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Chapter Title: The Economic Basis of Farm Equipment Financing

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## The Economic Basis of Farm Equipment Financing<sup>1</sup>

Equipment and motor vehicles used for farming in the United States were valued as of January 1, 1954 at nearly \$19 billion. Thus equipment<sup>2</sup> inclusive of trucks and automobiles made up about 47 percent of the nation's non-real-estate farm assets, which, value of livestock and stored crops being added to that of equipment, totaled about \$40 billion. With farm land and buildings valued at about \$88 billion, the total for all farm physical assets was close to \$128 billion; and of such assets, equipment and motor vehicles constituted about 15 percent.<sup>3</sup> Table 1 gives a similar measure (except that stored crops are not recorded among total physical assets) for earlier years. The rise from 4.6 percent in 1920 to 7.4 percent in 1940, and to 15.8 percent at the beginning of

<sup>1</sup> Much of the data for this chapter is from *Progress of Farm Mechanization*, by Martin R. Cooper, Glen T. Barton, and Albert P. Brodell (U.S. Department of Agriculture, Misc. Pub. No. 630, October 1947), and from the Censuses of Agriculture.

<sup>2</sup> Farm equipment is defined to include field equipment, such as tractors, combine-harvesters, plows, and harrows, and farmstead equipment, such as milking machines, cream separators, feed grinders, and electric motors. Installations that become, at least in part, permanent and immovable fixtures, and thus part of the real estate (such as water systems, drainage systems, electric wiring and light fixtures), are excluded. Trucks, though of major importance on commercial farms, have been excluded from materials specially gathered for this study (though present in Tables 1 through 3 and in some other tables, as specified), because their purchase usually involves different financing arrangements than those relating to other equipment used on farms, and because of the difficulty of isolating farm as against commercial and industrial uses of such equipment. The same is true of automobiles, only here it is consumer and producer uses that are statistically fused. Hand tools are excluded wherever possible because purchases for farm and for nonfarm use are indistinguishable in the records, and because dollarwise their importance among equipment purchases is small.

<sup>3</sup> See *The Balance Sheet of Agriculture, 1954* (U.S. Department of Agriculture, Agricultural Research Service, Agr. Inf. Bul. No. 134, August 1954), Table 1, p. 2. Equipment covered includes automobiles and trucks; also hand tools.

TABLE 1

VALUE OF EQUIPMENT AND MOTOR VEHICLES AS A PERCENTAGE OF TOTAL FARM PHYSICAL ASSETS, DECENNIAL YEARS 1910-40 AND 1945

Census Region <sup>a</sup>	1910	1920	1930	1940	1945 <sup>b</sup>
New England	5.9	7.9	8.0	8.1	10.1
Middle Atlantic	5.7	9.1	9.9	11.0	14.5
East North Central	2.7	4.6	5.7	7.9	9.4
West North Central	2.7	4.2	6.0	8.0	9.1
South Atlantic	3.3	4.6	4.6	5.5	6.8
East South Central	3.5	4.0	4.9	5.6	7.2
West South Central	3.1	4.1	4.9	6.5	7.3
Mountain	2.8	4.7	6.5	7.7	8.0
Pacific	2.4	4.4	4.3	6.3	6.1
United States	3.1	4.6	5.8	7.4	8.6

Data are from the U.S. Censuses of Agriculture and refer to the following dates: April 15, 1910; January 1, 1920; April 1, 1930 and 1940; January 1, 1945. Farm physical assets include land and buildings, implements and machinery, and live-stock. "Implements and machinery" includes trucks and (except in 1945) automobiles, and hand tools, as well as field and farmstead equipment as defined in footnote 2 of Chapter 1.

<sup>a</sup> States included in the census regions are as follows: *New England*: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut; *Middle Atlantic*: New York, New Jersey, Pennsylvania; *East North Central*: Ohio, Indiana, Illinois, Michigan, Wisconsin; *West North Central*: Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas; *South Atlantic*: Delaware, Maryland, District of Columbia, West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida; *East South Central*: Kentucky, Tennessee, Alabama, Mississippi; *West South Central*: Arkansas, Louisiana, Oklahoma, Texas; *Mountain*: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada; *Pacific*: Washington, Oregon, California.

