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Land Reform and Productivity in Mexico

By FOLKE DOVRING*

WHAT DID LAND REFORM do to agricultural productivity in Mexico? The case is often used as an argument for or against land reform in other countries, especially in Latin America. Evidence has appeared ambiguous so far, and accordingly the debate has been ambivalent. It has been widely believed that land reform hurt productivity, and even the defenders of the reform have usually placed more emphasis on its sociopolitical merits than on its economic role as affecting productivity.

Some new sources of data have appeared in recent years. There have also been some attempts at fresh analysis. Renewed interest in land reform in Latin America indicates this as a time when we should re-examine old clichés and put some order into recent findings.

Land Reform and the Resulting Farm Structure

The Mexican land reform, begun in a small way before 1920 and culminating in the 1930s, created *ejidos* (communal holdings) and private smallholdings. As a by-product, it also favored the growth of medium-sized farms. Data on holding numbers and areas, from the four censuses of agriculture, are shown in Table I.

The chronology of ejido formation is not accurately known; some ejidos existed de facto before they were legally confirmed. The 1930 census lists more ejidos, and more ejido area, than officially granted up to that time.¹ Numbers

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¹ *Anuario estadístico de los Estados Unidos Mexicanos*, 1939, p. 411, Table 206.

TABLE I — NUMBER OF HOLDINGS AND 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	1.4	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	11.9	6.8	9.9	12.2
5 hectares and under	0.8	1.1	1.3	1.3
Ejidos	1.9	7.0	8.8	10.3
Total	14.6	14.9	19.9	23.8

of grants applied for exceeded those made definitive, especially in the early years,² and numerous requests were denied.³

In the 1950s, ejido formation was restricted and touched mainly low-grade land; the increase in ejido cropland in part reflects land clearance. After 1960, there has been some continued land reform activity. During 1960-68, grants were made totaling 17 million hectares — mainly low grade pastures,⁴ but including more than a million hectares of cropland.⁵

Private farms over 5 hectares have increased more rapidly in number than in area, thus their average size fell. To some undetermined extent, this is due to nominal subdivision of larger farms as a means of forestalling land reform action. It is also known, although not to what extent, that ejido lands are (illegally) leased to private operators. Most ejido lands are cultivated as small private farms; only a small fraction of all ejidos are run collectively by their membership.

Ejidots were created above all where the population was dense. This left the private farms with the lion's share of the nation's virgin land resources. The 1940 census includes data on areas that could easily be converted to cropland: 5.6 million hectares on private farms and 2.4 million on ejidos. The 1960 census indicates that the private farms still have the largest room for expansion. They have also had most of the expansion of irrigation: their share rose (1940-60) from 600,000 to 2 million hectares, that of the ejidos from 1 million to 1.4 million.

Changes in Crop Production Before 1930

It is widely believed that the initial phases of land reform in Mexico caused

agricultural production to go down. A statement to this effect is included in the recent study by Venezian and Gamble.⁶ Their conclusion is based on insufficient scrutiny of their source: the Nacional Financiera clearly indicates that its national crop production indices 1901-1925 are borrowed from an article by Humberto G. Angulo, published in 1946 with indices 1893-1925.⁷ In this article, the reader is warned about the low quality of the data used, especially for the years 1909-19.⁸ How weak these data really are is best appreciated by looking at those from the late Porfirio Diaz years as shown in annual routine publications up to 1907.⁹

The index computed by H. G. Angulo shows very sharp fluctuations for the years 1907-13, contrasting against the

² *Ibid.*, p. 411, Table 205.

³ *Anuario estadístico de los Estados Unidos Mexicanos*, 1943-45, pp. 572 sq., Table 227.

⁴ Sergio Reyes Osorio, "Aspectos de la problemática agraria nacional," *Revista del Mexico agrario* 5, Jul/Aug 1968, pp. 71-95.

⁵ See *Anuario Estadístico Compendiado*, 1964, pp. 140 sq., 1966, pp. 154 sq. See also, Departamento de Asuntos Agrarios y Colonización, *Memorias* (Annual).

