



# EMPLOYMENT, GROWTH, AND PRICE LEVELS

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**HEARINGS**  
BEFORE THE  
**JOINT ECONOMIC COMMITTEE**  
**CONGRESS OF THE UNITED STATES**  
EIGHTY-SIXTH CONGRESS  
FIRST SESSION  
PURSUANT TO  
**S. Con. Res. 13**

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APRIL 7, 8, 9, AND 10, 1959

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**PART 2—HISTORICAL AND COMPARATIVE RATES  
OF PRODUCTION, PRODUCTIVITY, AND PRICES**

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## EMPLOYMENT, GROWTH, AND PRICE LEVELS

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TUESDAY, APRIL 7, 1959

CONGRESS OF THE UNITED STATES,  
JOINT ECONOMIC COMMITTEE,  
Washington, D.C.

The committee met at 10 a.m., pursuant to notice, in the old Supreme Court room, the Capitol, Hon. Wright Patman (vice chairman) presiding.

Present: Representative Patman; Senators O'Mahoney and Bush; Representatives Bolling, Reuss, Coffin, and Widnall.

Representative PATMAN. The committee will please come to order.

This morning the Joint Economic Committee begins 4 days of economic hearings going through a review of the historical changes which have taken place in our economy, as shown by various measures of its performance.

This is the second set of hearings in the committee's current broad investigation of economic policies. In this week's hearing, with the aid of outstanding authorities, we will review changes in the performance of the economy as revealed by such measures as national income and product, production, productivity, and prices.

As announced by the chairman, Senator Paul Douglas, on Friday, March 27, we open these hearings by looking at the economy as revealed in the national income and products accounts. Tomorrow will be devoted to measures of production and productivity. Thursday, the committee will be concerned with prices. On Friday, this second set of hearings will conclude with an analysis of long swings in U.S. growth.

This week's hearings have been designed to provide a factual and historical perspective valuable to the committee in its deliberations during the year on the way the economy has been performing and on changes in policies which would contribute to improving its performance in the future.

This morning's witness is Dr. Raymond W. Goldsmith, professor of economics at New York University. He is one of this country's outstanding scholars in the field of national income analysis. He also has had wide experience and is author of a monumental three-volume work entitled "A study of Saving in the United States."

He acted as chairman of the National Accounts Review Committee which was appointed by the National Bureau of Economic Research at the request of the Bureau of the Budget. Their report was reviewed by this committee's Subcommittee on Economic Statistics during 2 days of hearings in October 1957.

Dr. Goldsmith, you may proceed in your own way, summarizing your statement or reading it. Of course, your full statement will be

inserted in the record, and you have permission to revise and extend your remarks to include any material or matter that you feel is relevant. In other words, you have the permission that the Members of Congress always have on their respective floors, to revise and extend their remarks.

**STATEMENT OF RAYMOND W. GOLDSMITH, PROFESSOR OF  
ECONOMICS, NEW YORK UNIVERSITY**

Dr. GOLDSMITH. Thank you, Mr. Chairman and members of the committee.

I shall avail myself of the privilege of inserting the full statement into the record, as it is a little too long to be read and probably also a little too technical and dull to keep your attention. I should like to make a relatively brief oral presentation based on half a dozen charts which I have prepared and which are attached to the statement so that you can consult them. I am doing this, also, so that you will feel freer to interrupt me if I just talk than if I rapidly read a prepared statement. I am, of course, ready to answer questions about parts of the statement which I do not cover in my oral presentation and other relevant questions that I have not touched upon in the statement itself. Now, it is obvious, as always, that this is a personal statement which does not implicate either New York University or the National Bureau of Economic Research, for which I have been doing some of this work.

I take it, as the chairman intimated, that you are devoting a week to this more or less academic presentation because you feel that knowledge of and understanding of the past will to some extent help you in assessing the future and possibly in deciding what to do about it insofar as anything can be done about it by legislation. And I take it, also, that you are starting out the hearings with a discussion of national product and income, because that is usually regarded as the best simple, single measure of economic growth.

That assumption is to a good extent valid. Gross national product is a measure of the total unduplicated output of the economy. You can visualize it as the heap of goods and services that is turned out by the economy in any one year. We call it gross, because it does not make a deduction for capital consumption allowances. Once we make that deduction, we have net national product. The difference usually is not very large, and I shall, throughout the presentation, adhere to the more general concept of gross national product.

I shall, then, start by reviewing the record. Before doing so in detail, I shall just cite three figures which characterize the period that I am covering, namely, the 120 years between 1839 and 1959. During this 120-year period, which covers virtually all of the modern economic history of the United States, the gross national product in current prices has on the average increased at an annual rate of nearly 5 percent. However, if we eliminate price changes and reduce the figures to the constant price level of 1929, we find an average rate of growth of 3½ percent. If we go one step further—and that is a very relevant step for economic analysis—and take account of the increase in population and deal in terms of real gross national product

