produced / Value of Total Output of Crops and Livestock	Average Annual Growth Rates: Coffee	Non Coffee Crops	Livestock
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 VI-7 (continued)

Year	Agricultural Labor Force	Labor Force Involved in Coffee Production	Per Cent of Total Agricultural Labor Force Engaged in Coffee Production	Value of Coffee Produced Value of Total Output of Crops and Livestock	Average Annual Growth Rates Coffee	Non-Coffee Crops	Livestock
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. (See also Table V-3.) The relationship between the 1932 figures and the subsequent ones does not, therefore, tell us very much.

Column (4) is based on Table A-178. Column's (5), (6) and (7) are based on figures from Tables A-180 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, tantalogical 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 through 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. (The figures used for this analysis are presented in Table A-107).

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

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(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. (See figures of Table A-107.) 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.,

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

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[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 VI-9

Composition of Registered Exports of Goods and Services: 1950 and On
(thousands of current dollars)

Year	Coffee (1)	Petroleum (crude) (2)	Coffee and Petroleum (3)	Bananas (4)	Other Agricultural Mining and Forest Products (gold excluded) (5)	All Agricultural Exports Except Coffee (6)	Manufactured Exports* (7)	All "Minor" Exports (8)	Exports of Goods (9)	Exports of Goods and Services (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 Comerci° 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-152.

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						Semi-Manufactured		Manufactured		Grand Total
	Agriculture and Fishing	%	Mining	%	Total	%	Millions of Dollars	%	Millions of Dollars	%	
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 VI 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 Internaticnal 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 VI-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.

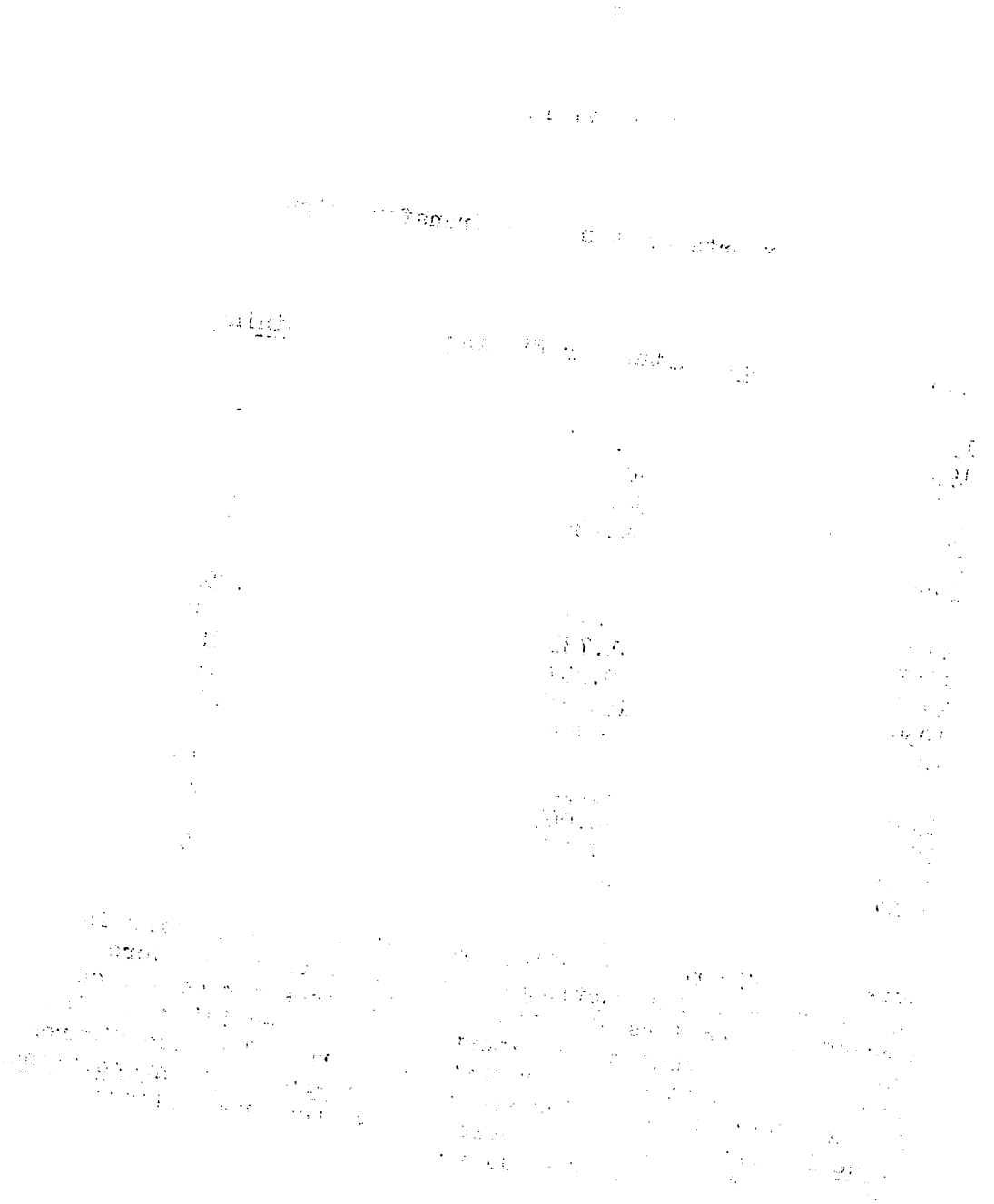

TABLE VI-12

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 VII

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] Two alternative yield series for barley were presented in Chapter II, Table XVIII. 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 stem 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

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[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 operation 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 organiaations 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 No.	1962 Has.	1963 No.	1963 Has.	1964 No.	1964 Has.	1965 No.	1965 Has.	Total 1962-65 No.	Total 1962-65 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 these 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., p.

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 artisana

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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., p.

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. (See page 182.)

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 18 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 relevant 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.

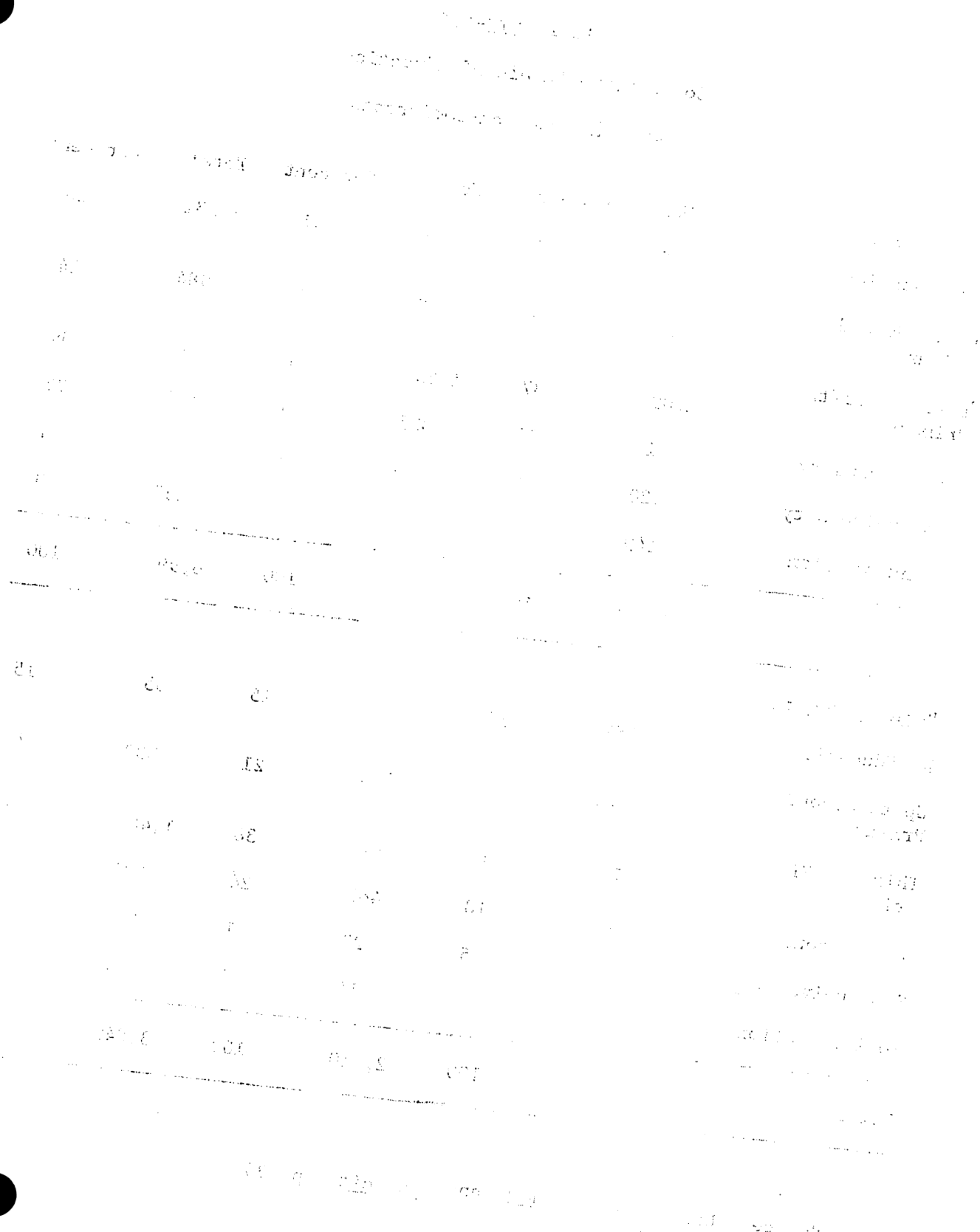

Table VII-4

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. (See Tables A-191 and A-192.) 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 Castellaños 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. (See Table A-190.)