⁶ Eduardo L. Venezian and William K. Gamble, *The Agricultural Development of Mexico: Its Structure and Growth since 1950* (New York: Praeger, 1969), pp. 52-54. Cf., also the same authors, "Agricultural development and policy in Mexico," *International Studies in Economics, Monograph No. 8*, "Latin American agricultural development and policies," ed. by Lehman B. Fletcher and William C. Merrill (Ames, Iowa: Department of Economics, Iowa State University, September 1968), pp. 75-85; and same authors, "El desarrollo de la agricultura mexicana: estructura y crecimiento de 1950 a 1965," *Investigación económica*, Jan-June 1967 (printed 1969), pp. 41-108.

⁷ Humberto G. Angulo, "Índice de la producción agrícola," *Revista de economía* (México, D.F.) Vol. 9, No. 1, January 15, 1946, pp. 19-24. Cf., Nacional Financiera, *La economía mexicana en cifras*, México, D.F., 1965, p. 57, and 1966, pp. 45, 61, and Appendix Table 12.

⁸ For the years 1909-19, production data, such as they are, exist for only 5 crops, all the rest had to be estimated free hand. Angulo also makes clear that his indices are value indices computed by Fisher's formula (volume index times price index); thus the supposition by Venezian and Gamble, *op. cit.*, p. 52, footnote, is incorrect.

⁹ *Anuario Estadístico de la República Mexicana . . . a cargo del Dr Antonio Peñafiel*. (México: Secretaría de fomento), the 1907 returns (Vol. 15) published 1912.

much smoother flow of national crop output from 1925 onwards. The first of the sharp peaks is in 1907 — the last year of the published data from the Porfirio Diaz period, and only the second year on Venezian and Gamble's reading of the series. This high index for 1907 must be rejected as based on patently erroneous reporting: not only is the corn harvest reported as 5 million tons (more than twice any previous peak year), but 2 million of this is in the state of Jalisco and 1½ million in a single cantón in the same state! These and similar reporting errors are implicitly corrected in a recent publication of historical statistics¹⁰ showing crop production for 1907 only slightly above that of previous years, with corn not much over 2 million tons. The data for subsequent years which Angulo used also show the peak years with giant corn harvests, no doubt as erroneous as that for 1907.¹¹

The reported spectacular progress of the late Porfirio Diaz years is thus a myth.¹² So is the reduction of output in the early land reform period. When pre-revolution data are screened for their grossest errors, it is found that aggregate crop output in 1925-29 was about one-tenth larger than in 1903-07, and so was population.¹³ Per capita domestic supply of farm products in the 1920s was thus on essentially the same level as before the revolution.

The Civil War is likely to have caused temporary disruptions and some reduction in output, among other things because of losses of human lives — about one million. There is no evidence to show that the early land reform measures had any negative effect on production. At the state level, there were increases in some parts of the country and decreases in others; in part at least, this is connected with similar differential changes in population numbers.

TABLE II — INDICES OF AGRICULTURAL PRODUCTION, COUNTRIES IN LATIN AMERICA FOR WHICH LONG-TERM SERIES ARE AVAILABLE: 1934/38 TO 1964/66

Country	Average 1952/56 (index base 1934/ 38 = 100)	Average 1964/66 (index base 1952/ 56 = 100)	Average 1964/66 (index base 1934/ 38 = 100) ^a
	Argentina	111	116
Brazil	138	155	214
Chile	133	124	165
Colombia	179	136	243
Cuba	147	105	154
Mexico	190	176	334
Peru	151	135	204
Uruguay	138	104	144

^a Linked index.

Production Changes Since 1930

Agricultural production in Mexico has risen rapidly in recent decades.

¹⁰ *Estadísticas Económicas del Porfiriato. Fuerza de Trabajo y Actividad Económica por Sectores* (Mexico D.F.: El Colegio de Mexico, no date — around 1965).