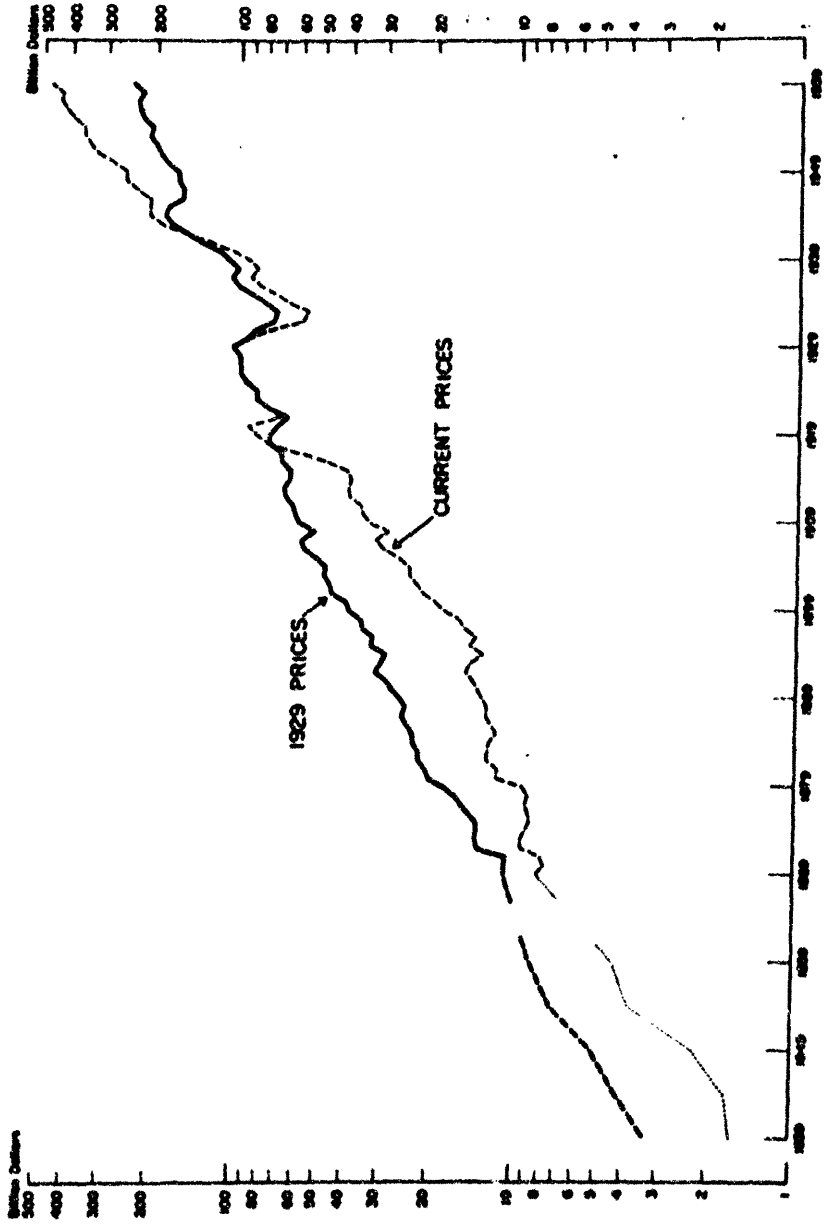
per head, we obtain an observed average rate of growth of about 1½ percent a year.

Let me now turn to the record in a little more detail as it is set forth in this set of seven charts, of which I shall discuss six. The seventh one is for your orientation. It describes relationships among national accounting totals, like national product, gross and net, national income, personal income and personal disposable income; and shows some of the breakdowns that can be made, and which I discuss to some extent in the statement, but into which I shall not go in this oral presentation unless you want me to.

Let me start with the simplest concept we have, which is gross national product in current prices. This curve, the thin line on chart I, shows the course of gross national product irrespective of what the determining forces are.

AGGREGATE GROSS NATIONAL PRODUCT  
CURRENT AND CONSTANT (1929) PRICES

Chart I



These are annual data. I have not eliminated any fluctuations. You will see that the figures before 1869 are drawn in a lighter line than the later data. This has been done to make it quite clear that our statistical data are poorer for these first 30 years. We have data only at 5-year intervals, and they are less reliable than the figures from the late 1870's on. This line, as I told you, shows an average annual increase of about 5 percent a year, but as you can see, exhibits very substantial short period ups and downs.

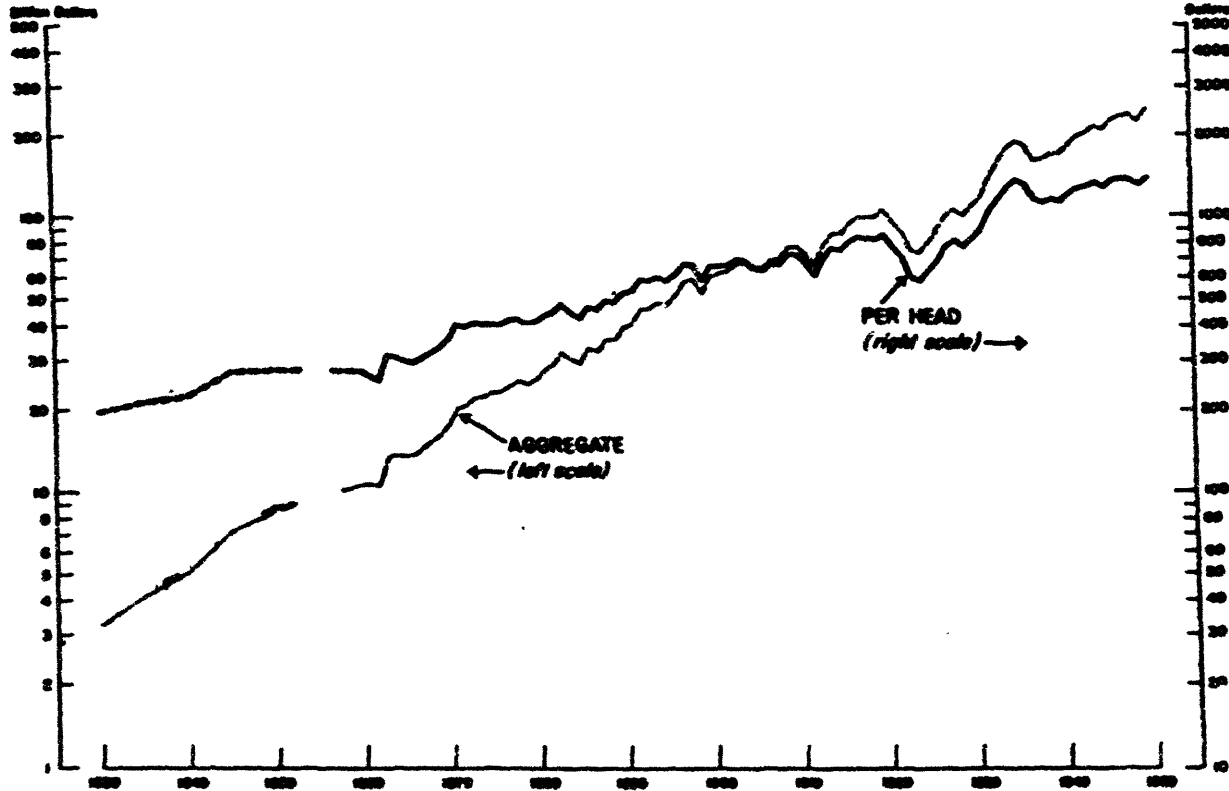
The heavy line eliminates price fluctuations by expressing all the figures in 1929 prices. Deflation, as we call it, is statistically a very difficult process, with many technical problems of its own, some of which I have mentioned in the statement. I feel, however, that by and large deflation produces a reasonable picture of what the total product of the American economy has been over these 120 years in quantitative terms.