The Reyes and Urrutia-Castellaños 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

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[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 breakdowns 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				
			Migrants		
	Non-Migrants	All 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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Table A-1

MAJOR OUTPUT SERIES

Year	Total Crops and Livestock: ECLA Millions of 1950 Pesos	Total Crops and Livestock: National Accounts (Millions of 1950 Pesos; Factor Costs)	Total Crops and Livestock: National Accounts (Millions of 1958 Pesos; Factor Costs)	ECLA Indices: Total	ECLA Indices: Crops	ECLA Indices: Livestock	Coffee Metric Tons	Coffee (Index) 1958=100	Non Coffee (Index) 1958=100
				1958 = 100					
1918							93.6	15.9	
1919							137.8	23.4	
1920							113.3	30.1	
1921							191.1	32.5	
1922							144.3	24.5	
1923							169.0	28.7	
1924							180.7	30.7	
1925	1,288			38.0	32.0	49.4	153.6	27.0	34.2
1926	1,434			41.2	39.7	50.3	200.2	34.0	42.3
1927	1,414			43.2	37.1	52.0	192.4	32.7	39.1
1928	1,529			47.7	42.3	53.6	217.1	36.9	43.5
1929	1,549			48.7	44.9	52.0	231.4	39.3	47.5
1930	1,626			50.3	49.2	51.1	254.8	43.3	52.0
1931	1,546			47.7	44.9	50.3	247.0	42.0	46.6
1932	1,638			50.3	47.5	55.3	260.0	44.2	49.3
1933	1,729			53.0	50.1	58.7	267.8	45.5	52.4
1934	1,756			54.7	49.2	64.5	257.4	43.7	51.9
1935	1,792			55.6	50.1	63.7	309.4	52.6	50.0
1936	1,892			59.2	54.4	62.9	325.0	55.3	55.0
1937	1,884			58.3	55.2	61.2	331.5	56.4	55.7
1938	1,992			60.9	57.0	62.9	343.5	59.2	57.2
1939	2,024			61.8	58.7	62.0	344.5	58.6	59.6
1940	2,070			63.6	66.4	61.2	447.1	76.0	64.2
1941	2,098			64.5	61.7	63.7	371.8	63.2	62.2
1942	2,154			67.1	63.0	66.2	427.7	72.7	60.6
1943	2,118			65.3	59.5	70.4	412.1	70.1	56.9
1944	2,227			68.9	63.0	74.6	431.6	73.4	60.4
1945	2,307			72.4	66.5	76.3	429.0	72.9	65.4

Table A-1 (continued)

MAJOR OUTPUT SERIES

Year	Total Crops and Livestock: ECLA Millions of 1950 Pesos	Total Crops and Livestock: National Accounts (Millions of 1950 Pesos; Factor Costs	Total Crops and Livestock: National Accounts (Millions of 1958 Pesos; Factor Costs)	ECLA Indices: Total	ECLA Indices: Crops	ECLA Indices: Livestock	Coffee Metric Tons	Coffee (Index) 1958=100	Non Coffee (Index) 1958=100
1946	2,465			75.9	71.6	79.6	436.8	74.3	71.8
1947	2,556			78.6	74.2	82.1	465.4	79.1	73.6
1948	2,562			77.7	73.3	80.4	478.4	81.3	71.8
1949	2,728			84.8	80.3	83.0	453.7	77.1	82.6
1950	2,505	2,808	5,506	77.7	69.9	86.3	412	70.7	70.7
1951	2,591	2,842	5,573	78.6	79.1	74.9	452	76.8	81.1
1952	2,677	3,036	5,953	84.0	85.8	76.9	504	85.7	85.9
1953	2,863	3,043	5,968	84.2	87.1	76.6	507	86.2	88.1
1954		3,124	6,126	86.4	88.3	78.9	498	84.7	91.7
1955		3,201	6,277	88.6	87.1	88.4	454	77.2	94.1
1956		3,301	6,472	91.3	89.5	93.0	493	83.8	87.1
1957		3,503	6,869	96.9	95.6	97.2	584	99.3	92.5
1958		3,614	7,086	100.0	100.0	100.0	589	100.0	100.0
1959		3,795	7,442	105.1	107.4	102.0	620	105.4	109.2
1960		3,798	7,448	105.1	104.2	107.7	563	95.7	110.8
1961		3,947	7,740	109.2	107.7	110.0	619	105.2	109.6
1962		4,077	7,995	113.6	111.7	116.2	587	99.8	120.6
1963		4,101	8,041	113.7	108.6	124.8	588	100.0	114.8
1964		4,331	8,492	120.3	117.5	127.0	629	106.9	123.3
1965							594	101.0	

Missing

Sources and Methodology: Table A-1

Column 1: ECLA, op. cit., Statistical Annex, p. 1. This is a value added series in 1950 pesos, and the methodology is explained in the ECLA Annex.

Column 3 is from the National Accounts published by the Banco de la Republica. (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. Column (2) is derived from Col. (3) multiplied by the implicit price of agricultural products in 1950 as compared to 1958 as found in the Cuentas Nacionales. This price was .51 times the 1958 price.)

Columns 4, 5 and 6, ECLA, op. cit., p. 152 for the years up to 1950 and National Accounts of the Banco de la Republica for subsequent years.

Columns 7 and 8: from Table A-180 where the methodology is explained in detail.

Column 9: 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 ECLA statistics.

Estimation of agricultural output in general is, as one would expect, very difficult in Colombia; this holds even at the present time, and the more so the farther back in time. Even the coffee output series are not necessarily accurate, since the only figure which is easily available is registered exports; these are not necessarily equal to total exports, since expecially in recent years there has been substantial contraband due to exchange rate differentials; in any case exports are not always a good indicator of output. Nevertheless

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 possibly not so difficult when it comes to estimating rates of change. Certain independent pieces of evidence, such as price series over time, are available so that some crude consistency checks can be performed. The most difficult categories are the crops which are not traded a great deal relative to their total output, such as platano, corn, yucca, etc. But even the ECLA series from 1925 to 1950 probably gives a meaningful picture of the rate of change of agricultural output over the long run, though not necessarily in individual years.

In the years 1950 through 1953 the ECLA series and the National Account series overlapped, and the discrepancy between them was not overwhelming: the National Account series was about 6 to 12 percent higher depending on the year. It is possible that the National Accounts estimate was not independent of the ECLA estimate, but since the methodology has been at least roughly constant in the National Accounts series since 1950, this suggests that whatever problems are present in the estimation of absolute output levels, there may have been no methodologically induced biases implying that the rate of change of output would be wrong. And since coffee has often accounted for one-third to one-half of total value of output in the crop sector (according to the official statistics) the per cent errors in the estimation of other crops would have to be very high, if that of coffee is relatively accurate, to produce an overall upward or downward error of as much as

25 per cent in the value of crop output. For example, if the coffee estimate were accurate, all of the other crops would have to be in error by about 50 per cent in order to imply a 33 per cent error for the total crop estimate in 1950.

Still, the estimates 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 how satisfactory it was, even from a conceptual point of view, let alone from an empirical point of view. It is true that a reasonable amount of effort went into it. Year by year variations in particular should be doubted for the pre-1950 years.

TABLE A-2

Price Series, Livestock and Crops

	Livestock	All Crops	Coffee	Other Crops	Livestock & Non-Coffee Crops	Total Livestock & Crops
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	26.5
1947	35.5	31.7	21.9	39.0	37.8	33.2
1948	35.4	34.4	22.5	43.1	39.3	35.1
1949	46.6	36.5	28.1	42.7	44.7	40.0
1950	49.0	50.9	42.2	57.5	53.3	51.0
1951	53.7	58.3	53.6	61.6	57.7	57.2
1952	60.1	55.6	57.2	54.4	57.3	58.0
1953	65.3	60.0	59.9	49.9	57.6	62.6
1954	74.4	75.2	81.0	71.1	72.8	75.1
1955	75.2	67.9	70.6	66.2	70.7	71.3
1956	75.2	81.3	93.4	73.0	74.1	79.9
1957	86.4	96.6	103.9	90.4	88.4	93.0
1958	100.0	100.0	100.0	100.0	100.0	100.0
1959	118.6	95.7	81.2	107.8	113.2	104.3
1960	130.0	101.4	88.7	109.6	119.8	111.3
1961	131.3	112.0	93.7	125.1	128.2	120.5
1962	134.9	112.9	91.6	125.8	130.4	124.0

(continued on following page)

Sources and Methodology for Table A-2

Sources and Methodology:

In the post-1950 period we use the current value of production series (unpublished Central Bank data) and the national accounts physical output series 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 series involved 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 available the crop-livestock breakdown in current prices some guesswork was involved but errors from this source are likely to be small.

The figures for the period 1938-1948 are the author's calculations based on the price figures presented by the World Bank Study. (The Bases of a Development Program for Colombia, 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.