¹¹ Secretaria de relaciones exteriores. Departamento de publicidad, *Boletín de información* No. 35 (1923), gives data on output of corn, beans, and wheat, 1908-22; data for 1917 are lacking, those for 1913 are erroneously the same as for 1916.

¹² It is also incorrect to state, as Venezian and Gamble do (*op. cit.*, p. 13), that during the Porfirio Diaz period, "production of agricultural raw materials and export crops increased . . . but domestic food production continually decreased." The data, for whatever they are worth, indicate that the relative proportions between domestic food crops and other products remained relatively stable, and both groups increased more or less at par with population growth; the three leading crops, corn, beans and wheat, between themselves continued to occupy close to two-thirds of all crop output value. If the spectacular increases in 1907, 1909-10 and 1913 had been true, this would have meant gains for domestic food crops, principally corn.

¹³ Crop output indices for the country and each of its states for 1903-07 and 1925-29 were computed from comparable data for 19 crops using 1950-62 prices; subsequently the exercise was repeated on the basis of the corrected data for 15 crops for the country as published in, *Estadísticas Económicas del Porfiriato*, which gave a closely similar result. A similar proportion comes out when national product in agriculture is compared for the same two five-year periods: see, Enrique Pérez López, "The national product of Mexico: 1895 to 1964," in *Mexico's Recent Economic Growth, The Mexican View* (Austin, Texas: University of Texas Press, 1967), pp. 28-29.

Table II shows data from F.A.O. index numbers.¹⁴ The index numbers give Mexico a special place in Latin America and indeed in the world. The more than trebling of gross production (or net output) in three decades represents an exceptionally high rate of long-term growth. For the census years 1950 and 1960, the F.A.O. indices are 148 and 281, respectively. When indices of gross output are computed from census data (see below), 1950 gets an index (1940 = 100) of 165 and 1960 an index of 256.

What happened to production in the 1930s — the period when land reform activity was at its height — is not entirely clear. From annual crop data, it appears that crop output 1935-39 was about the same as 1925-29, thus there would have been some decline in per capita output. But too much depends on the choice of years to compare: 1938-42 appears to have risen over 1928-32 by a higher percentage than population growth 1930-40, and the same holds when aggregate crop output in the censuses of 1930 and 1940 is compared.

Some apparent decline in crop output around 1930 is blamed by Venezian and Gamble on the world crisis.¹⁵ Detail data show that most of this reported decline was in corn, mainly a subsistence crop at the time, thus more vulnerable to reporting errors than to influences from the world market. That fall in corn production is contradicted by the censuses of 1930 and 1940, both of which report much higher corn totals than corresponding annual data. Censuses of agriculture are known often to understate crop output and seldom to overstate it. The annual returns of the 1930s are therefore likely to be somewhat on the low side. This observation may cause a slight reduction in the apparent rate of progress as shown by the older F.A.O. index series; but at the

same time it takes away the notion that land reform activity was to have held back progress in Mexican agriculture.

Census Data by Categories of Farms

The Mexican censuses of agriculture report crop and animal production separately for ejidos and for private farms over and under 5 hectares of total area. From the censuses of 1940, 1950 and 1960, price weighted aggregates were computed as basis for index numbers shown in Table III.¹⁶

Over the 20 years gross output appears to have increased 2½ times. The output of ejidos doubled, that of private farms over 5 hectares increased more than 3½ times. The differences are largest in animal production and somewhat smaller in crop production. Between 1940 and 1950, private farms above 5 hectares would seem to have nearly doubled their output, while ejidos registered only a modest increase. In animal production, the difference in rate of increase was much smaller. For the period 1950-60, the advance in crop output appears about the same for both categories, while the private farms above 5 hectares had almost all the increase in animal production. Most of the resources for animal production belong to the larger private farms, hence crop output is most indicative of relative resource productivities.

