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LAND REFORM AND PRODUCTIVITY: THE MEXICAN CASE, ANALYSIS OF CENSUS DATA*

by

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LAND REFORM AND PRODUCTIVITY: THE MEXICAN CASE, ANALYSIS OF CENSUS DATA

Folke Dovring

The ongoing debate about land reform in Latin America often uses the experience of Mexico as an argument for or against reform in other countries. The debate has been ambivalent to a high degree; both sides of the controversy have believed that Mexican experience would support their standpoint. Against the socio-political argument for the liberation of the rural masses from quasi-bondage, many economists have maintained that land reform sometimes has adverse effects on agricultural production and productivity. The Mexican case is cited time and again to support contentions of this kind.

Part of the difficulty of this controversy resides in the fact that agricultural production data from Mexico with specific reference to the principal categories of farms are obtained only at intervals of ten years, through the censuses of agriculture. For several years now, the debate has repeated arguments drawn from the 1950 census and comparisons with the 1940 census. In addition, spot reports and personal impressions have been used to suggest one standpoint or the other, despite the lack of comprehensive information. Recently, however, the summary of the 1960 census was published.[1] It offers a welcome addition to the scarce documentation.

In the following discussion, we will analyze some of the data in the 1960 census and tie them in with those of the preceding censuses and some other information in order to prepare the ground for an up-to-date judgment on the economic consequences of Mexican land reform. The present analysis is preliminary, and the results are presented in broad features. We hope that more detailed analysis will be possible so as to further refine the results.

[1] IV censo agrícola ganadero y ejidal, 1960. Resumen general (Mexico, D. F.: Dirección General de Estadística, 1965).

ıd reform and the resulting farm structure

Land reform in Mexico came as a result of the :al revolution of half a century ago, but it was not ented all at once. For more than a decade, there was more than token activity under the land reform law. E the changes in ownership took place between 1927 39; the bulk of the activity belongs to the 1930s, ite a large part even happened after 1935. The of 1940 marks a point where most but not yet all of ıd transfers had taken place. Since 1950 some : changes have occurred in the farm-holding structure country in pursuance of the land reform, at the same s the size structure of private farms has continued ıge.

Most of the land distribution consisted in assigning more or less contiguous land tracts to communal :y known as ejido. In addition, some of the land measures led to the creation of small holdings in e ownership. Number of holdings and land areas are in Table 1.

The property of the ejidos is joint for the ship, but collective farming is the exception. In ɔnly 2 percent of the 1.6 million ejido members were zed in "productive cooperatives" in crop growing and husbandry (mostly the latter). The situation was r both in 1940 and 1950. Many ejido members are d in other forms of cooperation (credit, procurement, ing) while doing their farm work individually. The ajority of ejido members are individual small-scale ers, enjoying de facto tenure to individual pieces of land. The main peculiarity of the situation is that land cannot be sold or mortgaged, and the members are ɔre denied one of the most common sources of ltural credit. Cooperative credit banks endeavor to ıe gap; with what degree of success or failure would interesting lesson to learn, if the data could be nequivocal both as to the need for credit and as to gree to which that need is being filled.

Individual holdings of ejido members are small but they are not all parvifundia. On the average, are about 27 hectares of land per ejido member, of close to 7 hectares are cropland. Fifteen percent of mbers belong to ejidos where there are more than 10 es of cropland per member. Many ejido members ate land that they own as private property or lease civate landowners. Some ejido members employ hired

Table 1. Number of Holdings and Their Total and Cropland Area, According to Censuses of Agriculture (Areas in Million Hectares)

Sector	1930	1940	1950	1960
		Number of holdings		
Over 5 hectares	277,473	290,336	360,798	447,334
5 hectares and under	576,588	928,593	1,004,835	899,108
Ejidos	4,189	14,680	17,579	18,699
		Total holding area		
Over 5 hectares	122.4	98.7	105.3	123.3
5 hectares and under	0.9	1.2	1.3	1.3
Ejidos	8.3	28.9	38.9	44.5
Total	131.6	128.7	145.5	169.1
		Cropland area		
Over 5 hectares	12.1	6.8	9.9	12.2
5 hectares and under	0.7	1.1	1.2	1.3
Ejidos	1.9	7.0	8.8	10.3
Total	14.6	14.9	19.9	23.8

labor. The scatter of holdings around the mean appears to be far less wide among the holdings of ejido members than among private farms--in other words, there is more distributive equity within the ejido sector than within the private sector, as would be expected from the purpose and nature of land reform.