Sources and Methods

TABLE A-3

Value Series: Current Prices

	Millions of Pesos				Indices (1958 = 100)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	Livestock	Crops	Total	Total (Alternate)	Livestock	Crops	Total	Total (Alternate Estimate)
1938	194.1	335.8	546.8	529.9	7.55	7.01	7.49	7.2
1939	192.8	390.9	608.9	583.7	7.50	8.16	8.34	8.0
1940	188.7	375.5	552.7	564.2	7.34	7.84	7.57	7.6
1941	196.4	345.8	560.7	542.2	7.64	7.22	7.68	7.3
1942	194.1	446.4	676.0	640.5	7.55	9.32	9.26	8.7
1943	248.1	527.4	819.8	775.5	9.65	11.01	11.23	10.5
1944	375.8	661.0	1076.1	1036.8	14.62	13.80	14.74	14.1
1945	457.1	761.1	1263.0	1218.2	17.78	15.89	17.30	16.6
1946	509.0	924.5	1467.4	1433.5	19.8	19.3	20.1	19.5
1947	748.1	1125.6	1905.4	1873.7	29.1	23.5	26.1	25.5
1948	732.7	1207.0	1993.0	1939.7	28.5	25.2	27.3	26.4
1949	994.9	1403.4	2474.9	2398.3	38.7	29.3	33.9	32.6
1950	1087.4	1700.4	2891.0	2787.8	42.3	35.5	39.6	37.9
1951	1033.4	2208.1	3285.2	3241.5	40.2	46.1	45.0	44.1
1952	1187.6	2284.8	3555.3	3472.4	46.2	47.7	48.7	47.2
1953	1285.4	2505.1	3847.4	3790.5	50.0	52.3	52.7	51.5
1954	1509.0	3180.5	4738.0	4689.5	58.7	66.4	64.9	63.7
1955	1709.5	2830.8	4613.9	4540.3	66.5	59.1	63.2	61.7
1956	1796.9	3487.1	5322.1	5284.0	69.9	72.8	72.9	71.8
1957	2159.4	4425.9	6577.8	6585.3	84.0	92.4	90.1	89.5
1958	2570.7	4789.9	7300.5	7360.6	100.0	100.0	100.0	100.0
1959	3108.0	4924.0	8001.3	8032.0	120.9	102.8	109.6	109.2
1960	3599.0	5062.9	8541.6	8661.9	140.0	105.7	117.0	117.7
1961	3712.1	5776.6	9607.5	9488.7	144.4	120.6	131.6	129.0
1962	4030.9	6040.1	10286.4	10071.0	156.8	126.1	140.9	136.9

Sources and Methodology for Table A-3:

The value series in this table are the result of a multiplication of the physical output index found in Table A-1 and the price indices (partly Laspeyres and partly Paasche) found in Table A-2. This gives us the three value indices, one for livestock, one for crops, and one for the total, with base 1958 = 100 in each case. The indices were then converted into absolute figures by using 1958 values from the national accounts and using this year as the base for 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. Ambiguity (or error, according to one's view) may be present due to the different nature of different price series. Whereas the price series in Table A-2 for all livestock and crops is, for the post-1950 period at least, a value added price series (although for 1938 to 1950 it is a value of product price series), the price series for the individual components making up this total were not calculated on a value added basis. The only figures to which I have had access in current prices for these components were value of product figures. These were used with the physical quantum indices which for 1950 and on were in fact also volume of output figures. The same situation prevailed for the pre-1950 period with the price series we derived being a value of product price series and the quantum indices likewise being quantity of product rather than quantity of value added series. This does not constitute a particularly serious problem since almost all value of product in the agricultural sector does constitute value added and there is no reason to believe that the ratio of input to output has changed greatly over time. The value series in Column (3) for agricultural and livestock products is consistent with the national accounts value added series for 1950 and on and also with their unpublished value of products series.

A final source of difficulties 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 3) 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.

Table A-4

Output, Labor, and Capital in Agriculture, 1925-1953

	Output (millions of 1950 pesos) (1)	Active Population (thousands of persons) (2)	Capital[1] (millions of 1950 pesos) (3)	Output Capital (4)	Gross Investment (millions of 1950 pesos) (5)
1925	1,288	1,717	4,287	.30	183
	1,434	1,737	4,379	.33	184
	1,414	1,756	4,468	.32	192
	1,529	1,776	4,575	.33	204
	1,549	1,796	4,666	.33	200
1930	1,626	1,814	4,770	.34	206
	1,546	1,841	4,859	.32	201
	1,638	1,869	5,103	.32	273
	1,729	1,898	5,185	.33	197
	1,766	1,927	5,265	.33	203
1935	1,792	1,956	5,363	.33	217
	1,892	1,987	5,467	.35	226
	1,884	2,016	5,565	.34	229
	1,992	2,047	5,666	.35	233
	2,024	2,067	5,774	.35	242
1940	2,070	2,086	5,922	.35	258
	2,098	2,104	6,091	.34	262
	2,164	2,124	6,299	.34	280
	2,118	2,146	6,533	.32	299
	2,229	2,166	6,777	.33	342
1945	2,307	2,186	7,008	.33	348
	2,465	2,191	7,237	.34	362
	2,556	2,193	7,444	.34	330
	2,562	2,197	7,677	.33	370
	2,728	2,199	7,774	.35	226
1950	2,505	2,202	7,936	.32	256
	2,591	2,216	7,909	.33	272
	2,877	2,215	7,855	.37	295
1953	2,863	2,215	7,924	.36	411

[1]The measure of capital used by CEPAL excluded land. It included reproducible tangible goods, agricultural improvements and cattle.

SOURCE:

Table A-7

Five Year Averages of Yield

	1951-1955	1956-1960	1961-1965
Wheat	.78	.82	.91
Cotton	2.48	3.74	4.77
Rice	1.64	1.89	2.05
Barley	1.21	1.64	1.93
Beans	.55	.50	.61
Corn	1.20	1.20	1.03
Potatoes	5.23	8.22	13.25
Tobacco	1.14	1.72	1.96
Yucca	5.42	5.34	5.95
Platanos	7.99	6.51	5.11
Bananas	4.05	4.06	3.99
Cacao	.37	.39	.44
Coffee	8.72	8.61	9.35
Sugar			

Section II Capital Stock and Investment

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 are imported. Livestock is next best, and most other forms of capital are very difficult to deal with.

The problem of measurement is further complicated by the fact that it is not even conceptually clear exactly what should be included in the agricultural capital stock. From a theoretical point of view, land and capital may be indistinguishable, and for symmetry with treatment in other sectors of the economy, it might be advisable to include the value of land in the measure of total capital, in the calculation of capital-output ratios, etc. This would have the disadvantage, however, that the land does not have to be produced and is in that sense distinct from capital. But certain types of investment are perfectly substitutable with differences in land quality, in the sense that the land of one region without any investment may be identical to the land of another region which has received certain types of investment improving its quality. This does not constitute a problem in analysis of production functions over time, nor would it constitute a problem in analysis of cross regions provided one had an accurate measure of land quality. From a measurement point of view, one can say that those forms of investment which are most substitutable with differences in land quality are the most difficult to measure, and often do go unmeasured.

The most comprehensive investment and capital stock series 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 summarizes their series on investment. A more detailed breakdown on the capital stock by sub-sectors within agriculture is presented in Table A-12. (Comparable estimates giving capital per person are given in Table A-12.5) The ECLA series, while far from precise, are the result of some serious work; the figures are probably good enough to use for some general purposes. The approach used in calculating the investments which occurred in the different years and the capital stock at different points in time, involved primarily knowing the changes in the structure of output at different points of time. In the case of livestock, the methodology involved simply assuming a slaughter ratio for each point of time; in the case of crops, it involved knowing how the composition of crop production varied over 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 the period. If it was made, however, it would mean of course that the figures would by definition render any analysis of technological change or changing capital output ratios in the production of specific crops impossible. And to the extent that such changes occurred, the figures would be inaccurate. Annual changes in capital stock would probably be less accurate than changes over periods of time.

No statistics of even comparable quality on total agricultural investment have, to my knowledge been prepared since that study. The Planning Commission has made a rough estimate of investment

Table A-10

Existing Capital
(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, Stat. Appendix, pp. 29-31.

TABLE A-11

Capital Formation in Agriculture
(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	388.0	95	293.0

SOURCE: ECLA 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, (a different table on the same source. The latter sigmas are consistantly about 20 million pesos higher. The source of the discrepancy is unknown to me.

TABLE A-12

Distribution of Stock of Capital Among the Main Agricultural Activities

(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- 12.5

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.

Table A-13

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-14

Gross Investment in Agriculture, 1959
(millions of 1958 pesos)

				Per Cent of Total		
	Agriculture	Livestock	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.

Table A-14.5

Capital Invested in Livestock in Colombia, 1958

Type of Investment	Capital (Millions of Pesos)	Percent
Land	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

SOURCE: Henry De Meel, "Plan Ganadero", Bogota 1960.

Note to Table A-14.5

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 all 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-14.5 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. (I do not know whether they are independent).

There was a heavy importation of machinery in the mid-fifties; importation of machinery had passed its peak by 1959 and was probably not a great deal higher than in 1950-3, (see Table A-15), so the two estimates do not appear to be consistent. Since any estimates of total investment in agriculture or total capital stock will inevitably be weak, it is better, for some purposes to focus on those parts of the total which can be estimated with a greater degree of accuracy,among the easiest parts are investment in livestock and in machinery and equipment.

Investment in Machinery and Equipment: Mechanization

For 1950 and on, we have figures on installed value in current pesos of imported machinery and equipment from the Banco de la Republica and on cif. dollar value of imports from Planeacion. In Table A-15 (Col. 1) the BANCO figures are converted into dollars. Banco data suggest that the c.i.f. value of the machinery is only 60 to 66% of its value when finally installed. On this assumption Cols. (4) & (5) based on Planeacion figures on the c.i.f. value of imports have been estimated; 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 the ratio was higher for replacements than 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) are 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. A new series can be constructed for the period as a whole only if it is done in pesos. In the basic figures (Annuario de Comercio Exterior) there is a classification problem as to which imports are used in agriculture and which in industry. Table A-16 summarizes the results.

After conversion into dollars a series is presented as Col. (6) of Table A-15, (using the same multipliers to convert from c.i.f. to installed value as used for the Planeacion series.) It is well below the estimates based on the Planeacion figures, 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. I do not know to what extent the Banco and Planeacion tried to estimate inputs of motors and other things which could go either to agriculture or to some sectors and which actually did go to agriculture.