¹⁴ The F.A.O. index numbers were used because they cover a longer period than most other index series. See also, E. Vargas Torres, "El Producto y la Productividad Agrícolas," *El Trimestre Económico* (Mexico, D.F.) No. 126, April-June 1965, pp. 265 sq., also N. L. Whetten, *Rural Mexico* (Chicago: Chicago University Press) 1948, p. 255.

¹⁵ Venezian and Gamble, *op. cit.*, p. 54. The expression ". . . the world depression, which hit largely agricultural Mexico's exports hard" seems to confuse the cash value of exports and the physical volume of production, which suffered least in the export crops.

¹⁶ On details of the weighting procedure see, D. E. Horton, *Land Reform and Agricultural Growth in Mexico*, unpublished MS thesis, University of Illinois, October 1967, pp. 70.

TABLE III—INDICES OF GROSS OUTPUT OF CROPS AND ANIMAL PRODUCTS BY MAIN CATEGORIES OF FARMS: 1960 OVER 1950 AND 1940; AND 1950 OVER 1940

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.

The differences between farm categories are still further reduced when crop output is shown as composite yield of all cropland and still more when some principal categories of cropland are distinguished (Table IV).¹⁷

The differences between farm categories are smaller in each of the special columns (1-4) than in the total (Col. 5). Thus some of the disadvantage of ejidos comes from their having inherited some

of the less productive land areas. Further scrutiny of crop yields per hectare underscore this type of conclusion. There are some crops where the highest yields are found on ejidos, and some where they are on private farms under 5 hectares, just as there are some where private farms over 5 hectares have the apparent advantage.

The facts in no way lend support to the long-standing contention of the critics of Mexican land reform: that ejidos have lower yields than private farms. Typical is the contradiction of Venezian and Gamble who state that "private farms are more productive than ejidos" (p. 82), just after saying that on "differences in the quality of cropland controlled by each of these groups . . . no data . . . are available" (p. 80). If no data were available, then no statement could be made on relative productivities, which of course must relate to comparable resources to have any meaning. But we are not entirely without data on this. As mentioned above, the private farms over 5 hectares have received the bulk of new irrigation as also of new cropland generally. That ejidos are pressing harder upon the margins of cultivation as hinted vaguely by Venezian and Gamble (p. 80), hence use resources of lower average quality, is strongly indicated by their higher incidence of crop losses through frost, drought and flooding, as well as by their lower rate of fallowing.¹⁸

As the data stand, they give no clear indication of any significant difference in crop yields between the ejidos and the

¹⁷ Cf., D. E. Horton, *op. cit.*, Table 16. Other indicators of gross output per hectare are given in Vargas Torres, *op. cit.*, p. 257. As his data relate to area harvested and to 1950 prices, they are not comparable with those in Table 4.

¹⁸ On rate of cropping and crop losses see, *IV Censos Agrícola-Ganadero y Ejidal, 1960: Resumen General* (Mexico, D.F. 1965), Tables 22 and 30.

TABLE IV—VALUE OF GROSS CROP OUTPUT OF SELECTED CLASSES OF CROPS BY MAIN CATEGORIES OF FARMS: 1960 (CENSUS) PRICES (*pesos per hectare*)

Categories of farms	1	2	3	4	5
	Crops on arable land	Fruit crops	Agaves for alcoholic beverages	Agaves for fibers	Total 1 + 2 + 3 + 4
		1960			
Over 5 hectares	490	2,920	4,332	1,286	609
5 hectares and under	507	2,818	^a	^a	635
Ejidos	483	2,736	3,080	1,279	558
Total	488	2,851	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.

private farms over 5 hectares in 1960. Private farms under 5 hectares had higher yields of several crops, indicating more intensive tillage.