Private farms in Mexico are still the dominant part of the country's agriculture. Among them, the size distribution is still rather extreme, with a wide scatter around the mean, as in most Latin American countries. This is gradually changing, however. As shown on Table 1, the parvifundia of 5 hectares or under have begun to decline in numbers in recent time. More important, the number of private farms over 5 hectares has increased far more rapidly than their area, which means that their average size is declining. All of this change is not merely a

response to the land reform or to the risk of its continuation or resumption. Data on farms classified by size show quite clearly that the medium-sized farms are increasing in importance in the country, while the largest and the smallest sizes (under 5 hectares) are increasing more slowly than total farm number. This means also, of course, a gradual increase in distributive equity (a "concentration toward the center," as was experienced in Europe in the early half of this century).

Large farms are important in Mexican agriculture, but they do not dominate it. A table on farms classified by size of their cropland area (Table 4, pp. 25 sqq.) in the 1960 census shows that among privately owned farms over 5 hectares in size, nearly one-third of the cropland is in farms with 50 hectares or less of cropland area and two-thirds in farms above that size. The latter two-thirds, or 9 million hectares, represents not much more than one-third of all the cropland in Mexico. The large farms' share in pastures and forests is far greater, however. The large pasture holdings were generally exempt from reform measures. The large farms were also allowed to retain acreage up to certain relatively generous maximum farm sizes (depending on land use type). In areas where ejidos could not claim all excess acreage, the large farms also retained more than the specific maximum acreage--sometimes all they had to begin with.

Ejidos were created above all where the population was dense. Private farms therefore retained most of the land in the most sparsely settled areas of the country. This arrangement naturally left them with the lion's share not only of pastures and forests, but also of the nation's virgin land resources. The 1940 census included data on areas that could easily be converted into cropland--5.6 million hectares on private farms and 2.4 million on ejidos. Since then some cropland has been taken from private farms and added to the ejidos, and both ejidos and private farms have gained access to land not previously in farms. The increase in cropland on ejidos (of less than 50 percent, 1940-60) was thus due in part to transfer from private farms and in part to new land clearing, some of which is in entirely new settlements. The increase in cropland on private farms over 5 hectares (nearly doubling 1940-60) reflects land clearing, some of which was possibly on land not previously included in farms; at the same time there have been some offsetting losses of cropland transferred to ejidos.

The larger share in virgin land also explains why private farms now have a larger share in the irrigated land of the country than the ejidos (2 million hectares against 1.4 million). In 1940, 1.7 million hectares of irrigated land were divided into 0.6 million on private farms over 5 hectares, 1 million on ejidos, and 0.1 million on private farms under 5 hectares. Some of the initial situation of virgin lands still appears to exist. Some data in the 1960 census, referring to areas that might be cleared for cultivation (Table 22:2, pp. 143 sqq., last column, and Table 25, pp. 154 sqq.), indicate that the privately owned farms over 5 hectares still have the larger part of the room for expansion.

The increase in production

Agricultural production in Mexico has risen rapidly in recent decades. Table 2 shows data from FAO index numbers; the two series of index numbers have been "linked" by a summary procedure to show the rate of increase over the whole period.[2]

Table 2. FAO Indices of Agricultural Production, 1934/38 to 1964/65, Countries in Latin America for Which Long-Term Series Are Available

Country	Average 1952/56 (index base 1934/38 = 100)	Average 1962/64 (index base 1952/53-1956/57 = 100)	Average 1962/64 (index base 1934/38 = 100)[a]
Argentina	111	115	128
Brazil	138	152	210
Chile	133	123	164
Colombia	179	132	236
Cuba	147	104	153
Mexico	190	165	314
Peru	151	134	202
Uruguay	138	98	135

[a]Linked index.

[2]The FAO index numbers were used because they cover the entire period since 1934/38. For other long-term indices of Mexican agricultural output (not directly comparable with those of FAO or of other countries), see

The index numbers give Mexico a special place in Latin America and indeed in the world. The trebling of gross production (or net output) in less than three decades represents an exceptionally high rate of long-term growth. It would be difficult to show any other country, with acceptable agricultural statistics, that has maintained a similar rate of growth over a comparable stretch of years in modern time.

For the census years 1950 and 1960, the FAO indices are 148 and 281, respectively. When indices of gross output are computed from census data, as will be discussed in the following section, 1950 gets an index of 165 (over the 1940 level) and 1960 an index of 256. The differences are not important for the discussion to follow.