Because prices generally have had an upward trend over the last 120 years—whether it is the natural thing for prices to go up, we may leave for other hearings—the gross national product in 1929 prices shows a slower rate of growth than the aggregate gross national product in current prices. The average rate of growth in 1929 prices is around  $3\frac{1}{2}$  percent per year. You will also note that all the fluctuations become much more moderate when you eliminate price changes, although some of them, particularly the Great Depression, still are clearly visible in the record.

I am now turning to chart II. The thin line on this chart is the same as the heavy line you saw on chart I, namely, gross national product in 1929 prices. The heavy line reflects real gross national product per head. This, as I said, is probably the most usable, simple, single measure of economic growth we have.

Chart IX

### REAL GROSS NATIONAL PRODUCT (1929 PRICES) AGGREGATE AND PER HEAD





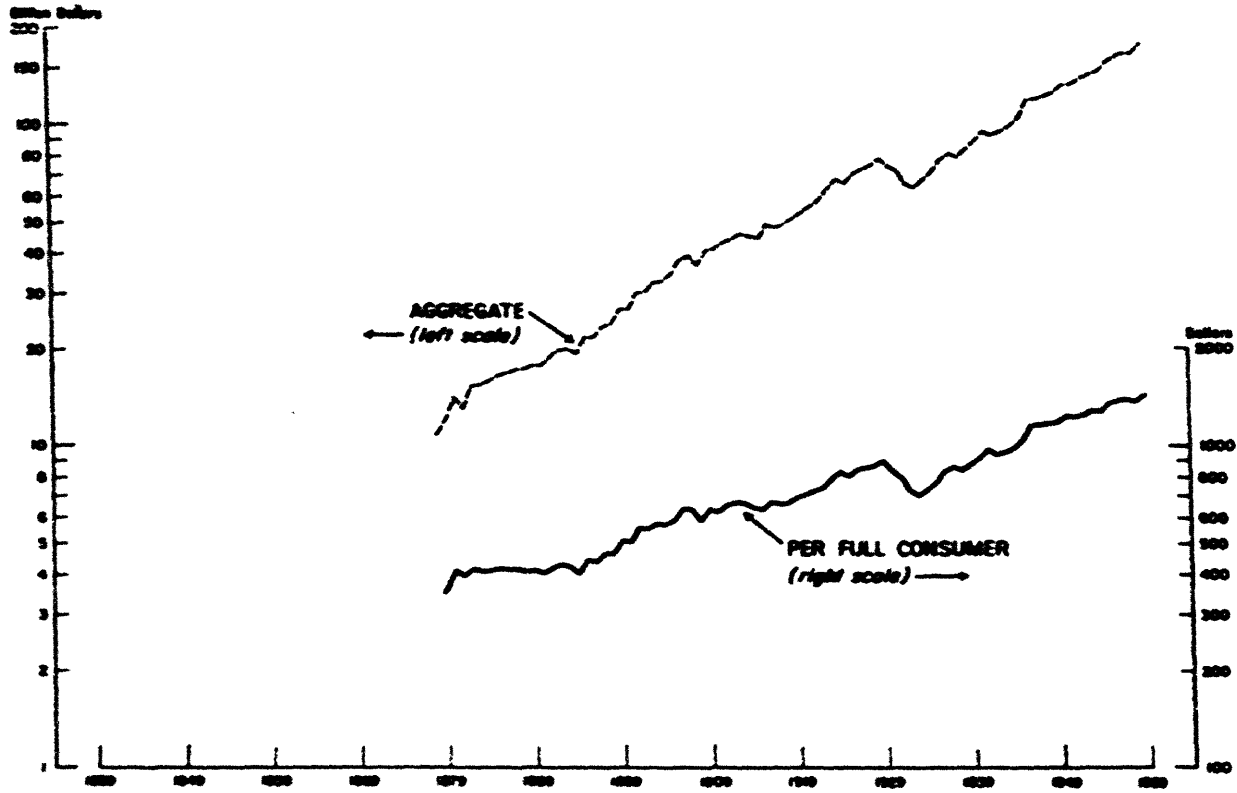
We must, in this connection, distinguish between two types of economic growth. One we may call extensive growth, and it may occur without any change in the standard of living in the form of an increase in the number of producing and consuming units. The second type, which we may distinguish from the first by calling it intensive economic growth, and which is the type of growth in which we are really interested, shows itself in an increase in gross national product per head, or some similar measure. This is the more relevant figure for the study of economic growth.

You will see in chart II that because of the rapid increase in the population of the United States, the real gross national product per head rises at a considerably slower rate than does the aggregate real national product. This magnitude grows, as I have indicated, at an average rate of  $1\frac{1}{2}$  percent per year. The fluctuations, over short periods, are similar in both the aggregate and the per-head series, because population growth is a rather regular phenomenon.

Let me now turn in chart III to a slightly different aspect. Gross national product per head, while a good general measure, is not, from a theoretical point of view, an ideal one. On the one hand, it is not a measure of productive efficiency, the amount of output per unit of input, a subject about which you will hear tomorrow. And it is not, on the other hand, a welfare measure. That you get in chart III, as best we can do it in a simple way.

Chart III

### PERSONAL CONSUMPTION EXPENDITURES (1929 PRICES) AGGREGATE AND PER FULL CONSUMER



Here you see personal consumption expenditures in 1929 prices, i.e., the heap of goods which consumers have received every year. In the lower heavy line I divide this aggregate heap by the number of consumers, adjusting for the differences in consumption standards between people of different age and sex. This is as far as we can go without making elaborate calculations, in presenting a welfare measure of national product.

