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## FOREWORD

by Simon Kuznets

### I

THIS is the second in a series of monographs resulting from an inquiry initiated by the National Bureau of Economic Research in 1950, with the financial assistance of the Life Insurance Association of America.<sup>1</sup> The inquiry examines long-term trends in capital formation and financing in the United States, and is organized primarily about the principal capital-using sectors of the economy—agriculture, mining, manufacturing, the public utilities, residential real estate, and governments. The analysis for each sector summarizes the major trends in real capital formation from 1870 (or the earliest year for which data are available), and in financing from 1900, and the factors determining these trends, and, so far as possible, suggests the significance of these factors for the future. In addition to the sector studies, the inquiry comprises two others. One deals with trends in external financing channeled through intermediate financial institutions and attempts to link the major types of institutions with the various groups of capital users. The second integrates the results of all the other studies, within a framework provided by countrywide estimates of national product and relevant components, and by countrywide estimates of assets and debts.

Some of the findings have been presented in part or in preliminary form in a series of Occasional and Technical Papers.<sup>2</sup> This monograph, like those to follow, presents the full results of a specific study together with supporting data. The others, completed or near completion, deal with trends in capital formation and financing in mining and manufacturing, the public utilities, and governments; the flow of

<sup>1</sup> The first monograph, *Capital Formation in Residential Real Estate: Trends and Prospects*, by Leo Grebler, David M. Blank, and Louis Winnick, was published by Princeton University Press for the National Bureau of Economic Research in 1956.

<sup>2</sup> Leo Grebler, *The Role of Federal Credit Aids in Residential Construction*, Occasional Paper 39 (1953); Daniel Creamer, *Capital and Output Trends in Manufacturing Industries, 1880-1948*, Occasional Paper 41 (1954); Raymond W. Goldsmith, *The Share of Financial Intermediaries in National Wealth and National Assets, 1900-1949*, Occasional Paper 42 (1954); Melville J. Ulmer, *Trends and Cycles in Capital Formation by United States Railroads, 1870-1950*, Occasional Paper 43 (1954); Alvin S. Tostlebe, *The Growth of Physical Capital in Agriculture, 1870-1950*, Occasional Paper 44 (1954); Israel Borenstein, *Capital and Output Trends in Mining Industries, 1870-1948*, Occasional Paper 45 (1954); David M. Blank, *The Volume of Residential Construction, 1889-1950*, Technical Paper 9 (1954); all published by the National Bureau of Economic Research.

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financing through financial intermediaries; and finally, a summary presentation and analysis of trends in capital formation and financing for the country as a whole.

## II

Dr. Tostlebe's illuminating study deals with long-term trends in the accumulation of real capital and its financing in agriculture—the oldest major sector in the productive structure of the country. Familiar as the history of this sector may be, the sharpness and magnitude of the trends in its product, capital, and labor force, studied by Dr. Tostlebe not only for the country as a whole, but for ten major regions within it, may come as a surprise. The findings that are the most striking and perhaps most deserving of note in this brief foreword are (1) the distinctive ways in which increase in capital and in number of persons engaged combined to produce the remarkable growth in agricultural output attained over the period studied; (2) the marked shifts in the composition of physical capital accumulated in agriculture; and (3) the noticeable trends in the relative importance of the various sources of financing.

(1) From 1870 to 1950, the gross value of agricultural output, in constant prices, rose nearly 400 per cent; and the growth still continues, the index of farm output having risen 14 per cent from 1950 to 1956 (see *Economic Report of the President*, January 1957, p. 189). The movements of the two factors of production, capital and labor, over the eighty-year period covered in Dr. Tostlebe's study, have, however, been strikingly different. The number of persons engaged in 1950, 6.9 million, was about the same as in 1870; but physical capital, including land, grew from about \$20 billion (in 1910-14 prices) to about \$54 billion. If we exclude land, the rate of growth is even more marked—from about \$6 billion to about \$19 billion, or over 200 per cent.