Part of the background of these high rates of increase is the relative standstill in agricultural production in the preceding period. It has been said and repeated many times that land reform in Mexico was accompanied by a fall in agricultural output. The index base, 1934/38, could thus represent an abnormally low level from which it was relatively easy to rise fast.[3] It is, however, doubtful whether the period 1925-39 did, in fact, witness any real fall in agricultural production. Declines in some crops were offset by increases in others. Possibly there was stagnation, and possibly there was a slow change upwards or downwards that is difficult to establish with certainty.

E. Vargas Torres, "El producto y la productividad agrícolas," El Trimestre Ecónomico No. 126 (April-June, 1965), pp. 265 sq., and N. L. Whetten, Rural Mexico (Chicago: Chicago University Press, 1948), p. 255.

[3]It has been noted that the base period for the older series of FAO index numbers was a period of depressed economic conditions in many parts of the world, and especially for agriculture, although generally for reasons different from those in Mexico. Indices based on 1934-38 may therefore give a somewhat exaggerated rate of increase in certain other countries besides Mexico. It is, in fact, uncertain whether there was any decline in agricultural production in Mexico even in the period when the land reform activity was at its height. The indices quoted in Whetten, op. cit., do not show such decline. Whether the decline associated with the revolution was real remains uncertain because of the way in which the index was computed. See revisions of pre-revolution statistics in

A gross output index by categories of farms

For the purpose of the present inquiry, agricultural production as recorded in the censuses of 1940, 1950, and 1960 was weighted by uniform prices to eliminate the effect of currency inflation as well as of changes in relative prices. These price weights are the average producer prices shown in the 1960 census. The price-weighted quantities of crops and animal products were computed separately for the three categories of farms for which the data are available.[4] Expressed as index numbers, they are shown in Table 3.

These indices differ from those of FAO in several respects. The output quantities do not include the sale of live animals or the slaughter of meat animals on the farms, because comparable data by categories of farms are available only in the 1960 census. Excluded also are the products collected from wild growth on uncultivated land, as well as forest products, both of which are shown in the censuses but lack relevance for the present purpose. Further, the index numbers shown in Table 3 make no allowance for deduction of feed, seed, and waste, all of which are netted out in the FAO indices.

These omissions and simplifications are less significant for a comparison between categories of farms over two decades than they would be for comparisons between countries as well as for studies over even longer periods. From the land-use data it is evident that the private farms over 5 hectares control by far the largest areas of pastures as well as forests in Mexico. Their dominant position in the sale of live animals, as evidenced by the 1960 census, therefore does not tell anything about the efficiency of one sector or the other. In animal

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Fernando Rosenzweig (ed.), Estadísticas económicas del Porfiriato. Fuerza de trabajo y actividad económica por sectores (El Colegio de México, no date, 1963 or later).

[4] On details of weighting, etc., see D. E. Horton, "Land Reform and Agricultural Growth in Mexico" (unpublished M.S. thesis, University of Illinois, 1967), pp. 70 sqq. 1960 census prices are used here, a technique minimizing the rate of increase of productivity.

production as defined in the censuses (mainly cows' milk), the large pasture heritage of the private farms over 5 hectares may also give them more of a lead in total output and its rate of increase than would follow from any analysis of efficiency of resource use. It is in crop production that the most meaningful comparisons can be made between the sectors.

Table 3. Indices of Gross Output of Crops and Animal Products, 1960 Over 1950 and 1940, and 1950 Over 1940, by Main Categories of Farms

Category of farms	1 Crop production	2 Animal products[a]	3 Total of 1 + 2
	1960 over 1940		
Over 5 hectares	323	531	364
5 hectares and under[b]	168	135	142
Ejidos	223	176	210
Total	262	237	256
	1960 over 1950		
Over 5 hectares	166	253	184
5 hectares and under[b]	112	87	93
Ejidos	170	105	154
Total	163	137	155
	1950 over 1940		
Over 5 hectares	195	210	198
5 hectares and under[b]	150	155	152
Ejidos	131	168	136
Total	161	173	165

[a] Animal products do not include sales of live animals or village slaughter, for which comparable data by farm categories are lacking; they do include milk and milk products, wool, eggs, honey, and wax.

[b] Including backyard production ("en las poblaciones") of animal products that in the 1940 census cannot be separated from production on farms of 5 hectares and under.