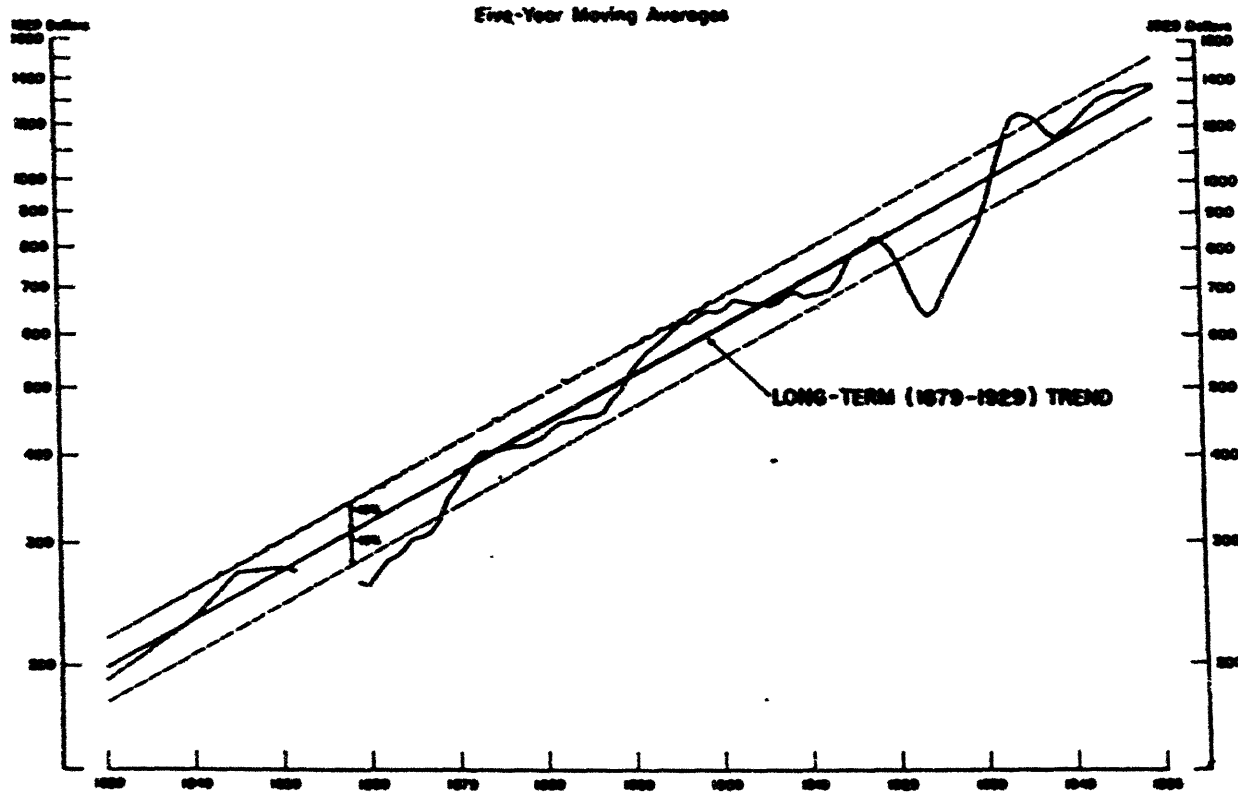
If you compare the heavy line in chart III with the one on chart II, you will find that the slope is very similar. Real consumption per full consumer over this period has increased at the rate of about  $1\frac{1}{2}$  percent per year, very little different from the rise of gross national product per head.

This reflects two things. First, the share of consumption in national output has been relatively stable. If you disregard smaller fluctuations, gross capital formation has absorbed one-fifth of national output; four-fifths have been going to consumers. Second, there has been a slight increase in the ratio of full consumers to population, reflecting the ageing of the population.

In chart IV we reach the heart of the matter that you have assigned to me. This chart again shows real gross national product per head, but this time I have used 5-year moving averages in order to eliminate the shorter time fluctuations which do not interest us in this long-term analysis.

Chart IX

## THE TREND IN REAL GROSS NATIONAL PRODUCT PER HEAD 1839-1959



I have determined the average rate of growth first for what we probably may regard as the longest normal period we have had. It runs from 1879 to 1929. This period is not affected by extraneous events to the extent the periods before and after were. It shows a rate of growth, pictured by the heavy section of the trend line, of 1½ percent per year. I have then continued this trend forward to 1959 and backward to 1839, which is as far as our figures go, to see whether the trend of the middle or core period did exist earlier for a while and seems to have continued for the 30 years after 1929.

It so happens that the extension of the trend to 1959 pretty much hits the actual figures on the nose.

Representative PATMAN. Senator Bush would like to ask you a question.

Senator BUSH. I am sorry. Maybe I missed it. But what do you use as a measure of the real gross national product in this chart? What is the measure?

Dr. GOLDSMITH. This is gross national product reduced to 1929 prices. The gross national product, as you know, Senator, is the monetary value of final output, of unduplicated total output.

Senator BUSH. I appreciate that, but do you have those figures back so far? How did you construct this thing?

Dr. GOLDSMITH. Well, I did not estimate them myself. We do have a series that runs back to 1869, by Professor Kuznets, our leading authority on national income estimates, and I have linked that series to the figures which the Department of Commerce has prepared for the period from 1909 on. For extrapolation from 1879 to 1839 I have used a recent estimate of commodity product by Professor Gallmann. The values before 1879, as I emphasized, are less reliable than the figures for the later period. But we have various indirect ways of checking them to satisfy us that they are reasonable as to order of magnitude. You will see that I have left a gap in the 1860's, the Civil War period, because we do not have reliable estimates for what happened to gross national product during those years. Does this approximately answer your question, Senator?

Senator BUSH. Yes, sir.

Dr. GOLDSMITH. We find, then, that we can extend the trend, which we fit arithmetically to the core period of 1879-1929, forward for 30 years, and we still seem to be reasonably close to the actual figures.

In order to make it easier for you to visualize how close the actual figures are to the trend line, I have drawn a line 10 percent above and another 10 percent below the trend. There are only three instances in which the actual figures move outside this band, which means that they were either more than 10 percent above the trend, or more than 10 percent below it. Those three instances are just where you would expect them. They are first in the Civil War period, they are secondly in the Great Depression, and they are thirdly in World War II.