For the Banco figures (designed to be one component of an estimate of total investment) there would seem to be no need for this sort of precision. In 1950 our figure for total inputs is very close to the Banco c.i.f. figure for new imports (i.e. excluding replacements). For the most part the Banco new import series and our series move in similar patterns. (Our own series does include some replacements so this relationship hardly seems a logical one.) Pending more information to enable a more intelligent choice among these series, we will use primarily that of Col. (5), based on Planeacion figures. While it is possible that it constitutes an overestimate for some years, our own estimate has been equal to or greater than the Banco series for every year since 1954, so the latter is clearly an underestimate during that period. It is still possible that our series or that of the Banco would better reflect the pattern of fluctuations in these imports, but this cannot be demonstrated. Col. (9) is Col. (5) deflated by a price index of U.S. exports of agricultural machinery and equipment. Note that there is now some domestic production of agricultural machinery so the imports are an underestimate of total supply. I am unaware of figures on this output, though.

While any of the series in Table A-15 would indicate 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 they differ widely in a comparison between 1962 and 1950, for example. A final indicator is the sales of

(Table A-13); the estimated direction of change over time may have some value, although the absolute figures do not. In 1950 Planeacion estimated investment of 175.4 million 1950 pesos, while the ECLA estimate was 339 million. I am unfamiliar with the basic figures and methodology which Planeacion used, but it seems probable that the major (if not the only) 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 doubtless the better of the two. A probably somewhat more serious estimate of investment in 1959 (See Table A-14) was presented in the 10 Year Plan. It was about 100% above the Planeacion estimate for the same year. Deflated to 1950 prices it is about 338 million pesos (using the deflator used by Planeacion), i.e. more or less in line with the ECLA figures for the early 50's.

The figures of Tables A-11 and A-14 together indicate that machinery is a more and more important component of capital formation with the passage of time. A comparison between ECLA's 1950-1953 non-cattle investment breakdown and that of the 10-year plan is as follows:

	Construction and Improvements	Machinery and Equipment (excluding draft animals
1950 (ECLA)	90.2	9.8
1959 (10 Yr. Plan)	67.5 to 77.2[1]	22.8 to 32.5[1]

[1] The uncertainties are two:

a) In the 10 year plan some items are included as equipment (p. 183) but it is not clear whether they would be so classified in the ECLA figures.

b) It is not clear whether ECLA considers the animals used for draft purposes as part of the "machinery and equipment" category or the "livestock" category.

agricultural machinery in a sample of the country's large stores.

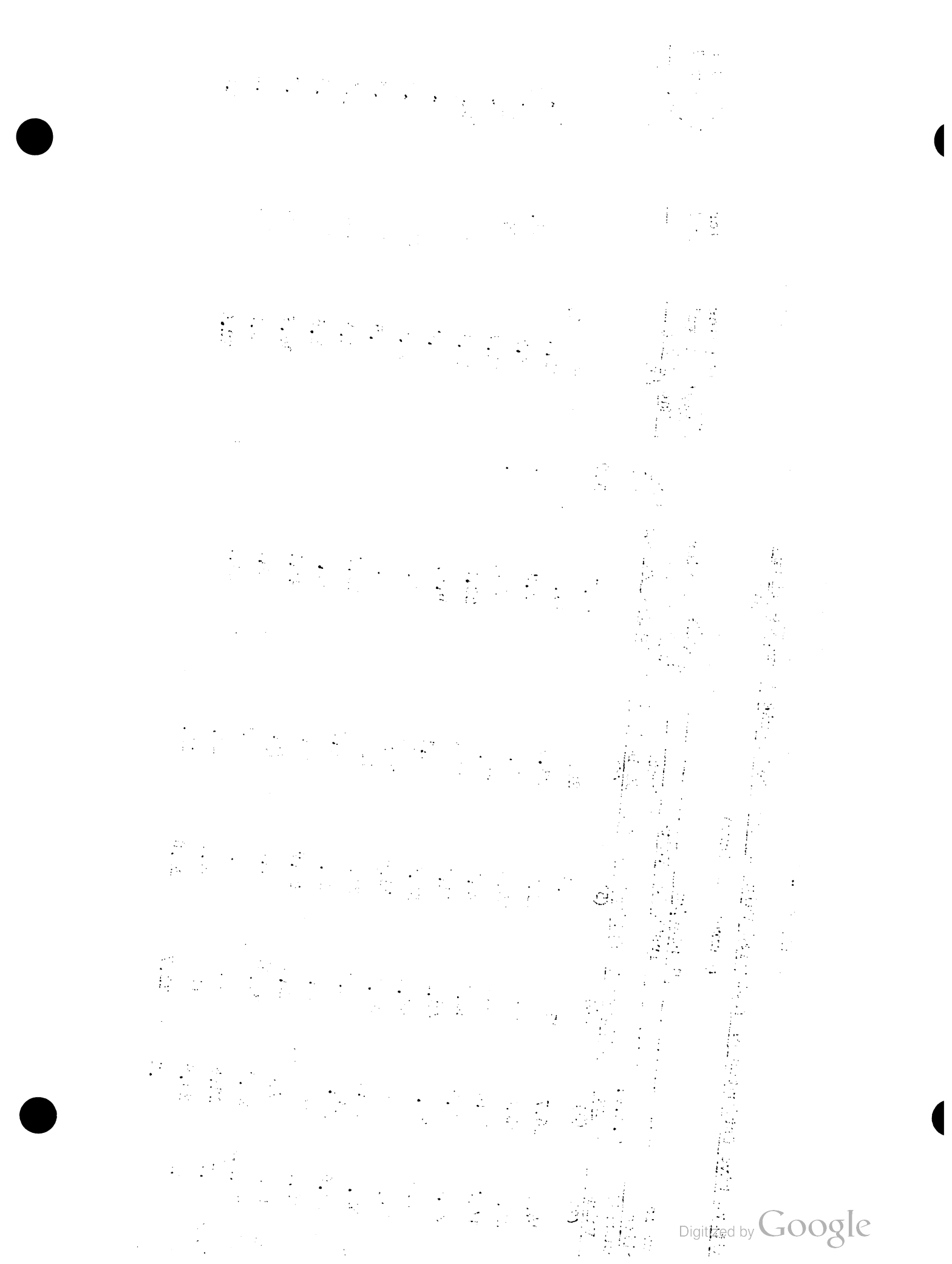
While its year to year fluctuations are not closely consistent with those of any of the other series, (nor would one expect them to be), it is in broad accord with the movements of the Banco and Planeacion series, and somewhat less so with my own series. Note that since it is an index, the absolute numbers are not relevant.

TABLE A-15

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
				Installed Value					
	C.I.F. Value (1)	Installed Value (2)	C.I.F. Value (3)	Estimate A (4)	Estimate B (5)	Estimate B in 1950 Dollars (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	n.a.		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	77.0	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



Data are scarcer in the pre 1950 period. The sources of estimates are ECLA and our own compilation (from Table A-16). Table A-17 presents some of these figures. The two deflated series agree reasonably well, and the author's series is converted into 1950 dollars to provide some comparability with the figures in Table A-15. The figures in Table A-17, however, are much below those in Table A-15 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 are reasonably accurate is still 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-18). Other measures of the degree of mechanization come from the various estimates of land cultivated with machinery.

The first estimate known to the author was that made by ECLA and based on figures for 1953. It is presented in Table 20. The estimates of numbers of different types of machines are probably reasonably accurate, although it is difficult to put a meaning on their calculations as to the degree of mechanization, since estimating the cultivated area which could be mechanized is difficult in the first place, and defining a line distinquishing mechanized and unmechanized cultivation also requires specificity. This is not so serious a problem in Table 20, since ECLA considers separately for each type of implement the amount of land on which that implement could be used.

TABLE A-16

Imports of Agricultural Machinery

Year	Author's Estimates: Tractors and Parts (c.i.f.) (Millions of Current Pesos)	Author's Estimates: Other Machinery Including Dairy (c.i.f.) (Millions of Current Pesos)	Author's Estimates: Total (c.i.f.) (Millions of Current Pesos)	Banco de la Republica's Estimates: Dollars c.i.f.	Banco de la Republica's Estimates: Total Imports c.i.f. (current pesos)	Estimates Installed Value of Imported Machinery (current pesos)
1935		844.9				
1936	512.5	353.6	866.1			
1937	746.0	884.3	1630.3			
1938	1997.9	675.9	2673.8			
1939	2239.6	692.5	2932.1			
1940	1271.1	549.0	1820.1			
1941	1318.0	640.3	1958.3			
1942	338.2	275.3	613.5			
1943	551.0	431.5	942.5			
1944	1547.7	535.6	2083.3			
1945	3350.0	823.9	4173.9			
1946	3512.0	1093.1	4605.1			
1947	6607.0	2920.3	9527.3			
1948	6060.0	3464.0	9524.0			
1949	10438.0	6419.8	16857.8			
1950	9159.0	9507.2	18666.2	9146.4	28.80[a]	49.55
1951	11069.0	7425.7	18494.7	7841.8		61.48
1952	12858.0	5803.5	18661.5	7427.3		36.09
1953	21907.0	5883.6	27790.6	11060.7		50.17
1954	33286.0	11563.0	44849.0	17849.9		74.38
1955						93.29
1956	45517.0	8127.3	53644.3	21350.4		82.81
1957	34152.0	9505.9	43657.9	11220.1		48.97
1958	42818.0	27140.6	69958.6	10913.5		100.91
1959	57740.0	29424.1	87164.1	13597.6		108.88
1960	82160.0	22891.5	105051.5	15757.7	103.85[b]	142.73
1961	86540.0	25634.9	112174.9	16714.1		125.02
1962	72540.0	42494.7	115034.7	16910.1		131.96
1963	22891.5	16602.2	118675.2			

[a] of which 20.6 was new machinery

[b] of which 99.08 was new machinery

Sources and Methodology for Table A-16

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.

