

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Productivity and Economic Progress

Volume Author/Editor: Frederick C. Mills

Volume Publisher: NBER

Volume ISBN: 0-87014-353-0

Volume URL: <http://www.nber.org/books/mill52-1>

Publication Date: 1952

Chapter Title: Increments to National Product, and Their Components

Chapter Author: Frederick C. Mills

Chapter URL: <http://www.nber.org/chapters/c3157>

Chapter pages in book: (p. 5 - 9)

ployment. Neither a productivity index nor a productivity increment is a measure of the effectiveness with which total available resources have been used; nor does either indicate the output that might have been won had all resources been employed.

In tracing changes in a given economy we are concerned not only with the sources of the increments to national product; we are equally interested in uses. Progressively, in a growing economy, additional productive resources are opened up and new productive power is won. These resources and this power may be put to diverse uses. To some extent, too, resources carried over from earlier periods may be shifted to new uses. The pattern of resource use, as it is modified from decade to decade and from generation to generation, is one of the most revealing aspects of economic growth. We shall turn to the subject of uses after tracing the expansion of national product over the last half century and defining the parts played by labor input and productivity as contributors to changes in total product.

## II

### INCREMENTS TO NATIONAL PRODUCT, AND THEIR COMPONENTS

The growth of the gross national product of the United States, in real terms, has been conspicuously uneven during the twentieth century, with the major fluctuations coming in the last three decades. Decade increments and the two components of each such increment are given in the following table and are charted in Figure 1. All values relate to decade aggregates.<sup>4</sup>

<sup>4</sup>The basic national product estimates here used are those of Simon Kuznets. To Kuznets' figures, on his peacetime concept, M. Slade Kendrick's estimates of the war and defense expenditures of the federal government have been added, with a correction to prevent duplication (see Note 1 at the end of this paper). This modification gives us measures corresponding to Kuznets' wartime concept of gross national product, except that the present totals include all defense expenditures in years of peace, as well as in wartime. I am indebted to Dr. Kuznets also for the classification of elements of the national product used in later sections.

In deriving estimates of labor input I have used continuing series of the Bureau of the Census and the Bureau of Labor Statistics, and employment and hours of work estimates of Clarence Long, Leo Wolman, and others.

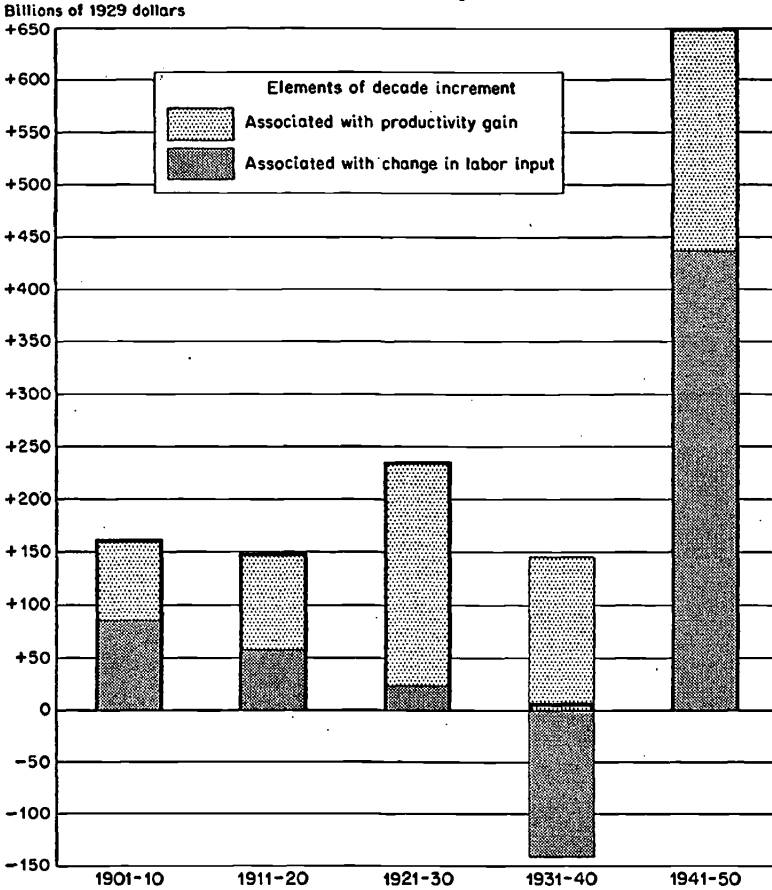
<i>Decade</i>	<i>Gross national product increment (billions of 1929 dollars)</i>	<i>Labor input increment of 1929 dollars</i>	<i>Productivity increment</i>
1901-10 (change from 1891-1900)	+161	+85	+76
1911-20 (change from 1901-10)	+148	+57	+91
1921-30 (change from 1911-20)	+235	+23	+212
1931-40 (change from 1921-30)	+5	-141	+146
1941-50 (change from 1931-40)	+650	+437	+213

The accelerations in economic expansion, as measured by increments to real gross product, came in the first, third, and fifth decades of the century. The second decade brought modest retardation; the fourth brought a major check, with actual retrogression during the first five years. The advance of the twenties was notable, that of the forties phenomenal.