The fact that all values, with these three exceptions, seem to fall within this relatively narrow band, together with the fact that an extrapolation of the trend is still in accord with the observed figures at the present time and is not too far away from the estimate in 1839, leads me to conclude that we may regard this trend, which implies

an increase in average real national product per head by  $1\frac{5}{8}$  percent per year, as applicable to the entire period of 120 years.

There is no long period in which the trend seems to have been much more rapid or much less rapid. For short periods, of course, you do find deviations, and they will be discussed, I think, on Friday, when Professor Abramowitz will tell you about the long swings in growth. But if you take periods of at least 40 or 50 years, you do not find large deviations from this trend. I therefore think it reasonable to say that this entire period, which covers all modern American economic history, can be regarded as uniform to the extent that a measured trend of  $1\frac{5}{8}$  percent per year in real gross national product per head applied to it.

In the statement, I discuss some statistical qualifications. I point out that there are a number of facts which make the observed rise of real gross national product per head, as it is depicted in the chart, somewhat higher than it should have been shown, and that there are other factors which make it somewhat lower.

These factors are rather technical. If you want me to go into them, I shall do it later. Weighing the six factors that I specifically discuss and some other factors into which I do not go item by item, I came to the conclusion, and this is mostly a matter of judgment, that the rate of growth might actually have been slightly higher than the one we derive from the basic statistics. I feel that the correct rate is probably at least as high as  $1\frac{3}{4}$  percent. It may have been a little higher, but I doubt very much that it has been as high as 2 percent. Around  $1\frac{3}{4}$  percent is probably the best estimate we can make at the moment, starting from the observed figures but making allowances for these statistical shortcomings insofar as we can do so.

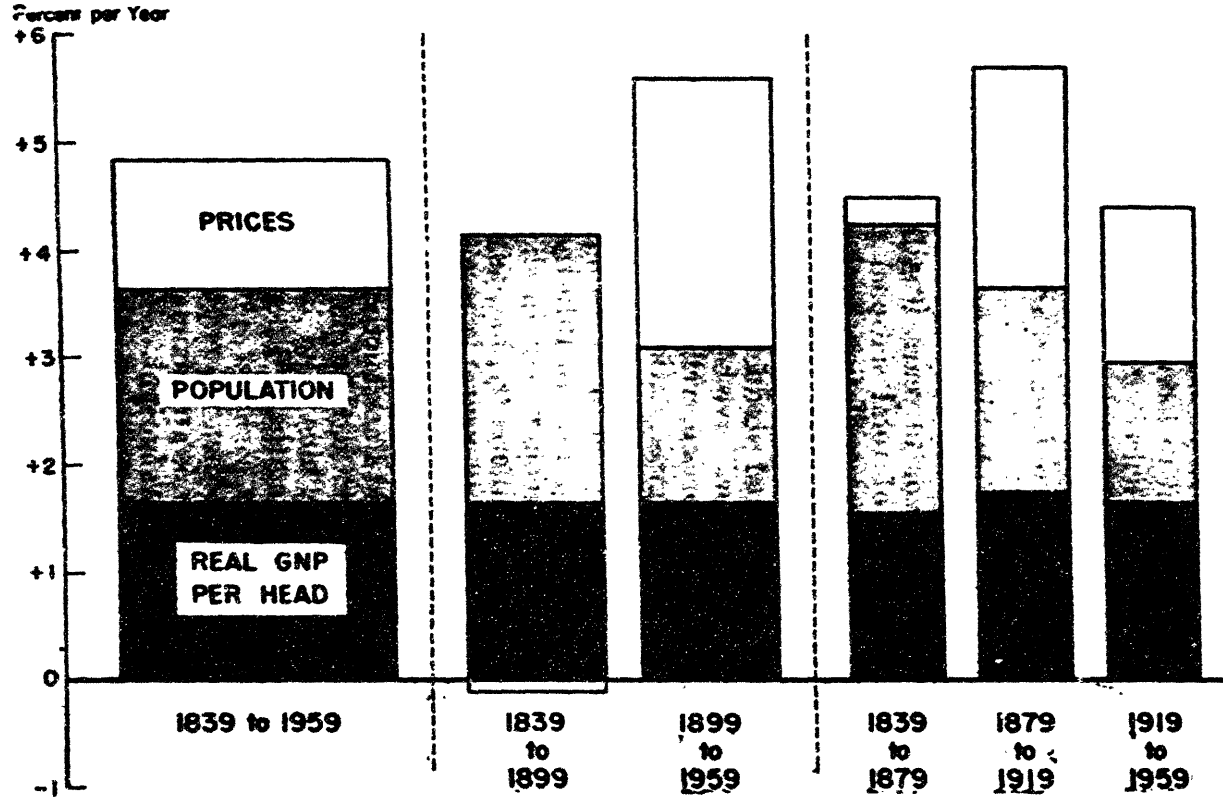
The movement, the trend, that we observe here, is that of real gross national product per head, but it is important now to retrace our steps to some extent, and to see how much of the observed growth in aggregate national product in current prices has been contributed by the three main factors.

Aggregate national product, as we observe it from year to year, can change because prices change; or it can change because the population grows; or it can change—and that is what we are primarily interested in—because real gross national product per head changes.

Chart V tries to bring this out in the most graphic way, examining first the entire period of 120 years, then splitting the period into two 60-year subperiods, and then on the right side splitting it alternatively into three 40-year periods, 40 years being about as short a period as you should use when you deal with long-term movements.

Chart V

### CONTRIBUTION OF GROWTH OF PRICES, POPULATION AND REAL GNP PER HEAD TO GROWTH OF AGGREGATE CURRENT GNP



You will see that the growth of aggregate gross national product in current prices has varied considerably. It has been sometimes as low as 4 percent, sometimes as high as 5½ percent, per year. Even this is not a tremendous difference but these are substantial fluctuations. However, the main thing to note is the stability in the underpinning, the rate of intensive growth, as I have called it. That has been quite regular. It is virtually the same in the two 60-year periods; there are only slight variations when you get to 40-year periods; and there doesn't seem to have been a movement in one direction. The highest rate of intensive growth, insofar as we can make a distinction, occurred in the central period from 1879 to 1919, the last 40 years showing the second highest rate and growth being somewhat slower in the first period from 1839 to 1879, for which, I repeat, our figures are the weakest.