<sup>b</sup> Data for 1945 exclude automobiles; if the farm share of automobile use is included, equipment constituted 10.2 percent of farm physical assets in the United States.

1954, marks a vast movement of mechanization and its increasingly rapid pace.

The importance of machinery in the farm production enterprise can be judged also by reference to the proportion of total production costs accounted for by its use. The available estimates concern the years 1935-39, when equipment costs (measured by the costs of operation and maintenance, including depreciation, taxes, insurance, and an allowance for interest) were found to make up 17 percent of total farm production costs.<sup>4</sup> More specifically, the

<sup>4</sup> Cooper, Barton, and Brodell, *op. cit.*, Table 31, p. 59.

costs of tractor use and of the farm share of automobile use have each been estimated at 4 percent of total production costs in the 1935-39 period, truck cost at 3 percent, and other farm machinery cost at 6 percent. It is interesting to compare the costs of tractor and animal power in those prewar years. Costs of horse and mule power were estimated at 12 percent of total production costs, as against the 4 percent attributed to the use of tractors. If these costs were known for later years, the percentages for mechanical equipment, and particularly for tractors, would be much higher, tractor numbers having nearly tripled in the thirteen years after 1940, while the number of horses and mules declined by 60 percent (Table 5).

Purchases of equipment and motor vehicles amounted to 10 to 13 percent of farmers' gross cash income from marketings annually between 1948 and 1953. Approximately the same proportion (10 to 11 percent) characterized the prewar years 1940 and 1941.<sup>5</sup>

#### *Regional Differences in the Demand for Farm Equipment*

For all farms in the United States, equipment other than automobiles made up 8.6 percent of total physical assets, by value, at the end of 1944, according to census data given in Table 1. Among the several census regions, relative importance of equipment varied from a high of 14.5 percent in the Middle Atlantic states to only 6.1 percent in the Pacific states, with the three southern regions nearly as low. Judged by value of implements and machinery in relation to area of cropland harvested (Table 2), degree of mechanization again appears highest in the Middle Atlantic states, which use \$35 worth of equipment per harvested acre. New England and the Pacific states are also high on this rating, and it is the broad strip of plain west of the Mississippi, from North Dakota and Minnesota south to the Gulf, that shows least equipment per harvested acre.

Regional differences in the dollar total of farm equipment owned are also shown in Table 2. More than half of the \$5 billion worth of tractors, trucks, and other equipment in use on farms

<sup>5</sup> *The Balance Sheet of Agriculture, 1953* (U.S. Department of Agriculture, Agr. Inf. Bul. No. 115), pp. 15 f., and *ibid.* 1954 (Agr. Inf. Bul. No. 134), p. 15.

TABLE 2  
 VALUE OF EQUIPMENT AND TRUCKS ON FARMS, AND PERCENTAGE  
 OF FARMS REPORTING EQUIPMENT, JANUARY 1, 1945  
 (dollar figures in millions)

CENSUS REGION <sup>a</sup>	FARMS REPORTING		VALUE OF EQUIPMENT <sup>b</sup> AND TRUCKS		
	<i>Equipment <sup>b</sup> and Trucks (including Tractors)</i>	<i>Trac- tors</i>	<i>Amount (mil- lions)</i>	<i>Per- cent- age</i>	<i>Per Acre of Har- vested Crop- land</i>
New England	78%	31%	\$ 125	2%	\$32
Middle Atlantic	87	50	508	10	35
East North Central	84	56	1,198	23	20
West North Central	89	61	1,463	28	11
South Atlantic	77	11	358	7	13
East South Central	73	8	284	6	12
West South Central	77	25	542	11	11
Mountain	84	44	307	6	13
Pacific	70	38	362	7	24
United States	80%	34%	\$5,147	100%	\$15

Data are from the 1945 Census of Agriculture, Vol. 2, Tables 13, 14, and 15, pp. 324, 326, and 332.

<sup>a</sup> For a listing of states included in each census region, see Table 1, footnote a.