From the first part of the table, we see that, over the 20 years, total output (as defined in the table) increased 2 1/2 times; the output of ejidos doubled, while that of private farms over 5 hectares increased more than 3 1/2 times. The differences are even more pronounced in animal production, but somewhat less so in crop production. The data come into even sharper contrast when the separate indices for the two decades are considered. Between 1940 and 1950, private farms over 5 hectares nearly doubled their crop output, while the ejidos registered only a modest increase. In animal production the difference in rate of increase was much smaller. For the period 1950-60, the reverse is true: the rate of increase in crop production was nearly the same on ejidos and farms over 5 hectares, while the latter had almost all of the increase in animal production.

The small farms of 5 hectares and under made all of their progress in the first decade. In the second decade, their animal production even declined, but the decline occurred in backyard production rather than on the small farms themselves, and that also explains the slight decline in total production on the small farms over the second decade.

Some light can be shed on these differences by analyzing the data by main types of production. If permanent crops are kept separate from crops on arable land, then the ejidos registered a rate of gain in permanent crops in the first decade that differed less from that of the farms over 5 hectares than was true of total crops; and in the second decade the rate was actually higher than on the larger farms. For the whole period, the rate of gain in permanent crops was about the same for the two sectors, but the total gain was smaller on the ejidos, because the farms over 5 hectares came out of the land reform with the largest part of both coffee, banana, and other fruit plantations as well as of the pulque agaves.

This point leads to the question of efficiency of land use as well as the spiny one of the intrinsic productivity of the land in ejidos and in private farms. On the latter point we know nothing in principle except that the private farms have higher rates of fallowing (which might show lower soil productivity, but also might show lower intensity of land use) and a higher incidence of irrigation (a definite advantage), while the ejidos have a higher incidence of crop losses through frost, drought, flood, and other natural calamities, which might indicate lower natural productivity of their land (but might also indicate more intensive land use).

Some crude indication of the efficiency of land use can be obtained from yield and output values per area unit. Table 4 shows some data on output values per hectare.[5]

Table 4. Value of Gross Crop Output, at 1960 (Census) Prices, of Selected Classes of Crops, by Main Categories of Farms. Data in Pesos per Hectare

Categories of farms	1 Crops on arable land	2 Fruit crops	3 Agaves for alcoholic beverages	4 Agaves for fibers	5 Total 1 + 2 + 3 + 4
			1960		
Over 5 hectares	476	2,920	4,332	1,286	609
5 hectares and under	507	2,818	a	a	635
Ejidos	478	2,736	3,080	1,279	558
Total	488	2,857	3,974	1,281	588
			1950		
Over 5 hectares	379	2,527	3,726	1,370	467
Ejidos	348	2,037	677	883	388
			1940		
Over 5 hectares	243	2,815	762	2,475	340
Ejidos	318	2,250	1,431	1,402	366

[a]Small numbers.

It is striking how much more the aggregate value output of ejido land appears to lag behind that of private farms in the total than in the specific columns. In rate of output from arable land, the sectors were about equal in

[5]Other indicators of gross output per hectare are given in Vargas Torres, op. cit., p. 257. As these data relate to area harvested (rather than total cropland) and to 1950 prices, they are not comparable with those in Table 4. They indicate a doubling of per-hectare output over nearly two decades. See also Horton, op. cit., Table 16.

1960 and also had similar outputs in fiber agaves. The value of alcohol output per acre is so much higher that a consolidated group, "all agaves," would have shown the ejidos with a lower value. Behind these differences are the historical facts that most of the alcohol agave groves, and hence also probably the best ones, are on the private farms, while the fiber agaves, almost exclusively located in the state of Yucatán, are mainly concentrated in the ejidos. These fiber-agave lands can, for geographical reasons, hardly be used in any other way. This example shows how the natural endowment of the land may decide the relative levels of productivity that are attainable or that have been attained at a certain date. Similar observations can be made about fruit crops. For instance, if wine grapes, one of the crops with the highest per-acre value of output, were separated from the rest, the differences in per-acre output between private farms and ejidos would diminish; still other regroupings of the material, to create even more homogeneous strata, would further reduce the differences in per-acre output. Among other things, one might investigate the proportions between bearing and non-bearing trees, which would affect certain averages and their proportions between sectors.

The upper part of the table thus removes a long-standing contention among the critics of Mexican land reform: that ejidos have lower yields than private farms. The 1960 census does not bear out this contention, which has its main source in the 1950 census; but then the opposite conclusion would have been drawn if the 1940 census had been the only source of information. In any event, the data do appear to confirm the conclusion that the ejidos failed to increase their yields between 1940 and 1950, but took up the slack between 1950 and 1960. Both of these statements are over-simplified, however. Data on the yields of individual crops tell a partly different story. Table 5 shows the per-hectare yield of the eight leading crops (those with the highest aggregate output value according to the 1960 census), listed from left to right in descending order of aggregate output value.