Population shows a declining rate of growth. That trend has been reversed in the last 10 years. Nevertheless, when you take periods as long as 60 or 40 years, it still appears that the contribution to the growth of total national product made by extensive growth, represented by population, has been declining.

Prices have been the most volatile component. There have been periods in which prices have not contributed anything to the growth of current gross national product, but have actually declined slightly. On the other hand, there have been periods in which prices accounted for quite a good proportion, well over one-third, of the total observed growth in aggregate gross national product. You will notice that the contribution of prices has not been largest in the last 40 years. The relative upward push of prices on gross national product was more pronounced from 1879 to 1919 than it has been in the last 40 years. We could, of course, obtain slightly different results if we sliced the 120 years differently, but, as I said, when you do this for sections of less than 40 years, it is not too helpful for long-term analysis. I have also made these calculations for 30-year periods, but they do not show very different results.

Senator BUSH. Could I ask another question?

Representative PATMAN. Go right ahead, sir.

Senator BUSH. The blue solid line across there rather supports what you just said, about that 1½ percent, doesn't it?

Dr. GOLDSMITH. Yes.

Senator BUSH. And then the population growth, 1839 to 1959, the one on the extreme left, is approximately 2 percent?

Dr. GOLDSMITH. That is right.

Senator BUSH. So that the growth in prices in that long period was about 1 percent; isn't that right?

Dr. GOLDSMITH. One and one-eighth percent; yes, that is right, Senator. In these 120 years, the average rise in prices per year has been slightly over 1 percent. Whether we would regard that as creeping inflation or not, I don't know.

Senator BUSH. Then in the 1919-59 period, what is the growth in prices?

Dr. GOLDSMITH. The growth in prices in that period is 1.4 percent. Say, 1½ percent.

Senator BUSH. That is a very interesting chart.



Dr. GOLDSMITH. Now let me put in a caveat. I have expanded on this in the statement.

Representative PATMAN. The members may ask you questions, and you may omit anything that you think will be brought out through questioning.

Dr. GOLDSMITH. In the statement I do point out, and that is very important, that stability in the overall rate of growth does not mean stability in the rate of growth of different sectors of the economy. As a matter of fact, differences in the rate of growth of different sectors of the economy are the essence of the process of economic development.

We know, for instance, that the rate of growth for different types of commodities and services has been quite different. We know that the rates of growth for national product in different parts of the country have been different. We have observed a tendency for the differences in the level of national product in income per head between parts of the country to become smaller. Those parts of the country that had a relatively low level of income per head in, say 1880, have grown more rapidly in terms of real national income per head than have the parts of the country that were then at the top. The rate of growth has been lowest in New England and highest in the Southeastern States, I think. We also know that there have been changes in the rate of growth of different types of income, labor income, profits, income from rents, interests, and dividends. We know, finally, that there have been differences in the rate of growth of sectors of the population of different affluence. There is every reason to assume that there has been some tendency toward equalization, that the rate of growth for the income of the lowest fifth of the population has been somewhat more rapid than for the top fifth.

What I want to emphasize is that we must not conclude from the relative stability in the rate of growth of real national product per head that we have had similar stability for parts: stability in the large is not stability in the small.

You may well ask me: Has this growth of  $1\frac{1}{2}$  percent per year, or of  $1\frac{3}{4}$  percent per year after making allowance for statistical shortcomings, existed since the beginning of time in the United States, since the founding of the Republic, or since Plymouth Rock? We don't have detailed statistics, but I feel quite confident in saying no. We can, both on the basis of indirect evidence and by back casting, feel quite confident that we cannot have had for any prolonged period before 1839 a rate of growth in real national product per head of anything like  $1\frac{1}{2}$  percent per year. We do not have reliable statistics, but my guess would be that, from the mid-18th century to 1839, the average rate of growth per head was not above one-half percent: One-half percent as against one and three-quarters; an entirely different order of magnitude.

Exactly when the break occurred, we do not yet know, because our historical statisticians have not worked these figures back far enough. We hope that will be done in a few years. But I would guess, and I suppose shock some of my historian friends, that the break had something to do with the industrial revolution and the coming of the railroads, and hence does not antedate 1839 by many decades.

While we cannot at the moment do much about the statistics for the United States before about 1850 we can look at another country which is not too dissimilar in its economic history from the United States, and for which we do, fortunately, have some figures for earlier periods. That is Great Britain. Hence, in chart VI, I show you rough estimates for the growth of real national income per head, or real national product per head, which is a very similar concept, for Great Britain, and I also show the comparable figures for the United States for the later part of the period.