TABLE A-17

Imports of Agricultural Machinery Before 1950 (All Values O.I.F.)

	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		23,868		93.7	
1952	20,344		20,467		99.4	
1953	29,054		29,054		100.0	

(continued on following page)

TABLE A-17, 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 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. ECLA assumed that the installed value of a machine was 43.84 per cent above its c.i.f. value.

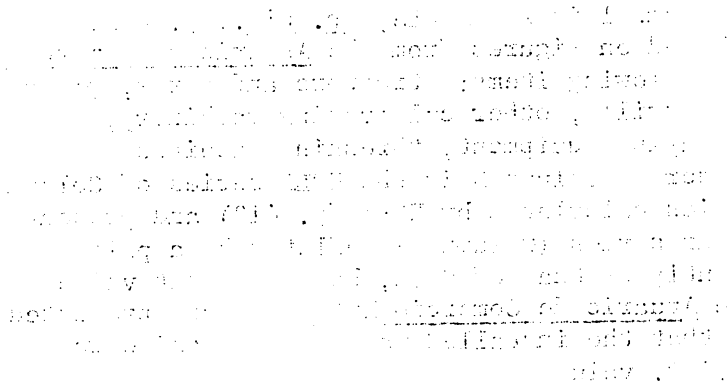


TABLE A-18

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-19.5

Summary of the Valuation of Agricultural Assets

(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.

TABLE A-20

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-20, 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-21

Cultivated Area, Tractor Density and Area Suitable for Mechanization, by Department

	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
Bolivar 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-21, 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.

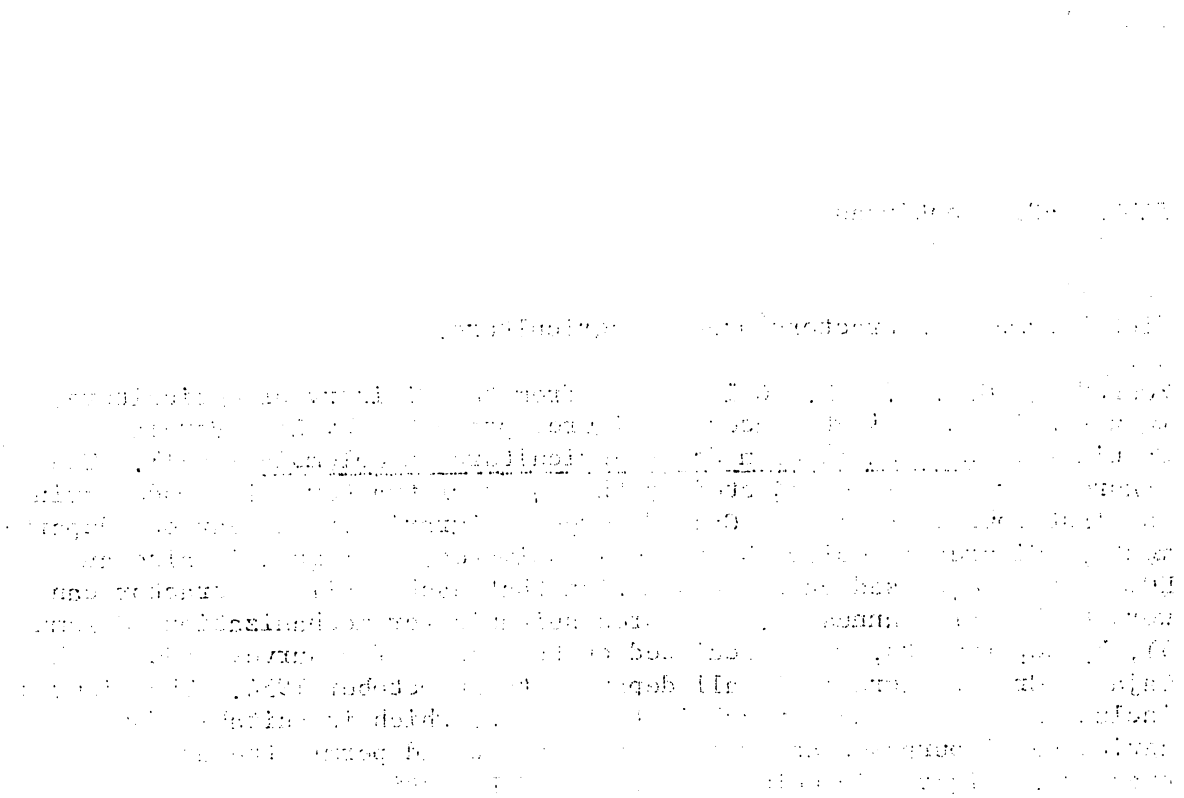


Table 21, also coming from ECLA presents mechanization ratios by departments, where the degree of mechanization is based on number of tractors available and on the assumption that each available tractor can work 80 hectares annually. The estimate of mechanizable land are based on a survey done by the Caja de Credito Agrario -- a study whose degree of precision is unknown to the author.

Table 22, from Lauchlin Currie's study, measure the degree of mechanization in the production of different crops. The line between mechanized and unmechanized production is again not precisely defined, as indeed it probably could not be, given the lack of relevant data.

Table 23 presents a conceptually more complete measure of the degree of mechanization, in that it links the value of all machinery to various other variables. Calculations of the value of machinery by department were carried out by the author on the basis of quantities of the different machines presented 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 Narino 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.

TABLE A-22

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-22, 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-23

Departmental Differences in the Degree of Mechanization

	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
Narino	.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: Table IV-1.

TABLE A-24

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

(continued on following page)

Table A-28

Importance of Renting in Large Crop Farms (40 hectares and up): Colombia

Farm Size in Hectares	Number of Farms									
	Total (1)	Crop Growing[1] (2)	Mixed[1] (3)	Agri-cultural and Mixed (4)	Rented (5)	More than One Form (6)	Rented and More than One Form (7)	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-28 (cont'd.)

Importance of Renting in Large Crop Farms (40 hectares and up): Colombia

Farm Size in Hectares	Rented Farms		Rented and More than One Farm
	Crop Farms (11)	Crop and Mixed (12)	Crop Growing (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	

SOURCE: Departmento Administrativo Nacional de Estadistica, Directorio de Explotaciones Agropecarias (Censo Agropecuria), 1960 Resumen Nacional (segunda parte).

[1]A farm as 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-29

Importance of Renting in Large Crop Farms (40 hectares and up): Tolima, 1959.

Farm Size in Hectares	Number of Farms by Type of Product				Number of Farms by Rental Arrangement					
	Total Farms (1)	Agricultural (2)	Mixed (3)	Agricultural and Mixed (4)	Rented (5)	More than one Form (6)	Rented and more than one Form (7)	Payment in Cash (8)	Share-Cropping (9)	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		Rented and More than One Farm
	Crop Farms (11)	Crop and Mixed Farms (12)	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	
2,500 and up	0.00	0	

SOURCE: Departamento Administrativo Nacional de Estadistica, Directorio de Explotaciones Agropecurias (Censo Agropecurian), 1960, Resumen Nacional (Segunde Porte).