These yield data underscore some of the conclusions from the preceding table and supply some further detail. In 1960, as shown by these and other yield data in the 1960 census, there was no clear tendency for either sector to have higher hectare yields. Corn and cotton yields were practically the same on ejidos as on private farms over 5 hectares. Yields of some other crops, such as wheat, were higher on private farms than on ejidos; these crops were usually the same ones that on the private farms had a high

Table 5. Yield per Hectare (of Area Harvested of Each Crop) of Selected Crops, 1940, 1950, and 1960, by Main Categories of Farms. Yield Data in Kilograms per Hectare, Except Where Otherwise Indicated

Categories of farms	1 Corn[a]	2 Cotton[b]	3 Coffee[c]	4 Wheat	5 Beans[d]	6 Sugar cane[e]	7 Henequen[f]	8 Bananas[g]
				1960				
Over 5 hectares	839	1,378	1,588	1,522	559	44,879	44.6	6,454
5 hectares and under	846	1,473	1,348	1,137	830	48,271	[h]	6,367
Ejidos	842	1,380	1,375	1,066	554	48,630	45.0	6,739
Total	841	1,379	1,497	1,341	565	46,848	44.7	6,604
				1950				
Over 5 hectares	855	999	1,439	1,093	427	67,127	47.2	6,719
Ejidos	741	889	1,386	816	352	52,122	39.0	4,724
				1940				
Over 5 hectares	624	919	474[c]	828	417	32,789	949[f]	4,509
Ejidos	692	705	321[c]	738	450	49,298	733[f]	4,796

[a] Common corn grown alone.
[b] Raw cotton.
[c] Coffee in the pulp, 1960 and 1950; clean beans, 1940.
[d] Beans grown alone.
[e] "Plantilla" (first-year crop).
[f] Data in 1,000 raw leaves, 1960 and 1950; in kilograms, 1940. Yields of areas under exploitation, not harvested areas.
[g] All varieties.
[h] Small numbers.

percentage of their harvested acreage under irrigation. When the ejidos had higher yields, as in sugar cane ("plantilla"), they sometimes (but not always) also had a higher proportion of their harvested area under irrigation. In some tree crops, the differences in hectare yield were accounted for by the proportions between bearing and non-bearing trees, as in coffee, where the yield per bearing tree was almost exactly the same on the three categories of farms.

As the data stand, they give no clear indication of any significant difference in crop yields between the ejidos and private farms over 5 hectares. Private farms under 5 hectares had higher yields in several crops, indicating more intensive tillage.

The data from the 1950 and 1940 censuses partly contradict those from the preceding table because they show that the yields of several crops did increase also on the ejidos. The proportions between yields of individual crops on the ejidos and on private farms are not always fully consistent with the tendencies indicated by the aggregate yield figures shown in Table 4. The apparent contradiction has, of course, to do with the changes in the composition of the total crop basket. They bring to mind the fact that comprehensive data (as in Table 4) are more conclusive than selected examples, even important ones, as in Table 5. These figures also give reason to warn against overstressing the significance of data referring to single years (see, for instance, the yields of sugar cane in 1950 compared with the other two years).

The higher level of yields of some crops on the ejidos in 1940 than on private farms requires some comment. First, the entire output according to the 1940 census is so much higher than that shown in the annual returns from the late 1930's that these annual returns must have underestimated the output to some extent. Even so, the yield levels according to the 1940 census can be logically explained. The private sector was obviously depressed in 1940. Ongoing land reform in the thirties, and the consequent uncertainty of many landowners about how much land they could count on to retain must have acted as a deterrent against normal production. With the reduction in the land reform activity in the 1940's, the large farms were able to recover relatively rapidly from their depressed state, hence the high increase in output rate in the 1940's. The ejidos, by contrast, were not in a depressed state in 1940. In each locality, the establishment of a landed ejido provided full security of tenure from that date, and

hence adequate incentive to produce "to capacity" by the standards of the period. The estates that became ejido lands may also have experienced a "land reform period slack" at some time or other during the 1920's and 1930's, but by 1940 the established ejidos had already picked up this slack, causing the output rate to slow down during the 1940's.