Chart XI

### SECULAR GROWTH OF REAL NATIONAL INCOME PER HEAD IN U.S.A. AND GREAT BRITAIN (1929 PRICES)

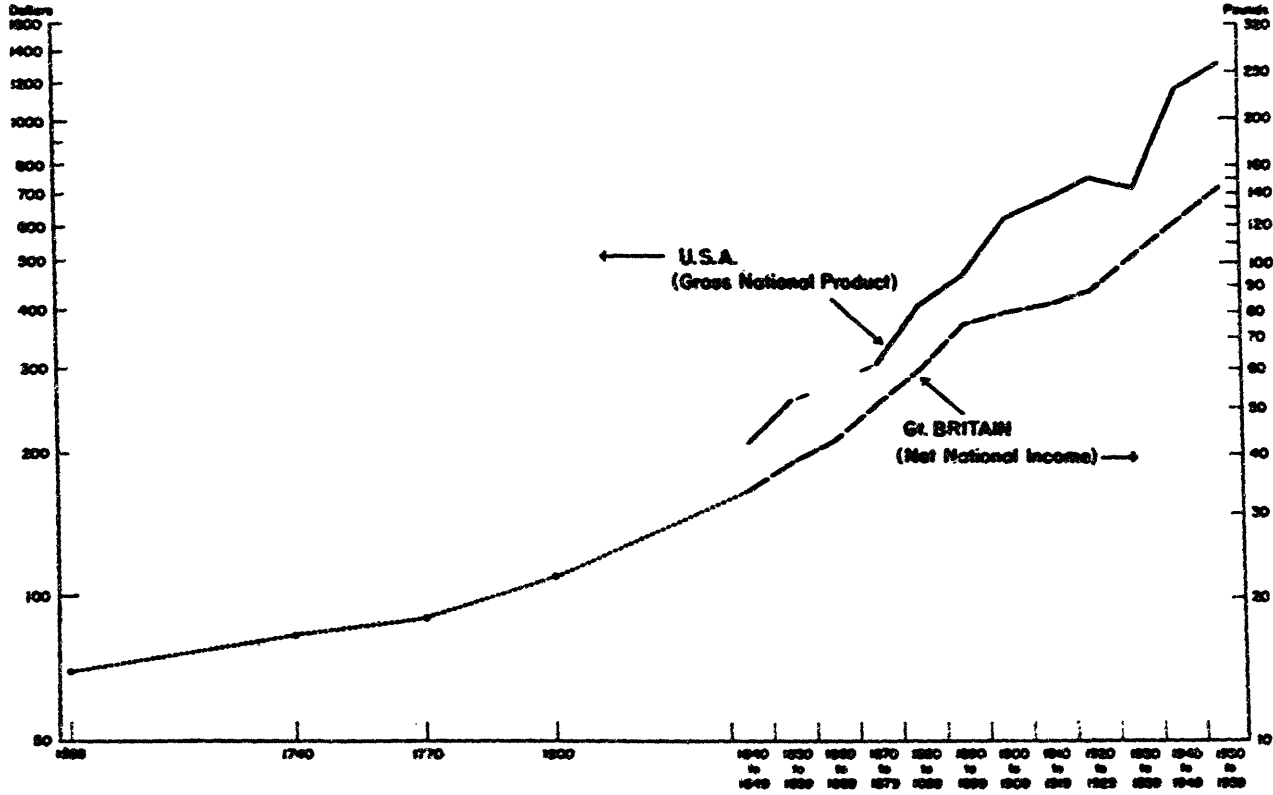


Chart VI is drawn so that £1 is plotted as equal to \$5. This has some justification, because all figures are expressed in 1929 prices when the rate of exchange between pound and dollar was about 5 to 1. However, there is good reason to assume that even at that time the purchasing power of the pound was somewhat higher than its foreign exchange value, let us say around \$6. Hence, if you want to compare the two lines directly, you mentally should lift the British line by 10 to 20 percent; you should lift it a little more since for the United States we use gross national product and for Great Britain net national income because of the availability of data. This would bring the two lines somewhat nearer together.

The points I want to make are really only two: Number one, in Great Britain, where we do have some evidence, it is quite clear that there was a marked break in the rate of economic growth some time in the early 19th century. Between 1688, which is the date for which we have the first and quite remarkable national income estimate for England, and 1770, the average annual rate of growth of income per head was between one-fourth of 1 percent and one-half of 1 percent, entirely different from the rates we are used to now. Then growth began to accelerate. It may have been between one-half and three-quarters of 1 percent in the late 18th century, picking up steam in the first quarter or so of the 19th century. There then followed a period in which the rate of economic growth in England was probably not much different from that of the United States.

Second, the difference in economic growth between the two countries really developed only after the middle of the 19th century. It may look like a small difference, but the power of compound interest is tremendous if allowed to act over long periods. From about 1840 to 1959, the average rate of growth in real national product per head in this country, as I told you, was  $1\frac{5}{8}$  percent. The parallel figure in England is  $1\frac{1}{8}$  percent. This does not look like a very great difference, just  $\frac{1}{2}$  percent. However, this  $\frac{1}{2}$  percent has been sufficient to create a difference at the present time in real income per head in the two countries of between 60 and 100 percent, although in the middle of the 19th century the two were probably almost equal.

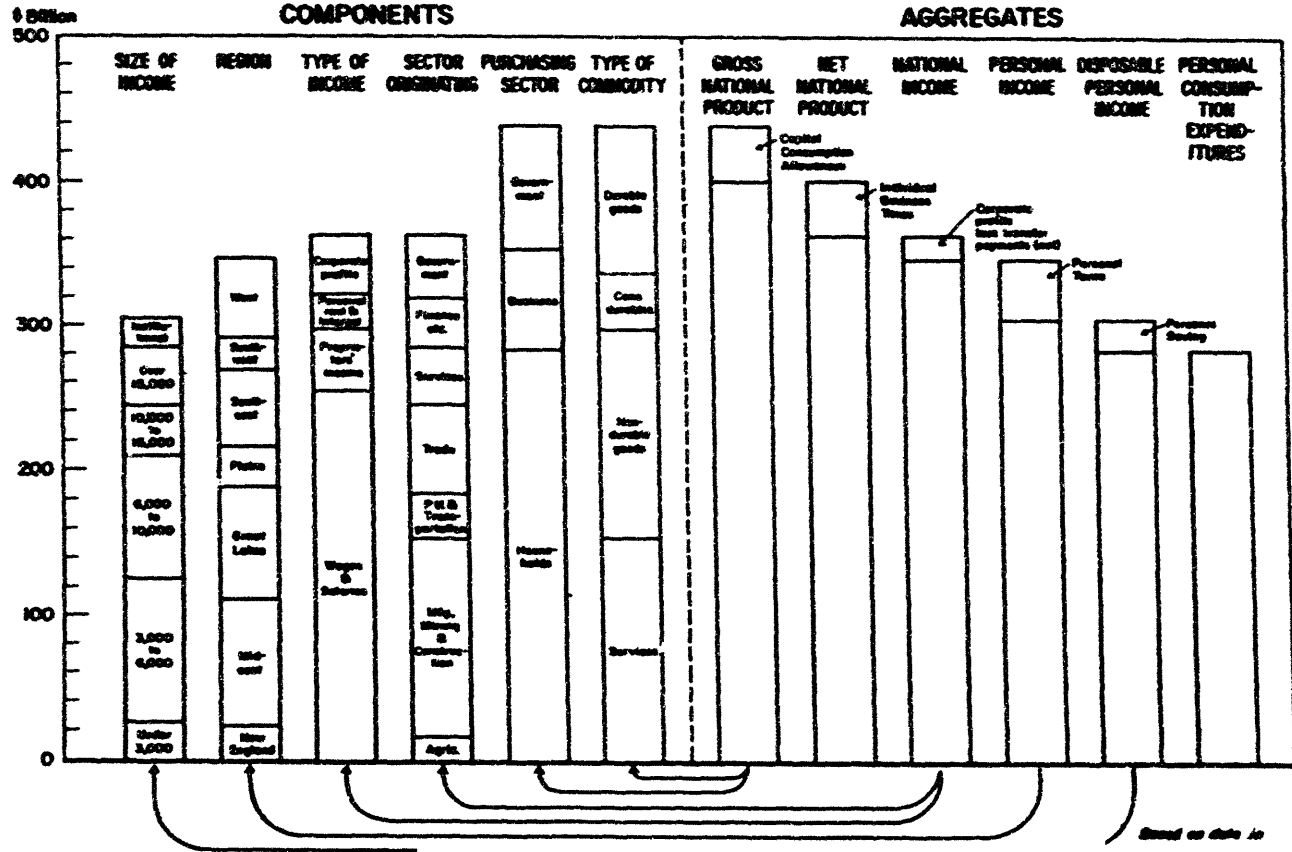
I have not made similar comparisons for other countries. If there is special interest on the part of the committee, I shall try to answer questions. Of course, we do not have for any other country as complete records as in the case of Great Britain. However, we probably would not find a country in which for a century or 120 years, the average rate of growth was as high as  $1\frac{5}{8}$  percent. You may say in a popular way that what has brought the United States to its present position is "steady does it." It is not that we have had an extraordinarily high rate of growth in the short run, or even over a generation. It is the fact that by luck or by our exertion or by virtue of our institutions we have been able to continue with such a rate for 120 years, which, so far, no other country has been able to do.