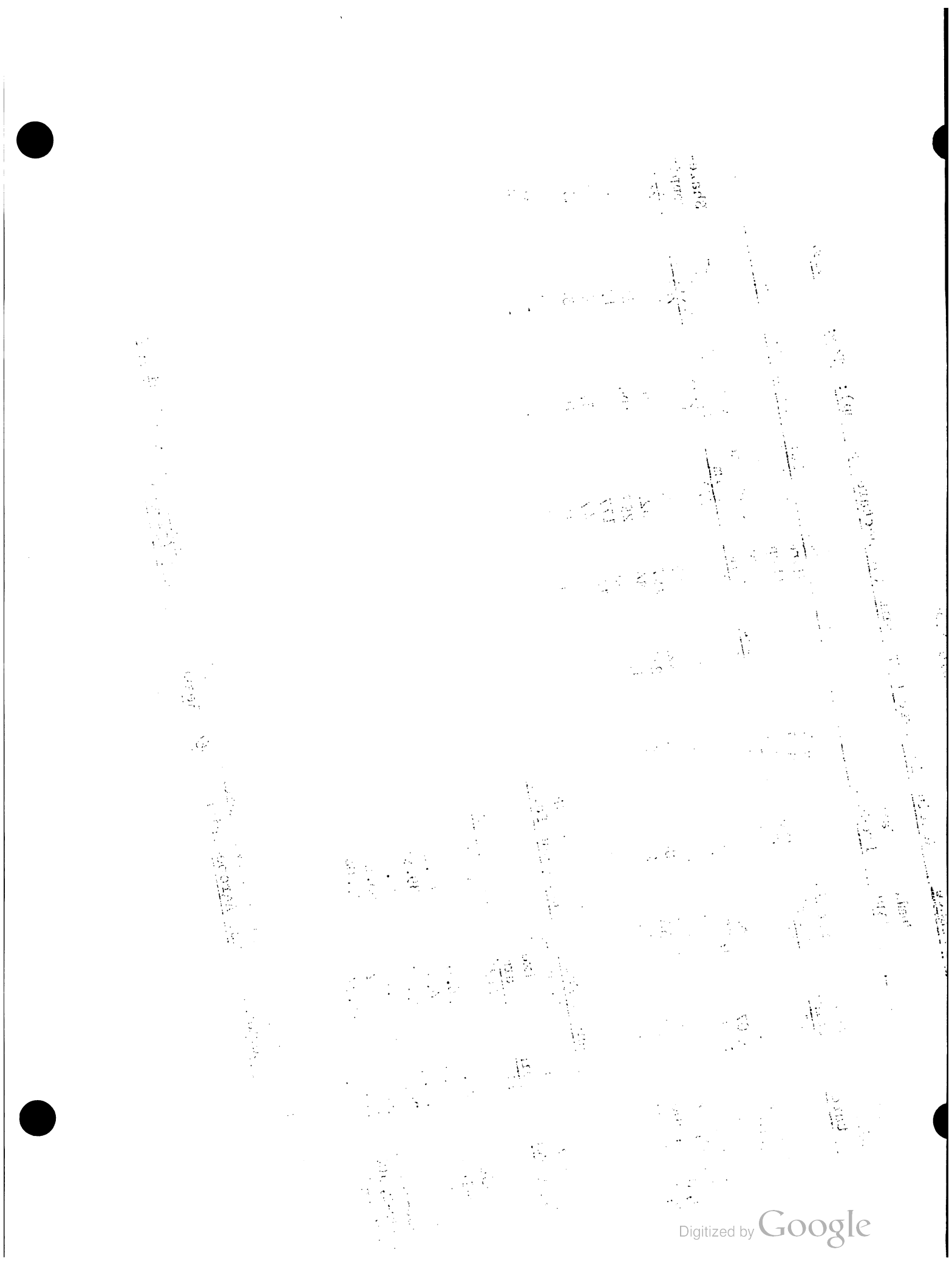


TABLE A-40

Land Tenure by Farm Size

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, p. 42.

TABLE A-41

Per Cent Distribution of Land by Size of Plot and Tenure Arrangement

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-41, 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: Agricultural Census of 1960, p. 42.

TABLE A-42

Distribution of Rural Plots by Size Groups,
According to Tax Breakdown

Farm 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-43

Number, Area and Assessed Value of the Assessed Plots by Size Groups[a]

Farm Size in Hectares	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	417,700	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.

SOURCE: INCORA, based on data from the Instituto Geográfico, "Agustin Codazzi", February 1963.

TABLE A-44

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

Farm Size in Hectares	Number by: Taxed Units[a]	Number by: Owners[b]	Area by: Taxed Units[a]	Area by: 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 on 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-50

Average Number of Hectares for Various Uses, by Size of Farm

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 A-51

Colombia: Land Use by Size of Farm and by Region

(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
T O T A L	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-60

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-60, 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-70

Area Planted to Different Crops According to Farm Size

Crop	Number of Farms and Farm Size (in hectares)									
	0-5		5-50		50-200		200 and up		Total	
	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-70.5

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 A-70.

TABLE A-71

Characteristics of Different Farm Sizes in Colombia: Per Cent Using Various Inputs

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-71, 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-72

Use of Tractors

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-75

Farm Size and Extent of Irrigation in Saldaña, Tolima

Farm Size in Hectares	Number of Farms Studied	Per Cent of Area Under Cultivation
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-96

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 per Farm		
	Per Farm		Per Plaza				Total Available Man-Days	Effectively Employed	
			Total		Cropped			Total Man-Days	Per Cent of Available Man-Days
	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.

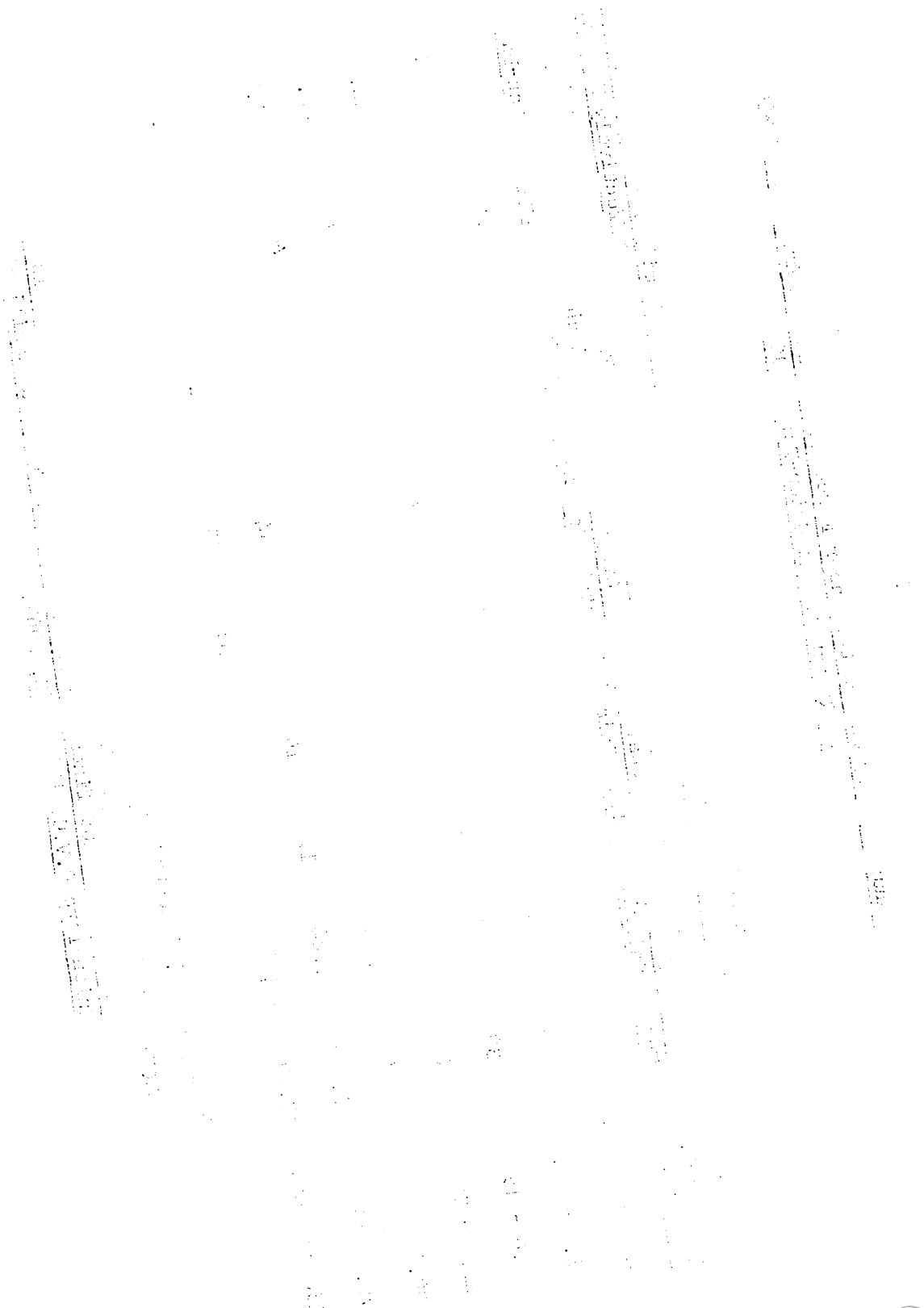


TABLE A-100

Annual Agricultural Real Wage Indices by Department, 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

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TABLE A-100, 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

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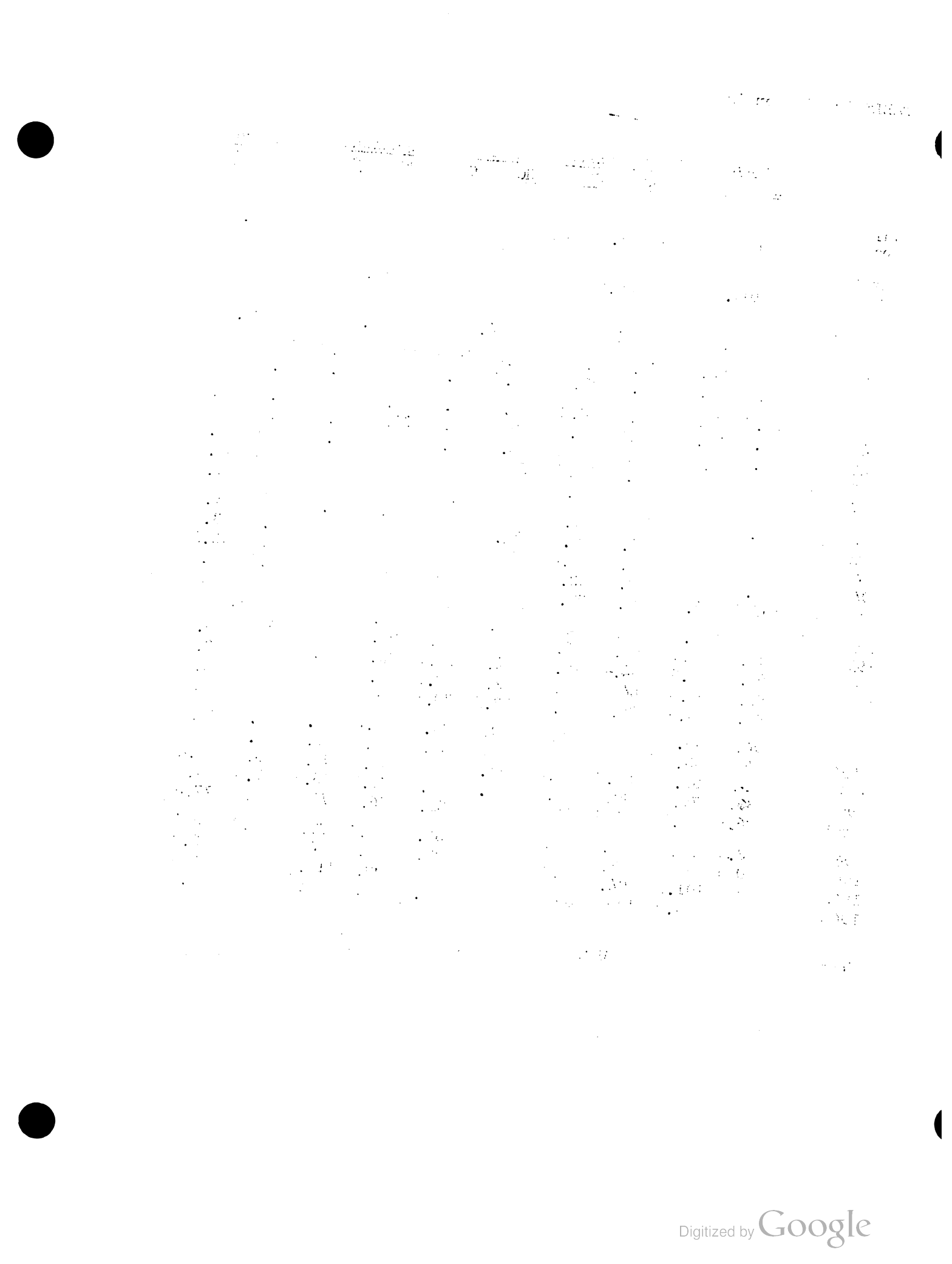