In 1940, the ejidos had higher yields than the private farms; in 1950 the reverse held. Both categories improved their yields in both periods, the private farms the most 1940-50 and ejidos most 1950-60. 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 consequent uncertainty of many landowners about how much land they could count on to retain must have acted as a deterrent against expanding production or even maintaining it at normal levels—or at least against reporting the result. With the reduction in land reform activity in the 1940s, the private farms could rapidly recapture some slack capacity. Their expansion in cropland acreage since 1940 is evident and depends on their larger scope for such expansion;

but their advantage in yield improvement rate belongs to this early period of “picking up slack.” The ejidos, by contrast, were (most of them) in a position to produce “to capacity,” by the standards of the period, already in 1940.

It is a common mistake to regard crop yields per area unit of unweighted land as indicators of resource productivity. Pressing on the margins of cultivation, as the ejidos do, will lead to lower average area-unit yield but to higher aggregate yield from comparable resources. The point can be further illustrated on the basis of state level data.

Crop Output Indices by States

To trace the possible incidence of land reform upon crop output and its growth, indices at the state level were computed for 1927-64, using the annual returns as source of data¹⁹ for the 29 states and 3 territories. The censuses of 1940, 1950,

¹⁹ On procedure and price weights see, D. E. Horton, *op. cit.*, pp. 86 and Appendix 2-4.

and 1960 were also used for comparison. For the annual data, average prices for 1925-29, 1938-42, and 1958-62 were used alternatively to gauge the scope of the "index number problem"; for census data, similarly, country-average prices from the censuses. The differences between the indices computed with these alternative price weights were small and can be disregarded for our purpose.

The indices were first brought in relation to the percentage of a state's cropland that was in ejidos and private holdings under 5 hectares (the reform sectors) in 1960. The result clearly reflects the amount of expansion (of cropland and of irrigation systems) that had taken place. The highest indices were on the whole found in states where there had been much expansion of cropland and irrigation since 1940. As mentioned above, most of the land clearance took place in the less densely settled areas which are the same where ejidos do not dominate. The data therefore give the impression that to some (not very high) degree there was more progress in areas where private farms over 5 hectares dominated over the land reform sectors. This finding is not an indication of relative productivities, only of previous density of occupation.

The next step is to compare the yield level in 1960 in total and by tenure sectors with the share of the reform sectors in total cropland. Listing the states in descending order by this criterion, two conclusions stand out. One is the neutral one, that cases with average yield higher or lower than the country-wide average occur side by side along the entire scale. Statewide yield level is thus not correlated with the tenure situation, but is likely to reflect the prevalence of high- and low-value crop enterprises in one region and the other. The other con-

clusion is a seeming paradox: the reform sectors have the higher yield level mainly where they hold a lesser share of all the cropland; conversely, the private farms over 5 hectares have the higher yield level more often where they hold the lesser share of the cropland. The explanation can once more be given in terms of margin theory: the "majority sector" in each case is also the most likely to have the bulk of the state's low-grade land. Wherever the ejidos have most of the land, the remaining private farms over 5 hectares have usually managed to retain their most valuable land, thus they now use resources which, while smaller, are of higher average quality. As can easily be demonstrated, the private farms also tend to be smaller when they are the "minority sector," and thus intensity of land use is negatively correlated with size of farm. Conversely, where the large farms have retained the bulk of the land, they also still have much of the low-grade land and get lower yields than the ejidos (the states of Guerrero and Oaxaca are cases in point). The occurrence of high-value specialty crops, sometimes heavily concentrated in one tenure sector, also distorts the picture here and there.

Somewhat better indications might be expected from analysis of area-unit yield and its changes over time. Studying this over the period 1940-60, changes in yields are placed in relation not to the share of the reform sectors at either end of the period (which again merely would reflect the rate of land clearance) but to the change which the share of the reform sectors underwent in the meantime. This shift in relative shares should indicate how far land reform activity was still a factor in the 1940s and 1950s. For the country as a whole, cropland in private holdings over 5 hectares rose (1940-60)

by 64 per cent, that of the reform sectors by 27 per cent, thus there is a "differential index" of 129 to indicate the pace at which the private farms over 5 hectares increased their cropland base faster than did the reform sectors.