Lest we conclude too hastily that the accumulation of physical capital was, in and of itself, a factor that directly determined and produced the steady and impressive growth of agricultural output, attention must be drawn to the differences in movement between the first and the last forty years within the period covered. From 1870 to 1910, the number of persons engaged rose from 6.9 million to 11.6 million, i.e. almost doubled; the stock of physical capital, in 1910-14 prices, grew from \$19.8 billion to \$45.4 billion, i.e. more than doubled; gross farm output increased from \$2.5 billion to \$6.7 billion (again in 1910-14 prices), i.e. more than doubled. Here one could argue that the additions to both labor and capital were of a

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proportional magnitude only somewhat smaller than those in output; and that it was the additions to both factors of production that were important in producing the growth in output. But from 1910 to 1950, the number of persons engaged in agriculture *declined*—from 11.6 million to 6.9 million; and the physical stock of capital grew only from \$45.4 billion to \$53.7 billion. Yet the gross value of farm output increased, in 1910-14 prices, from \$6.7 billion to \$11.8 billion—i.e. almost doubled.

Whatever one might say of the extensive expansion of agriculture in the first four decades, certainly the last four must have witnessed far-reaching technological and related institutional changes which permitted the remarkable rise in agricultural output—with only minor additions to capital within agriculture and despite sharp declines in the number of workers engaged. Part of the explanation lies in the contribution of other industries, outside of agriculture, to the production of the farming sector: the *net* value of agricultural output, net of payments to other industries and net of depreciation, rose from \$5.3 billion in 1910 to \$7.6 billion in 1950. While this rise of some 40 per cent over four decades was only half the rise of close to 80 per cent in the *gross* value of farm output, yet it was substantial—considering that the labor force was cut almost in half and that the additions to physical capital amounted to less than 20 per cent.

The point to be stressed—and it is amply illustrated in Dr. Tostlebe's discussion—is that physical capital assumes meaning only within a given technological and institutional framework, and it follows that in a progressive economy such as ours, this meaning changes all the time. Thus while there is continuous demand for capital replacement and addition, the magnitudes needed are a function of an ever changing and ever increasing stock of knowledge. The recent decades in particular have witnessed the capacity of technological progress to produce greater quantities without substantial increases in either labor or capital—which is but another way of saying that the rate of increase in productivity per unit of input of resources, whether capital or labor or both combined, has been accelerating.

(2) The changes in technology that alter the meaning of the demand for capital and labor can be clearly seen through their effect on the composition of new capital in agriculture. Between 1870 and 1910, the total increase in physical capital amounted to \$25.6 billion (in 1910-14 prices). Of this total, additions to land accounted for \$16.6 billion, or about 65 per cent; buildings, for \$3.8 billion or about 15 per cent; implements and machinery, for \$1.0 billion or only 4 per cent; horses and mules, for \$1.6 billion or somewhat over

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6 per cent; other livestock, for \$1.1 billion or over 4 per cent; and crop inventories, for \$1.4 billion or well over 5 per cent.

The distribution of additions during the last four decades was strikingly different. Of the total, \$8.3 billion, additions to land were \$4.3 billion, almost 52 per cent—still a substantial, although a smaller, proportion. Additions to buildings amounted to \$1.1 billion, about 13 per cent, also a smaller proportion than in the first four decades. But additions to implements and machinery were \$3.1 billion, 37 per cent instead of the 4 per cent they formed of the additions from 1870 to 1910. Investment in horses and mules *declined*, by as much as \$1.8 billion; that in other livestock rose by only \$0.7 billion; and that in crop inventories by only \$0.9 billion. The effects of mechanization of agriculture are clearly evident in these figures, and the process is still going on.