The continued rapid rise in level of output during the 1950's and after, with much the same rate of increase in the crop sector on the ejidos and private farms, reflects the steady rise in demand from the flourishing urban sector and not-too-unfavorable export markets.

Some explanatory factors

The rapid development of Mexican agriculture since the close of the land reform, and the apparent differences in performance of its main categories of farms, have usually been explained by reference to factors believed to be particularly significant on large private farms: improved seed (especially of corn and wheat), chemical fertilizers, machines and mechanical power, in addition to the obvious ones of expanded cropland and expanded irrigation. We can scrutinize these factors one by one.

Hybrid corn? The Rockefeller Foundation has sponsored and financed research on corn varieties to produce improved strains adapted to Mexican conditions. The results may have made some impact in the form of rapidly rising corn yields in the years since 1960. Until 1960 the impact was small, however. In the 1960 census, improved corn varieties accounted for 8 percent of the corn production of the country, which was less than 1 1/2 percent of all the crop and livestock output. Hybrid seed as such can be credited only with the increment of yield over and above the level of common or indigenous corn. The yield proportion was about 1:1.75 in 1960, and hence 3/7 part of the hybrid corn output was incremental, or about 2/3 percent of the national agricultural output. Nearly half of this amount was grown on the ejidos.

Improved wheat strains? Wheat production in 1960 accounted for close to 4 1/2 percent of all agricultural output; of this proportion, 30 percent was produced on the ejidos. The 1940 census reported a wheat crop close to 35 percent of that of 1960. The importance of irrigation in the level of wheat yields was mentioned above; the importance of expanded hectarage should also not be

orgotten. Incremental yield due to improved varieties robably accounts for less than 1 percent of the national gricultural output.

Chemical fertilizers? Mexico has in recent years chieved a relatively high application rate for nitrogen ertilizers and much lower ones for phosphate and potash. bout 13 percent of the cropped area received chemical ertilizers in 1959. A table of expenditures in the 1960 ensus (Table 20, pp. 128 sqq.) shows that private farms ver 5 hectares spent three times as much on fertilizers as id the ejidos, and more than twice as much on pesticides nd herbicides. And yet there is no appreciable difference n the level of crop yields!

Machines and power traction? The use of many kinds f machines has been expanding rapidly in recent years, but s yet not even the large farms are anywhere near to being ighly mechanized. In 1960 Mexico had 55 thousand tractors, early a million draft horses, over 800 thousand mules, and 2/3 million draft cattle. Private farms above 5 hectares ad over 43 thousand tractors and still over a million raft animals.[6] The proportion of the value of machinery apital to livestock inventory is about 1:4 in Mexico as a hole and is 1:3 on private farms over 5 hectares. In the nited States, with a relatively more prominent animal ndustry, the proportion is close to 2:1. Power traction nd other mechanical means of cultivation have probably een significant in clearing certain areas for cultivation nd in keeping them in profitable production; but by no tretch of the imagination can they be considered a rincipal factor in the agricultural development of Mexico p to 1960.

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[6]This number represents a rise from the 1950 ensus. More precisely, the numbers of draft cattle have ecreased somewhat, both on farms over 5 hectares and on he ejidos, but in both sectors the increase in horses and ules offset this decrease. The data in the 1940 census re not fully comparable with those of the 1950 census, but y inference we can conclude that all kinds of draft nimals increased between 1940 and 1950 both on the ejidos nd on private farms over 5 hectares; for draft cattle, omparable figures are at hand to prove that they ncreased from 1940 to 1950.

All of this only further underscores the fact that until 1960 the basic factors of agricultural development in Mexico were land clearance, new irrigation systems, and intensification of farming. Intensification has been the main key to the capacity of the ejido sector to keep up with the general development. Excess manpower was put to work there to till the land more intensively and to apply higher value crops to larger parts of the total cropland.

One aspect of intensification that is evident mainly on private farms is the expansion of milk production, the main item of growth in animal product output.[7] That the expansion of animal production took this main direction is of course a consequence of the demand structure within the country. That the private farms achieved most of this expansion is logical, since they have most of the pasture lands and may have had somewhat less need to put every cultivable piece of land under the plough than did the ejidos. The development of the dairy industry may hypothetically be connected also with the decreasing average size of the private farms: in other countries, dairy farming is mainly an enterprise for smaller and medium-sized farms; if this were also true in Mexico, it would be further evidence of the usefulness of smaller farm sizes in the early phases of economic development.

Farm population and labor force

Throughout the period since the land reform, farm population and labor force in Mexico have continued to increase. Table 6 shows some data from the censuses of population.