<sup>b</sup> Equipment includes hand tools as well as the field and farmstead equipment defined in footnote 2 of Chapter 1.

at the end of 1944 was concentrated in the East and West North Central states, the latter group, with almost \$1.5 billion, having the highest regional total. The Middle Atlantic and West South Central divisions each had about a third as much, or slightly over \$500 million; New England, with \$125 million, had least of all, primarily because of its smaller area. Thus in the Corn Belt and Great Plains regions, together with the Middle Atlantic and West South Central states, nearly three-fourths of all the equipment is concentrated; and it is here, naturally, that farm equipment sales and the potential demand for equipment financing are greatest.<sup>6</sup>

<sup>6</sup> Direct reports of retail sales of farm equipment are available for the year 1948 through the special census of retail trade. Their regional pattern, which is given in the form of a percentage distribution in Appendix A, page 85, bears out the impression gained from the asset data in Table 2.

The 1945 census remains our latest source for comprehensive data on value of equipment in use on farms. If Table 2 could be matched by a similar one for 1954, probably the regional patterns would show little change. The absolute figures for dollar value of equipment, however, would be very much higher, nearly tripling those for 1945.

### *Differences in Demand by Economic Class of Farm*

The extent of use of farm equipment is closely related to the scale of operations of individual farms, which vary in the United States from part-time or nominal businesses of very small output to commercial enterprises of considerable size. Table 3, drawing upon the 1945 census figures, shows how much greater a share of total equipment was held by large- than by small-scale farms. At that time, large-scale commercial units accounted for only 2 percent of all farms, but they used 13 percent of all farm equipment. Family farms classified as large enterprises made up 7 percent of the total number of farms but used 23 percent of the nation's farm equipment. Medium-sized family farms made up 20 percent of the number of farms and owned 36 percent of the equipment. Further evidence of the commercial importance of these larger farms is found in the fact that in 1944, representing 29 percent of all farms, they produced 76 percent of total farm output. The remaining 24 percent was produced by the family farms with small output, other small-scale farms, part-time farms, and nominal farming units, which together in that year comprised 71 percent of the total number of farms.

The importance of large farm units as sources of demand for farm equipment, and thus for farm equipment credit, is also shown by dollar figures in Table 3, which reveal that, on the average, the large-scale farming units used \$6,720 of farm equipment per farm, while the large and medium-sized family farms used \$3,135 and \$1,718 worth, respectively. The equipment of small family farms, on the other hand, was valued at only \$713 per farm on the average, and the equipment of all other farming units—small-scale, part-time, and nominal—was valued at approximately \$300 per

TABLE 3  
 VALUE OF EQUIPMENT AND TRUCKS, VALUE OF FARM OUTPUT, AND PERCENTAGE OF  
 FARMS REPORTING TRACTORS, 1945, BY ECONOMIC CLASS OF FARM

ECONOMIC CLASS OF FARM <sup>a</sup>	EQUIPMENT <sup>b</sup> AND TRUCKS		FARM OUTPUT <sup>c</sup>		TOTAL NUMBER OF FARMS	LAND IN FARMS (ACRES)	PERCENTAGE OF FARMS REPORTING TRACTORS
	Average per Reporting Farm	Percent	Average per Reporting Farm	Percent			
Farming units:							
Large-scale farms	\$6,720	13%	\$39,352	22%	2%	26%	86%
Large family-farms	3,135	23	10,500	24	7	18	86
Medium family-farms	1,718	36	4,662	30	20	24	69
Small family-farms	713	19	1,876	17	28	18	30
Small-scale farms	269	4	825	4	16	6	9
Part-time and residential:							
Part-time farms	289	2	575	2	10	2	14
Nominal farms	291	3	295	1	17	6	9
Total, or average, for the United States	\$1,117	100%	\$ 3,171	100%	100%	100%	34%

Compiled from 1945 *Sample Census of Agriculture: Special Report* (Bureau of the Census), pp. 120-23.

<sup>a</sup> The economic classes of farms used here are those employed in the Census of Agriculture; classes are mutually exclusive and are defined in terms of the total value of the products sold or used by the farm household or in terms of a combination of value of

product, value of land and buildings, and number of days the farm operator worked off the farm. For full definitions see the *Special Report* cited above, pp. 15 f.

<sup>b</sup> Includes field and farmstead equipment, as defined in footnote 2 of Chapter 1, and hand tools.