TABLE A-100, continued

	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	91.8	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	110.8	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	77.8	76.7	92.2	90.6	98.0	102.5	83.2	88.1
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	93.3
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-103

Rural Population Growth Rates (in percentage terms)

by Departments as Indicated by Census Returns

	1938-51	1951-64
Antiquia	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
Cundinamara	0.45	0.76
Choco	0.22	2.65
Huila	2.36	-1.35
Magdalena	1.47	653
Meta		
Narino	0.88	1.34
Nortedes	-0.27	1.06
Santander	0.42	0.96
Tolina	1.53	-0.47
Valle de 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-110

Price and Area Planted to Coffee

	Real Coffee Price	New Plantings (thousands of hectares)	Net Increase in Area, Annual Averages
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		21,[a] 50+[b]
1958	5.84	6.04	
1959	4.35		

(continued on following page)

TABLE A-110, 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.

This table must be revised in the light of more recent statistics.

Table A-112

Price and Output Statistics

Year	Output in Metric Tons of Pergamino Coffee (Central Bank Estimate)	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
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-112 (con'd.)

Year	Output in Metric Tons of Pergamino Coffee (Central Bank Estimate)	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 in New York (U.S. cents)	Index of Real Coffee Prices 1950=100
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	65.4	
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
1949		453.7	986	37.61	83.3
1950	412		1476	53.25	100.0
1951	452		1875	58.70	113.8
1952	504		2003	57.01	127.3
1953	507		2098	59.92	125.8
1954	-498		2836	79.93	151.5
1955	454		2472	64.57	134.2
1956	493		3270	73.97	171.6
1957	584		3640	63.94	162.7
1958	589		3501	52.34	137.2
1959	-620		2842	45.21	103.0
1960	563		3105	44.89	105.8
1961	619		3281	43.62	102.9
1962	587		3209	40.77	96.0
1963	588		3966	39.52	93.2
1964	629		4990	48.79	97.5
1965	594		5004	48.49	95.7

Sources and Methodology for Table A-112:

Column 1 presents estimates of output of gergamino 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 6 presents the current peso the 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 poind of Manizales coffee in U.S. cents in New York as given in Column 8 is reproduced from the Boletin de Informacione-Statistica Sobre Cafe, No. 41, 1967, published by the Federacion Nacional de Cafeteros de Colombia, page 4. Column 9 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-178

Coffee as a Percent of All Crop Output

Year	Value of Crops Output (Current Prices on the Farm	Value of Coffee (Current Prices)	Value of Coffee Output (Current Prices on the Farm	Value of Coffee/ Total Value of Crops	Value of Crops and Livestock	Value Added: Crops and Livestock (Current Market Prices)	Value Added in Crop Livestock and other (Current Market Prices)	Value of Crops and Livestock (Current Market Prices)	Value of Crops and Livestock (Current Market Prices)	Value of Coffee/ Value of Crops and Livestock (Current Prices)	Implicit Price Series for Value Added in the Agricultura Sector
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-178 (Continued)

Year	Value of Crops Output (Current Prices on the Farm	Value of Coffee (Current Prices)	Value of Coffee Output (Current Prices on the Farm	Value of Coffee/ Total Value of Crops	Value of Crops and Livestock	Value Added: Crops and Livestock (Current Market Prices)	Value Added in Crop Livestock and other (Current Market Prices)	Value of Crops and Livestock (Current Market Prices	Value of Crops and Livestock (Current Market Prices	Value of Coffee/ Value of Crops and Livestock (Current Prices	Implicit Price Series for Value Added in the Agricultural Sector
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-11S.

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-150

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-150, 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-150, continued

SOURCES AND METHODOLOGY: The figures on total registered exports excluding gold are based on figures from 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 ground that the gold exports which were 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 on the basis of the per cent distribution of exports listed in Wylie, op. cit., p. 154. The figures for gold production 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.

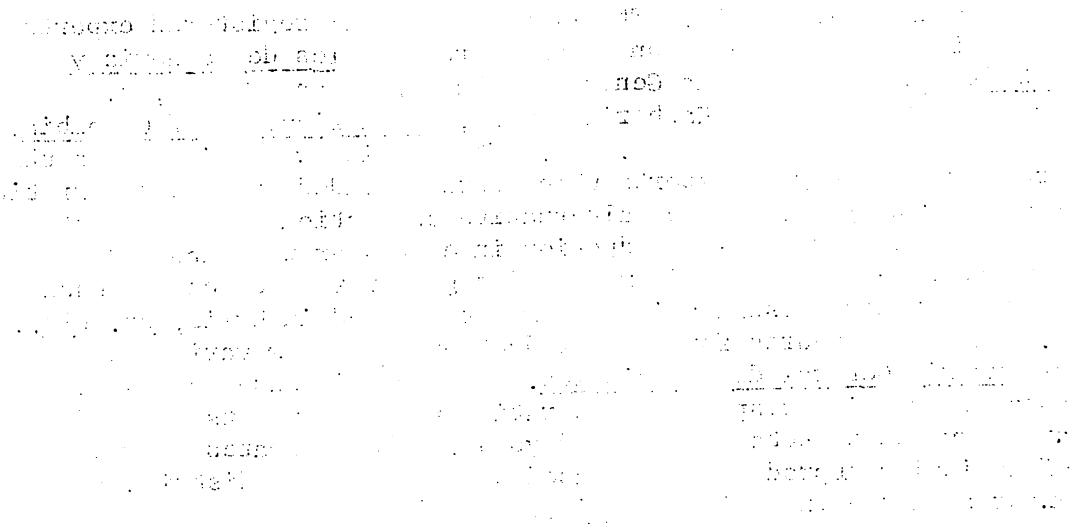

TABLE A-151

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-151:

Column (1) comes from the Anuario de Comercio Exterior. Gold exports were estimated by the author from the production figures, allowing for domestic consumption. Services figures were from ECLA estimates. (Column 5) is based on figures in the Anuario de Comercio Exterior.

TABLE A-152

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-152, 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-155

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 and 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-155 (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	2.257
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-155: 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-156

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	462.6	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-156 (continued)

Year	Food Imports/ Agricultural Imports (10)	Cereals (Including Malt and Other Simple Preparations (11)	Animal Based Products (12)	Cereal Imports/ Agricultural Imports (13)	Animal Based Imports/ Agricultural Imports (14)	Prepared Foods (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	.47[illegible]	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-156: Column 7 which corresponds conceptually (as closely as we could make it) to Column 7 of Table A-155 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-155. The figures in Table A-156 also include prepared food items, and as in the case of Table A-155, 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-156a

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									

TABLE A-~~182~~ 153

Colombia: Exports of Manufactured Products[1]
(Value FOB in thousands of U.S. dollars)

Industrial Origin of Export	1951	1952	1953	1954	1955	1956	1957
Food (Including Sugar)	8032.3	754.3	20.8	39.2	2386.7	5903.3	340.1
Beverages	2.1	0.2	0.1		0.4	1.4	
Tobacco	21.3	2.7	4.1	21.2		23.3	13.9
Textiles	172.3	169.6	796.4	1914.4	736.5	521.1	261.9
Footwear and Clothing	138.6	154.7	430.9	1951.6	477.4	193.3	231.6
Wood and Wooden Furniture	237.7	209.7	209.8	2027.0	731.5	1303.8	896.5
Pulp and Paper	1.6	1.6	1.2	2.5	0.8	5.7	3.8
Printing	24.2	31.1	19.0	15.4	8.7	5.7	20.1
Leather (Including Hides)	1043.4	943.2	1806.5	2455.7	1131.6	1634.2	942.4
Rubber	1.2	0.3	0.2	99.3	69.4	36.8	13.1
Chemicals	266.3	279.6	253.8	304.8	389.3	836.4	785.4
Petroleum Derivatives	56.4	147.6	342.9	796.6	3486.8	2786.8	4916.0
Products of Non-metallic Minerals (Cement and Others)	196.1	354.8	648.8	474.0	829.8	1321.3	966.3
Basic Metals (Including Platinum)	1724.1	2190.4	2219.6	1960.5	1979.8	2468.9	2053.5
Metal Products	47.7	22.0	28.5	114.8	173.3	436.0	385.1
Non-electric Machinery	236.7	117.8	132.0	265.2	708.8	1008.6	634.7
Electric Machinery and Apparatises	29.0	11.6	4.3	14.2	26.2	44.0	44.7
Transport Material	53.6	1.4		13.0	40.2	10.8	73.4
Other	43.4	68.2	71.1	93.1	103.5	332.8	183.7
Totals	12328.0	5460.8	6990.0	12562.5	13280.7	18874.2	12766.2

[1] Non-registered exports are excluded.