Two groups of states were singled out for close scrutiny: those where the differential index was over 150 and those where it was under 100. The former category includes seven states (Chihuahua, Durango, Morelos, Oaxaca, Sonora, Tabasco and Yucatán), in which apparently land clearance on the larger farms by far outweighed any impact of continued land reform. The latter group includes nine states (Aguascalientes, Colima, Chiapas, Hidalgo, Jalisco, México, Michoacán, Tlaxcala and Veracruz) in which there either was continued land reform activity sufficient to outweigh land clearance on the larger farms, or else the ejidos may have inherited cultivable virgin land to a larger extent than usual. In three states (Aguascalientes, Hidalgo and Michoacán) private farms over 5 hectares actually suffered some decline in cropland. Aggregate crop yields (per hectare of all cropland in the state) were used both from the annual returns of 1938-42 and 1958-62 and from the censuses of 1940 and 1960.

Comparing these two groups of states as groups, it appears that the reform sector group had kept up with the national crop yield trend somewhat better than the group in which the private farms over 5 hectares expanded vigorously. The difference is not large enough to base any positive conclusion on, and the margin argument could here work the other way around: very large expansion of cropland might mean adding mainly land of below-average fertility (the state of Oaxaca could be a case in point). In any event, the data lend no

support to any conclusion about inferior productivity trends in states affected by land reform measures 1940-60.

The same conclusion comes out of comparing data on continued land reform in the 1960s with available production figures. For instance, in 1962-63 and 1963-64, implementation of presidential land reform decrees transferred 3.9 million hectares, of which over 800,000 hectares were cropland, or about 3½ per cent of the cropland of the country. States where the cropland transferred in those two years was a considerably larger share of the state's cropland base than in the country as a whole include Campeche, Chiapas, Sinaloa, Veracruz and Yucatán. Production data for 1963 and 1964 reflect progress in these states to at least the same extent as in Mexico as a whole.

Some Explanatory Factors

The rapid development of Mexican agriculture since around 1940 has often been explained by referring to factors such as improved crop varieties, chemical fertilizers, machines and mechanical power, in addition to the obvious ones of expanded cropland and irrigation.

The improved varieties of corn and wheat may have contributed large amounts of the progress since 1960. In the 1960 census, hybrid corn is shown as contributing about ⅔ per cent of national agricultural output (incremental yield over common corn); nearly half of this amount was produced on ejidos. Improved wheat strains are not mentioned separately in the census, but their contribution (above unimproved wheat strains) as of 1960 appears to have been about 1 per cent of national agricultural output.

On chemical fertilizers, the 1960 census shows these to be applied to

about 13 per cent of Mexico's cropped area. A table on expenditures (Table 20, pp. 128 sqq) shows that private farms over 5 hectares spent three times as much on fertilizers as did the ejidos, and more than twice as much on pesticides and herbicides. And yet there is no appreciable difference in crop yields!

Mechanization of agriculture has made great strides in Mexico in recent time, but as of 1960 only a minority even of the large farms were highly mechanized. Power traction and other mechanical means of cultivation have been significant for the clearing of certain areas for cultivation and in permitting certain crop combinations that would otherwise be difficult; but by no stretch of the imagination can they be considered a principal factor in the agricultural development up to 1960.

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 ability of the reform sectors, and specifically of the ejidos, to keep up with the general development. Excess manpower was put to work to till the land more intensively and to apply higher value crops to larger parts of the cropland.

Contribution to National Development

Population and labor force data in the censuses show that agricultural expansion of the ejidos took place under only a moderate rise in ejido population and employment, while on the private farms of over 5 hectares the labor force increased more rapidly. If there was a difference in the rise in per capita income between the two main tenure sectors, it must have been smaller than

the difference in rise of aggregate output.

National account data for Mexico indicate that in 1950-60 gross domestic product (at constant prices — the market prices of 1960) rose by about 6 per cent per year. In the same years, the contribution of agriculture rose by about 5 per cent per year. The same growth rates continued at least through 1960-65. Thus growth in agricultural production ran ahead of the growth of population (about 3 per cent), and even further ahead of the growth in agriculture's labor force (about 2 per cent per year, or rather less in recent years).