<sup>c</sup> Value of all farm products sold or used by farm households.

farm.<sup>7</sup> Finally, it will be observed that tractors are not very much in use on small-scale farms, whereas 86 percent of the larger farms have at least one. Although data are not presented here, it is also true, as would be expected, that large, mechanically powered equipment, such as combines, hay balers, and corn pickers, is reported mainly in use on the larger farms.

### *The Importance of Tractors*

In the growing reliance of agricultural producers on machinery an important factor, it has been suggested, was the shift from animal to tractor power. It will be worth while to examine this development in more detail, by means of two tables, the first indicating changes in the dollar amount of equipment in use, and coming onto the market, since 1910, and the second giving separate figures for tractors and for other farm equipment.

Table 4 shows that the dollar value of farm equipment in use (other than trucks and automobiles) more than doubled between 1910 and 1920, fell by about 17 percent during the twenties, sank in 1935 to a level hardly above that of 1910, and did not until 1942 rise above the 1920 amount. From then on, the rise was uninterrupted and steep, so that by 1950 the total value was nearly four times what it had been in 1942. More directly, the changes in dollar volume of equipment sales, and thus in the potential market for farm equipment credit, are indicated in Table 4 by figures showing value of new equipment shipped annually by manufacturers. While this does not give the volume of farmers' purchases at retail, it does suggest the order of change. The dollar total of yearly sales of new equipment at factory prices more than tripled between 1940 and 1950.

The changing importance of tractor as against animal power in this development, and of tractors as compared with other types of farm equipment, is shown in Table 5. The values of equipment and draft animals in use are given first in current terms, and then as adjusted for price changes in order to approximate the changes in physical amount that are involved. It will be noted that by far

<sup>7</sup> Although there are no data available on this point, it is generally acknowledged that used equipment constitutes a relatively high proportion of the equipment purchased by farms in the small size classes, whereas the larger producing units purchase mainly new equipment.



**TABLE 4**  
**VALUE OF EQUIPMENT ON FARMS, AND**  
**VALUE OF MANUFACTURERS' DOMESTIC SHIPMENTS OF NEW EQUIPMENT,**  
**1910, 1920, AND 1930-53 ANNUALLY**  
*(in millions of dollars)*

<i>Year</i>	<i>Value of Equipment<sup>a</sup></i>	<i>Manufacturers' Domestic Shipments<sup>b</sup></i>
1910	1,240	c
1920	2,523	c
1930	2,095	347
1931	2,103	223 <sup>d</sup>
1932	1,916	c
1933	1,595	c
1934	1,363	c
1935	1,295	272
1936	1,384	369
1937	1,559	458
1938	1,830	367
1939	1,971	358
1940	1,859	429
1941	2,207	596
1942	2,782	601
1943	3,501	302
1944	3,855	549
1945	4,446	613
1946	4,631	763
1947	5,064	1,133
1948	6,567	1,514
1949	8,680	1,551
1950	10,506	1,562
1951	11,087	1,917
1952	12,754	1,687
1953	13,343	1,554

<sup>a</sup> Includes field and farmstead equipment as defined in footnote 2 of Chapter 1, and hand tools. Data are as of January 1 and were compiled as follows: for 1910-39 from *Progress of Farm Mechanization*, by Martin R. Cooper, Glen T. Barton, and Albert P. Brodell (U.S. Department of Agriculture, Misc. Pub. No. 630, October 1947), Table 39, p. 83; for 1940-53 from *The Balance Sheet of Agriculture, 1954* (USDA, Agricultural Research Service, Agr. Inf. Bul. No. 134, August 1954), Table 9, p. 15.

<sup>b</sup> Figures through 1938 are from *Agricultural Statistics, 1951* (U.S. Department of Agriculture), Table 620, p. 540; for 1939-51, from *Agricultural Statistics, 1953*, Table 660, p. 562; and for 1952 and 1953 from *Farm Machines and Equipment, 1953* (Bureau of the Census, September 1954), pp. 2 and 22<sup>f</sup>. Includes field and farmstead equipment as defined in footnote 2 of Chapter 1; machines for industrial and military use, internal combustion engines, hand tools, and some unspecified other items are excluded from 1943 on, but included for earlier years.

<sup>c</sup> Data not available.

<sup>d</sup> Includes shipments for export.