Table 6. Male Workers, 12 Years of Age and Over (Data in Thousands, 000's Omitted)

Year	Agriculture	Other occupations	Total	Agriculture as percent of total
1930	3,580	1,401	4,981	72
1940	3,763	1,663	5,426	69
1950	--	--	7,208	--
1960	5,481	3,816	9,297	59

[7] This disregards the possibility of more under-reporting on small than on large farms.

Although the agricultural labor force has ncreased, non-agricultural numbers have risen much faster, nd the percentage employed in agriculture has therefore allen consistently. The decline in percentage share has een rather normal for a country at the level and pace of evelopment and the high rate of population increase that as characterized Mexico during the past few decades. If he same trends continue, around 1970 or 1975 agriculture ill reach the position where it employs no more than half f the total labor force.[8] At about that time, the gricultural labor force should also cease to increase in bsolute numbers. A decline in absolute numbers can be xpected only at some later date.

The increment in farm population and labor force has ome mainly to the private sector. The number of ejido embers has remained rather stable, close to 1.6 million in ll three censuses. The ejido population (total of both exes and all ages) rose from five million in 1940 to 6.7 illion in 1950 and to 7.5 million in 1960. Male workers all ages) on ejidos totaled 2.6 million in 1950, probably early the same as in 1940, and rose to 3.2 million in 960. These numbers are, however, not identical with the abor input in ejido agriculture; many members of ejidos nd their families work outside the family holding, either n agriculture or elsewhere. Some ejido members also hire abor.

The private farms over 5 hectares increased their abor force most rapidly in the first decade. Male workers all ages) on these farms numbered about 1.1 million in 940, 1.6 million in 1950, and almost 2 million in 1960. f these figures, hired workers, sharecroppers, etc., epresented 0.7 million in 1940 and 1.1 million in 1950 and 960. The number of male family workers rose from 309 housand in 1940 to 511 thousand in 1950 and 834 thousand n 1960. Family workers have thus represented a rising hare of the total labor force on these farms, especially ince 1950. Along with the decreasing size of private arms, these data confirm that these farms are gradually ecoming family farms to a relatively higher degree than efore, and that a considerable part of their development elongs to the lower size strata.

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[8] Other projections are given in R. Benítez Zenteno nd G. Cabrera Acevedo, "La población futura de México - otal, urbana y rural," El Trimestre Económico No. 130 April-June 1966), pp. 163-170).

The figures for male workers are not directly comparable with those of the population censuses. For one thing, the age strata are different. More important, however, these worker categories overlap, inasmuch as many ejido workers work outside the farm, often in agricultural work, and most of this outside agricultural employment must be on farms over 5 hectares. There is also no point in comparing the number of ejido workers with the workers on farms under 5 hectares, because the very large number of workers attached to private farms of 5 hectares and under are in part included among hired workers both on private farms and on ejidos.

Such intricacies, however, cannot blur the striking fact that agricultural expansion on the ejidos took place under only a moderate rise in farm population and employment in the sector, while on the private farms over 5 hectares the labor force increased more rapidly.

The ejidos doubled their farm output from 1940 to 1960, while their labor force rose much less and their use of capital and other externally generated factors of production remained at a low level. It cannot be denied that this higher output with little change in labor and capital must have meant some modest increase in the level of net income of the ejido population. The private farms over 5 hectares, on the other hand, nearly doubled their use of labor while their output rose by 3 2/3 times and their use of capital and other purchased inputs were much higher than those on the ejidos. It is therefore difficult to say whether the rate of net product per worker on the private farms over 5 hectares rose more or less than that on the ejidos.

The contribution to national development

National account data for Mexico indicate that in the years 1950-60 the gross domestic product (at constant prices--the market prices of 1950) rose by about 6 percent per year, compound rate. In the same years, the contribution of agriculture rose by about 5 percent per year. The same growth rates continued in 1960-65. This proportion is not unfavorable in a country where agricultural production runs ahead of population growth. At the same time, however, agriculture's contribution to the total fell from 21 to 17 percent, indicating a huge income disparity for agriculture in contrast with the urban sectors. Still, the rate of increase in agriculture's value product is considerably

higher than the rate of increase in its labor force in absolute terms, which is on the order of 2 percent per year (or rather less in recent years). As shown in the previous section, the ejido sector may have received relatively more of this increase in value product than the private sector.