As is normal in low-income countries, there is a wide income disparity between the agricultural sector and the rest of the economy. In the case of Mexico, this comes more from the very rapid expansion of the urban sectors rather than from any failures of agriculture. The question may be asked, how well have the main tenure sectors served the national economy and its development.

Let us first dispose of the argument about the market contribution of large and small farms. It is often said that 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 overlooks the fact that the small-scale producers themselves 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. Data are shown in Table V.

The percentage of gross output marketed from ejidos is surprisingly close to that of the private farms over 5 hectares. The high incidence of commercial crops in ejido production is part of the explanation; the likelihood of a somewhat

TABLE V — PRODUCTION AND MARKETING OF FARM PRODUCTS, BY TENURE SECTOR, ACCORDING TO THE 1960 CENSUS OF AGRICULTURE (*data in millions of pesos*)

	Farms over 5 hectares	Farm 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 per cent 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

lower level of living on ejidos may be another part of it. From the viewpoint of the national economy, it is of interest to compare the absolute size of these marketed quantities with the volume of external inputs used by tenure sectors.

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 which is very difficult to ascertain. What is certain to have been supplied by other sectors of the economy are the stocks of machinery and implements as well as the use of fertilizers, pesticides, machine repair and hire, and motor fuel. Census data on these costs are compared with the marketed quantities of agricultural products in Table VI.

Since the land and the labor are free goods, from the viewpoint of the Mexican economy, it is evident that the small-scale, labor intensive production of the reform sectors is less costly than large-scale production, in terms of the goods that are scarce in the Mexican economy. The large farms are using more of the hardware that might have been invested toward even more rapid

industrialization of the country. The same is doubtless true of the establishing of new irrigation systems, since the private farms over 5 hectares received

TABLE VI — SALES OF AGRICULTURAL PRODUCTS, AND EXPENDITURES ON SELECTED EXTERNAL FARM INPUTS, ACCORDING TO THE 1960 CENSUS OF AGRICULTURE (*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	4,543
Machine capital	2,951	93	1,344
Annual expendi- tures 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
Annual expendi- tures per d = 0	85	..	55

by far the largest part of new irrigated land, and therefore also have 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 external costs—particularly those in irrigation works. Those in machinery and equipment remain somewhat more problematic in a labor intensive situation. 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.

In summary it is clear that the socio-political gains of the land reform have in no way been at the expense of economic progress. Land reform steered more of the nation's resources into labor

intensive growth in agriculture, which is precisely what the country needed at the time and still needs for some time to come.²⁰

²⁰ The above result on productivity was published in preliminary form in F. Dovring, "Land Reform and Productivity: The Mexican Case," University of Illinois Department of Agricultural Economics, AERR 83, November 1966, reissued by the University of Wisconsin Land Tenure Center as LTC 61, January 1969. Compare also, D. E. Horton, "Land Reform and Economic Development in Latin America, the Mexican Case," *Illinois Agricultural Economics*, January 1968, pp. 9-20. Since then, the finding that smallholdings and ejidos have higher factor productivity than large farms in Mexico has also been set forth independently (in preliminary form) in Solomon Eckstein, *El Marco Macroeconómico del Problema Agrario Mexicano*, Comité Interamericano de Desarrollo Agrícola (CIDA) and Centro de Investigaciones Agrarias, Mexico, their *Trabajos de Investigación Agraria*, January 1969, mimeo, pp. viii, 119 sq. The approach and analytical technique are different (and more elaborate), but the result is essentially the same as set forth above.

More recently, R. Hertford has confirmed essentially the same conclusions, based on yet another set of approaches and methods and including analysis of unpublished detail from the 1960 Census of Agriculture ("Sources of Change in Mexican Agricultural Production: 1940-65," unpublished thesis, University of Chicago, March 1970).

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