TABLE 5

VALUE OF DRAFT ANIMALS, AND OF TRACTORS AND OTHER FARM EQUIPMENT,  
SELECTED YEARS, 1910-53

YEAR	IN CURRENT DOLLARS (MILLIONS)			IN 1935-39 DOLLARS (MILLIONS)			NUMBER (THOUSANDS)		
	Horses and Mules	Tractors	Equipment <sup>a</sup>	Horses and Mules	Tractors	Equipment <sup>a</sup>	Horses and Mules	Tractors	
			Other than Tractors			Other than Tractors			
1910	\$2,790	\$ 2	\$1,238	\$2,564	\$ 1	\$1,876	24,211	1	
1920	3,072	283	2,240	2,748	123	2,055	25,742	246	
1930	1,539	461	1,634	2,019	460	1,634	19,124	920	
1940	1,328	589	1,364	1,503	772	1,364	14,478	1,545	
1945	1,078	1,330	3,186	1,257	1,212	2,025	11,950	2,422	
1950	476	2,929	7,577	b	b	b	7,781	3,609	
1953	294	3,770	9,573	b	b	b	5,636 <sup>e</sup>	4,400	

Data are given as of January 1. Dollar figures for 1910-45, both current and constant, are from *Progress of Farm Mechanization*, by Martin R. Cooper, Glen T. Barton, and Albert P. Brodell (U.S. Department of Agriculture, Misc. Pub. No. 630, October 1947), Tables 39 and 40, pp. 83 and 84. Current dollar figures for 1950 and 1953 are from *The Balance Sheet of Agriculture, 1954* (USDA, Agricultural Research Service, Agr. Inf. Bul. No. 134, August 1954), Tables 8 and 9, pp. 13 and 15, with the 1950 figure for horses and mules from the 1953 *Balance Sheet* (Agr. Inf. Bul.

No. 155), Table 8, p. 14. Numbers of draft animals and tractors are from *Agricultural Outlook Charts, 1954* (Bureau of Agricultural Economics, October 1953), p. 35.

<sup>a</sup> Includes field and farmstead equipment as defined in footnote 2 of Chapter 1, and hand tools.

<sup>b</sup> Data not available.

<sup>e</sup> Preliminary.

the greatest part of the increase in the total demand for farm equipment other than automobiles and trucks which took place since 1910 has resulted from the shift from animal to tractor power. Farm mechanical equipment other than tractors changed relatively little in physical amount between 1910 and 1945, though in the years 1940-44 it increased substantially (by 48 percent, as against 57 percent for tractors).

### *Characteristics of Agriculture Affecting Farm Equipment Financing*

Besides broad physical and economic factors which affect the trend toward mechanization in agriculture and thus the over-all demand for farm equipment, certain characteristics of farming as an industry have an important bearing on the problem of financing farmers' credit purchases of equipment. In the first place, the market for farm equipment consists of a very large number of relatively small units, there being almost five and a half million farms in the United States—more than the number of business enterprises of all other types combined.<sup>8</sup> This fact greatly affects not only the way in which farm equipment sales are made but also the problem of servicing the credit contracts which arise from credit sales.

Secondly, agriculture is an industry with a typically slow rate of capital turnover, having a relatively high ratio of fixed capital to total capital. For example, the rate of capital turnover for mid-western farms is normally about once every six to eight years. Farm capital requirements are met for the most part, therefore, by relatively long-term financing, and thus agriculture is peculiarly vulnerable to long-term price movements.

Thirdly, farm products have been subject to wide price fluctuations; in addition, output on individual farms fluctuates considerably because of weather. These factors tend to make farm income unstable, and unpredictable from year to year.

Finally, since most farms are individual proprietorships, a large number of them must be refinanced each generation as they are transferred, equipment assets included, to new owners. The personal nature of the typical farm enterprise also means that farm

<sup>8</sup> *Statistical Abstract of the United States, 1954*, Table 742, p. 635, and Table 560, p. 502.

and family income and expenses are intermingled, which complicates the credit problem. All these characteristics of agriculture place the financing of farm equipment in a somewhat different status than the financing of equipment in general, except, perhaps, in the case of equipment financing for very small commercial and industrial enterprises.