There is a sharp and revealing contrast in behavior between the two components of national product increases. One, reflecting additions or subtractions of sheer manpower, shows progressively declining increments through four decades, culminating in a decrement of major proportions in the thirties. The absolute contribution of added labor in the twenties was only about one-fourth that recorded for the decade 1901-10. Hours of work were being steadily shortened in these earlier decades, and those in the lower age groups were being withdrawn from the work force. After the first decade it was only in the forties, under the stimulus of war and defense, that we resorted primarily to the instrument of added manpower to augment production. (One reason for the very large labor input increment in the forties was, of course, the subnormal level of employment in the thirties, which provide the base of comparison for the following decade.)

The chief lifting force between the first and the fifth decades was steadily growing productivity. This increment grew from 76 billions (of 1929 dollars) in 1901-10 to 212 billions in 1921-30. Relatively, this last was the greatest productivity gain of the half century. There was a drop in the depressed thirties, but even in that decade the productivity increment was more than large enough to offset the loss of 141 billions resulting from a great decline in the

**Figure 1**  
**Decade Gains in Real Gross National Product**  
**and their Components**



Each bar measures the amount by which the national product of a given decade exceeded the national product of the preceding decade.

volume of labor input. The most recent decade brought a productivity increment of 213 billion dollars, a figure approximately equal to the gain of the twenties. The employed labor force in the latest decade was the largest in our history and this, of course, served to enhance the gain resulting from the actual advance in manhour productivity. Great as it was, the productivity increment

in this decade was materially exceeded by the labor input increment. Additions to manpower, supplemented by increases in output per manhour, gave us the tremendous increment to product upon which we drew for guns and butter in the forties.

I have said that the relative gains in productivity were greatest in the twenties. To the student of economic growth, indeed, special interest attaches to the period of six or eight years following the end of the first world war. In these years rates of acceleration in manhour productivity in the economy at large and in the important manufacturing sector reached their maxima, for the fifty-year period here reviewed. For the whole economy the rate of productivity gain attained almost 4 per cent a year between 1918 and 1924. In manufacturing industries output per manhour increased at a rate of 10 per cent a year for each of the three years between 1919 and 1922, an advance probably without precedent in our industrial history.

Back of these advances lay a highly favorable conjuncture of circumstances. The movement toward scientific management came to first fruition in the industrial expansion of the early twenties. The moving assembly line, dramatized by Ford a few years earlier, became a standard feature of mass production. The power available to industrial workers was greatly increased in amount and in flexibility of application. Working hours declined from 53 a week in 1914 and 1917 to an average of 47 in 1922. Occupational shifts contributed to the gain in manhour output in the general economy. In the recovery that followed the readjustment after World War I the number of persons in the relatively highly paid tertiary occupations grew, while employment in agriculture and in manufacturing lagged, or declined. The stock of real capital per worker, in the form of producers' durable equipment and industrial and commercial structures, stood at a relatively high level in the early twenties, having increased by some 40 per cent in two decades.<sup>5</sup> No comparable rise occurred until the notable increase that fol-

<sup>5</sup> I have here made use of Dr. Raymond Goldsmith's data on elements of estimated national wealth, in 1929 prices. See "A Perpetual Inventory of National Wealth", *Studies in Income and Wealth, Volume Fourteen* (National Bureau of Economic Research, 1951), pp. 5-73.

lowed the end of World War II. Perhaps of greater importance than the increase in the stock of capital goods was the advance in the *quality* of capital instruments. Technological improvements as well as the innovations of scientific management were widely adopted in the early twenties; such improvements were chiefly manifest in the tools of production. These diverse factors combined with others in the complex of working conditions that determine productive effectiveness to yield a remarkable productivity gain.

### III

#### USES OF PRODUCTIVE RESOURCES

The characteristics of an economic system are defined not alone by the magnitude and sources of its productive power. The purposes for which productive resources are used are the most significant indicators of its pattern of life. These purposes reflect the collective desires and needs of the individuals who make up the system. Basic wants for food, clothing and shelter, desires for satisfactions above subsistence levels, the role of instrumental goods in the productive process, and compulsions imposed by necessities of war or defense are all manifest in the patterns of use that prevail at given times. Such uses, in the aggregate, are shown by the familiar national income and national product classifications that have been developed within recent decades for this and other countries.

##### *Maintenance, defense, and progress*

A somewhat different classification of uses has been employed in this study. Here we think of economic resources as being used for three broad purposes — maintenance, defense, and progress. The population must be supported at an established consumption level; the existing stock of capital equipment must be maintained if there is not to be retrogression through depreciation and obsolescence; means must be provided for defense against attack from abroad. Only after these needs have been met is economic progress possible.