TABLE A-182 CONTINUED

Industrial Origin of Export	1958	1959	1960	1961	1962	1963	1964
Food (Including Sugar)	19.2	301.8	51.0	5352.1	7592.2	6815.3	4729.0
Beverages	0.7		0.9	0.7	22.6	81.0	26.3
Tobacco	16.9	43.9	22.0	21.2	19.2	43.1	34.0
Textiles	91.9	173.2	532.0	1475.8	4601.2	4785.8	8395.8
Footwear and Clothing	61.7	45.2	34.6	20.0	61.1	113.9	264.2
Wood and Wooden Furniture	1272.6	1361.2	2223.1	2343.7	2427.6	3475.8	4583.3
Pulp and Paper	12.7	18.2	10.2	11.7	9.3	50.1	147.9
Printing	13.8	32.1	22.0	83.1	268.6	335.6	601.7
Leather (Including Hides)	920.2	860.2	400.3	464.1	552.4	902.5	1637.1
Rubber	11.6	2.6	28.8	24.2	23.1	54.1	1160.8
Chemicals	1031.5	928.9	1400.3	1332.1	1203.2	2051.9	3614.5
Petroleum Derivatives	10134.8	8901.0	7755.6	6007.0	7453.7	4600.6	7871.2
Products of Non-metallic Minerals (Cement and Others)	1251.7	2348.3	2037.9	2458.8	2096.8	1935.5	3152.0
Basic Metals (Including Platinum)	1411.8	723.6	613.5	1509.0	1174.4	1692.2	2215.1
Metal Products	284.4	250.1	230.7	207.1	276.5	223.4	540.3
Non-electric Machinery	387.1	922.8	1848.8	1356.3	1012.1	1349.8	1670.9
Electric Machinery and Apparatises	11.3	20.3	62.9	57.0	61.6	96.1	64.6
Transport Material	80.9	18.7	16.8	607.3	31.8	215.1	107.4
Other	119.1	121.9	80.4	273.6	184.9	362.9	914.8
Totals	17133.9	17074.0	17410.3	23604.8	29072.2	29184.7	41730.9

Source: Figures for 1951-1960 come from the 10-year Plan (Plan General de Desassollo Economico y Social: Parte II, Industria, p. 10.). For subsequent years the estimates are the author's, based on the data in the Anuario de Comercio Exterior. An attempt was made to deduce the way the Plan classified various export items and to use this classification for subsequent years, for continuity. But, while my figures matched those of the Plan for 1959 and 1960, it cannot be guaranteed that the classification systems were identical.

TABLE A-190

Economically Active Population

By Number of Days Worked in February

And By Occupational Group and Sex

Occupational Group	Number of Days Worked in February: Less Than 7 Men	Less Than 7 Women	7 - 14 Men	7 - 14 Women	14 - 21 Men	14 - 21 Women	21 - 28 Men	21 - 28 Women	Total Men	Total Women
Professionals, Technicians and Similar	3.1	11.6	.3	---	.3	3.2	96.0	85.0	100	100
Managers and Administrators	2.1	---	---	---	---	---	98.0	100.0	100	100
Office Employees and Similar	8.1	5.4	---	1.6	.3	1.2	91.6	91.8	100	100
Sellers and Similar	5.2	6.7	.6	.6	1.9	.6	92.2	91.9	100	100
Operators of Transport Vehicles	6.6	---	.4	---	3.1	---	89.9	100.0	100	100
Factory Workers and Similar	8.4	9.7	1.0	.8	2.5	1.2	87.9	88.1	100	100
Manual Workers and Unspecified Day Laborers	18.5	16.6	.9	---	2.7	6.2	77.7	76.9	100	100
Service and Related Workers	5.6	4.3	.9	1.3	---	1.9	93.4	92.3	100	100
Total	7.1	6.2	.6	1.2	1.6	1.7	90.6	90.8	100	100

Source: Figures from Tables 34 and 35, Urrutia and Castellaños, op. cit.

Table A-191

Immigrant and Total Active Population of Bogota, by Economic Sector and by Sex, 1962

	Immigrants		
	Total	Men	Women
Agriculture, forestry, fishing and hunting	1,72	2,73	---
Manufacturing	20,69	23,64	15,63
Construction	4,60	7,28	---
Commerce	24,14	23,64	25,00
Transport, Communications and Storage	10,34	15,45	1,56
Services	25,29	14,55	43,75
Government	5,17	6,36	3,13
Armed Forces (including Police)	3,45	4,55	1,56
Other	1,15	0,91	1,56
No Information	3,45	0,91	7,81
Total	100,00	100,00	00,00

	Total Active Population		
	Total	Men	Women
Agriculture	1,5	2,2	0,2
Mining	0,2	0,3	0,1
Construction	6,2	9,9	0,3
Industry	21,6	25,2	15,7
Commerce	14,1	15,5	11,8
Finances and Insurance	2,8	3,5	1,7
Transport	5,0	7,8	0,5
Communication and Public Services	2,4	3,0	1,3
Services	38,2	22,2	64,3
Government and Armed Forces	7,0	9,2	3,4
Other	0,1	0,1	0,1
No Information	0,9	0,1	0,6
Total	100,0	100,0	100,0

Table A-192

Immigrant and Total Active Population of Bogota by Occupational Category and Sex, 1962

Panel A: Immigrants in Active Population

	Total	Men	Women
Professionals, technicians, and similar	7,47	10,10	3,13
Managers and Administrators	1,15	1,82	--
Office Employees and similar	18,39	16,36	21,88
Sellers and similar	22,42	19,09	28,12
Farmers, etc.	1,15	1,82	--
Operators of Transport Vehicles, etc.	9,20	12,73	3,13
Artisans, Factory Workers etc.	7,24	21,82	9,37
Other Artisans and similar	2,30	3,64	--
Manual Laborers	2,87	4,54	--
Services and related workers	14,94	3.64	34,37
Armed Forces (including police	2,87	4,54	--
Total	100,00	100,00	100,00

Panel B: Total Active Population

	Total	Men	Women
Professionals, technicians, and similar	8,42	10,40	5,22
Managers and Administrators	5,05	7,32	1,36
Office Employees and similar	13,99	13,11	13,43
Sellers and similar	10,40	11,20	9,08
Farmers, etc.	1,43	2,27	0,06
Mine Workers	0,02	0,04	--
Operators of Transport Vehicles, etc.	4,96	7,98	0,06
Artisans, Factory Workers, etc.	27,38	35,67	13,95
Manual Laborers	3,26	3,70	2,55
Services and related workers	22,21	3,95	51,81
Armed Forces (including police)	1,97	3,18	--
Professionals not identified	0,32	0,48	0,06
No information	0,59	0,70	0,42
Total	100,00	100,00	100,00

Table A-196

Monthly Earnings of Families in Three Barranquilla Barrios[1] in Late 1963 and Employed Blue Collar Workers Sampled in the 1953 Consumer Survey

	Corresponding Income[2] Category in Pesos of 4th Quarter of 1963	Monthly Family Incomes of Blue Collar Workers (1953 pesos)	Per Cent of Families	Families #	Families %	Income pesos of 4th Quarter 1963
				26	11.4	0-200
				72	31.7	201-400
100-199	253-505	35	15.9			
				70	39.8	401-600
200-299	505-758	62	28.2			
				29	12.8	601-800
300-399	758-1011	63	28.7	15	6.6	801-1000
400-499	1011-1264	32	14.6			
				15	6.6	1001 & up
500-599	1264-1516	16				
600-699	1516-1769	5	2.3			
700-799	1769-2022	3	1.4			
800-899	2022-2274	2	0.9			
900-999	2274-2530	1	0.5			
1000 and up	2530 & up	1	0.5			
		220		227		

1. The barrios were Corrijal, El Bosque, and Santa Domingo.
2. The corresponding income categories for 1963 were calculated using the Barranquilla blue collar cost of living series increase between 1953 (year average) and last quarter of 1963.

Source: Blue Collar 1953 Earnings from DANE, Economia y Estadistica #85.

TABLE A-197

Occupational Mobility of Migrants[a]

Occupations	(1) Occupation in place of birth %	(2) Occupation in second place of residence %	Difference (2) - (1) %	(3) First occupation in Bogotá %	Difference (3) - (1) %
Office employees	1.46	5.65	4.19	8.50	7.04
Professionals and technicians		4.84	4.84	2.95	2.95
Sellers	1.70	4.84	3.14	10.68	8.98
Farmers	8.00	8.06	0.06	0.73	-7.27
Vehicle operators	0.49		-0.49	3.88	3.39
Artisans and blue collar workers	2.67	7.26	4.59	10.68	8.01
Personal service workers	2.67	5.65	2.98	9.95	7.28
Students	33.98	24.19	-9.79	20.63	-13.35
Housewives	22.33	23.38	1.05	22.09	-0.24
Other[b]	25.97	16.13	-9.84	9.71	-16.26
No information	0.73		-0.73	0.24	-0.49
Totals	100.00	100.00		100.00	

[a]Columns (1) and (3) include the total of the immigrants and column (2) only the indirect ones.

[b]This category includes primarily minors.

Source: Marco F. Reyes Carmona, "Estudio Socio-Económico del Fenomeno de la Immigration a Bogotá," Economia Colombiana, p. 8.