The extremely wide disparity in incomes is, of course, in part a statistical illusion, as so often happens in economic accounts of this kind. Rural people get so many things at lower real cost than urban people do. For instance, the food retained and consumed on farms has a use value that should be measured in retail prices in order to compare rural food costs with those of city people. Rural housing is often obtained without any cash cost at all. Many local services are also less expensive in rural areas than in a city.

Even so, it is necessary to point out that there is a huge income disparity between the farm sector and the rest of the economy and that this disparity is due to rapid urban-industrial development rather than to any failure on the part of agriculture. At the stage of development where Mexico is now and has been for some time, it would be utopian to expect the urban sectors to absorb the rural surplus population much faster than has happened.

This discussion leads to the question of how well the main categories of farms have served the national household and its economic development.

Let us first dispose of the argument about the marketing quotas of large and small farms. It is often said that the large farms sell a larger part of their output on the market and hence are more useful to the national economy than are the small-scale producers. Such reasoning would seem to disregard the fact that the small-scale producers themselves, and their families, are also part of the national economy. In any event, the argument lacks validity in Mexico as of 1960 when ejidos are compared with farms over 5 hectares. The data are as follows (in million pesos):

	Farms over 5 hectares	Farms under 5 hectares and backyards	Ejidos	Total
Crop and animal production	10,832	2,528	7,038	20,398
Portion sold	6,725	551	4,543	11,818
Marketings as percent of total	62.1	21.8	64.5	57.9
Add:				
Sales of live animals	1,997	52	235	2,284
Slaughter on farms	61	30	57	148
Grand total:				
Gross output	12,890	2,610	7,330	22,830
Portion sold	8,722	602	4,778	14,102
Sales as percent of total	67.7	23.1	65.2	61.8

It is natural that the marketing quotas should be highest in the grand totals because the production of animals for final disposal principally takes the form of sales. It is also logical that the difference should be largest on the farms over 5 hectares, because they have the bulk of all livestock sales. That is why the sub-total for the marketings of crop and animal products (not including live animals) is most relevant for a comparison between ejidos and private farms.

The marketing quotas on the ejidos are in any event surprisingly close to those on the private farms over 5 hectares. The high incidence of commercial crops is part of the explanation; the still lower level of living on ejidos (in comparison with the workers on private farms) is another. From the viewpoint of the national economy, it is interesting to compare the absolute size of these marketed quantities with the size of external inputs on farms.

Most farm capital consists of land and livestock, neither of which has drawn many resources from other sectors of the national economy. Buildings may have drawn on such resources, but to an extent that is very difficult

to ascertain. What is certain to have been drawn from other sectors of the economy are the stocks of machinery and implements as well as use of fertilizers, pesticides, machine repair and hire, and motor fuel. When the size of these costs is compared with the marketed quantities of agricultural products, the following numbers emerge (data in million pesos):

	Farms over 5 hectares	Farms of 5 hectares and under	Ejidos
Total sales (grand total)	8,722	602	4,778
Sales less live animals	6,725	551	4,542
Machine capital	2,951	93	1,344
Annual expenditures for external inputs	635	..	251
Machine capital per 1,000 pesos of total sales	338	154	281
Machine capital per 1,000 pesos of sales less live animals	439	169	296

Since the land and the farm labor are free goods, from the viewpoint of the national economy, it appears that small-scale, labor-intensive production is less costly than large-scale production in terms of the goods that are scarce in the Mexican economy. The large private farms are using more of the hardware that might otherwise have been invested toward even more rapid industrialization of the country. The same is doubtless true of the costs of establishing new irrigation systems, since the farms over 5 hectares have by far the largest number of such systems, and therefore also higher irrigation costs in proportion to their market sales than the ejido sector.

This is not to say that all of the expansion in production could have been achieved without at least some of these investment costs--particularly those in irrigation works. Those in machinery and equipment remain somewhat more problematic in a labor-intensive situation. The surprising fact is that ejido production is cheaper, in social-account opportunity cost, than large-scale private-farm production. This fact is usually obscured by the widespread habit of observing the accounts of individual firms and extending their results to national aggregates, which is inadmissible when the factor proportions imply large quantities of farm labor with no opportunity cost outside agriculture. There is no doubt that the owners or holders of large private farms make a good income by using more machines and somewhat less labor, but they render a less useful service to the struggling and developing economy of a low-income, capital-scarce country.

The details of these calculations may become refined in further analyses. It is quite clear, however, even at this stage, that the land reform has in no way impaired the economic development of Mexico. Its social gains have not been made at the expense of economic progress.