It is apparent that this is also the process which explains the decline in the ratio of net to gross farm output, i.e. the rise in the relative importance of payments to other industries. The increased use of chemical fertilizers, the substitution of tractors for horses and mules, the increased use of other mechanical power—all of this means a growth in purchases by agriculture from other sectors in the economy. Nor does one have to stress that these shifts in technology, with the related changes in size of farm unit and other aspects of the organizational structure of agriculture, mean that financing must be provided not merely for the net additions to physical capital but also for facilitating changes from one type of capital to another and from one type of farming to another.

(3) As Table 2 of Dr. Tostlebe's monograph shows, the gross need for funds—to provide for replacement and additions to physical capital and to working cash—was, on the whole, met largely out of gross farm income. In only one decade, that affected by World War I inflation of values, was the share of "internal" financing below 70 per cent; and there is clearly a rise in the share of internal financing over the decades. In the latest of the five decades, 1940-49, gross farm income financed over 90 per cent of the total gross additions to physical assets plus working cash. This trend has contributed to the remarkable growth of farmers' equity in the total assets of agriculture.

This, however, is an oversimplified picture of the process and the problems. In treating agriculture as a unit, we overlook the fact that what is "internal" to this sector as a whole, may be "external" to the operating units, i.e. the individual farms. Some farmers may finance acquisition of real assets out of external funds, i.e. by adding to their

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debts. Other farmers may accumulate funds and use them to reduce their debts. In the total for agriculture, the reductions in and additions to debts will offset each other, and it may appear as if all capital formation were financed from internal funds. Yet, in fact, for units that did invest in real assets, the share of external funds may have been quite high. Financial institutions must, therefore, provide not merely the relatively small proportion of *net* external financing (net for agriculture as a whole) but also a great deal of gross financing, i.e. supply funds for whatever needs there may exist at the level of *individual* active units within this large sector of the economy.

The second point to be borne in mind is that, in part, our interest in the role of external financing, i.e. borrowing, stems from the possible burdens it imposes on the debtor enterprise. But these burdens are not simply a function of the share of external financing in the gross or net additions to capital assets; they are also a function of changing price levels, since the debts are in fixed monetary units. Any sizable price declines will naturally add to the burden of debts; and sizable and sustained price rises, all other conditions being equal, will mean a relief to the debtor. Much of Dr. Tostlebe's discussion of the changing financial position of the farmer, under the combined effects of price changes and of reliance on external sources of funds, bears on this point.

### III

The comments above are brief reminders of some major trends established in the monograph—their selection being naturally a reflection of my own interest and judgment. They fail to do justice to the wealth of detailed data and discussion in the monograph. Of particular value and interest is the analysis of trends for the ten agricultural regions—an excursion that permits us to observe the growth process in its varying rate and impact under widely different circumstances; and thus to see in clearer light the changing association among the various productive factors and output. One should also call attention to Dr. Tostlebe's discussion of the prospective trends in agriculture's demand for capital and in the sources of its financing, and of the difficulty of assigning proper weight to such trends, even for one fully familiar with the field—as evidenced by the degree to which projections of some specific aspects by highly competent authorities not much more than a decade ago, fell short of the mark. It is clear that while the general direction of the prospective trends can perhaps be safely established, the *rates* at which they will proceed are not easily estimated. And this is likely to be true in particular

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of agriculture—one sector among many, whose technology is therefore likely to be affected by a wide variety of impacts, not only from within the sector but even more from without.

But our knowledge of the forecastable relations among economic and other processes can be secured only gradually and slowly; and the emphasis should be on securing additions that are sufficiently tested to become the basis upon which further work can safely rest. The great value of Dr. Tostlebe's monograph lies not only in the analysis to which, within the limits of time and effort available, he could subject his data. It rests also on the provision of a variety of basic data, in comparable and continuous detail not heretofore available. We can confidently expect that these data, like those of the other studies within the present inquiry, will be used for years to come, as a rich deposit from which other analysts can quarry relationships among economic processes and magnitudes that may be used as bases for further generalizations and for a clearer perception of current problems and future prospects.