Let me, then, close with one caveat. I have made a point, maybe too much of a point, of the fact that the 120 years seem to have one trend in the rate of intensive growth. I want to make sure that this is not interpreted as saying, "Well, and so it will go on." Certainly there is some lesson in the past, and forces have been at work that we

may expect to continue. But we must not conclude that the rate of growth could not have been different, for instance, if we had made full use of resources in the last 100 or 120 years. And more importantly, there is no guarantee that in the future, with just doing nothing or doing whatever we want, we shall continue to grow at the rate of  $1\frac{3}{4}$  percent per year per head. Nor does past experience rule out the possibility that with appropriate policies, or with lucky breaks, the rate of growth may be higher.

It so happens that during the last decade the rate also was about the same as the long-term trend, but there are certain developments which give us some hope that the rate of growth is not beyond acceleration. These are mostly developments in the field of productivity. As that is the subject of tomorrow's session, I shall close here and try to answer as well as I can such questions as the committee has. Thank you.

## THE MAIN NATIONAL ACCOUNTING AGGREGATES AND THEIR COMPONENTS, 1957



Representative PATMAN. Thank you, Dr. Goldsmith. We have a rule that the first questioning is restricted to 10 minutes for each member.

Mr. Bolling of Missouri will be the first recognized.

Representative BOLLING. Dr. Goldsmith, in reference to the last two sentences, did I gather that there might be a development currently taking place in terms of productivity that in some sense might be similar to the development that took place around 1840?

Dr. GOLDSMITH. I was referring to possible changes in the trend in productivity. After all, the real gross national product per head, with which I have been dealing, is the result of the input of resources and the efficiency of that input.

The input of resources in turn is determined by the size of the population, by the proportion of the population that is in the labor force, and by the number of hours that each member of the labor force works; and by similar measures for capital and natural resources. Resource input times productivity, which is the ratio of output to input, determines gross national product per head. It is possible—this will probably be discussed tomorrow—that the trend in productivity, which also has been fairly regular in the last 80 years or so, may now be undergoing acceleration.

If that were so, we could also expect the trend of real gross national product per head to accelerate unless the increase in productivity were offset by either a decline in labor force participation or by a decline in hours of work.

The labor force participation ratio has been quite stable over the last 50 to 100 years, if you make adjustment for changes in the age structure of the population. Hours of work, of course, have shown a definite decline averaging between one-fourth and one-half of 1 percent per year.

The outlook depends, then, in part on the assumptions we make about further shortening of the workweek, or rather the workyear, because in the future some of the shortening may come not through fewer hours per week but fewer weeks per year.

Representative BOLLING. Now, in connection with that, on your chart 6, you pointed out that from about 1860 there had been a difference of one-half of 1 percent in the growth of the United Kingdom, as opposed to the United States.

Dr. GOLDSMITH. Yes. The difference in the average rate of growth for the last 120 years, from 1840 to 1960, let us say.

Representative BOLLING. Now, my question is: What is your explanation of the difference, if that is a reasonable question?

Dr. GOLDSMITH. It is a very reasonable question. I wish I or any other economist were in a better position to give you a succinct and unequivocal answer. That we cannot do yet. But we can point to certain factors which were at work. One of them is the greater dependence of Great Britain on foreign trade and on the changes in terms of trade. That, however, is probably less important than the fact that in this country we have had over a long period a higher ratio of capital formation, and hence have supplied the average worker with a larger amount of real capital. Then we have had a larger market, which has created certain external economies which were not available in Great Britain; although we must always realize

that international trade to some extent can substitute for the smaller size of the domestic market. This is, of course, what Britain has done. If they relied on the British market alone, the rate of growth in income would have been much less than it has been. Then there may have been institutional factors at work. And we cannot deny, although this is an unfashionable argument among economists, that there may be differences in the economic psychology of the population.

Representative BOLLING. Is there any observable relationship between the time at which the so-called industrial revolution hit in the United Kingdom, as opposed to the United States?

Dr. GOLDSMITH. I think that the break between the very slow rate of growth and the more rapid one occurred several decades earlier in England than in the United States. That is what you would expect, since the industrial revolution, and the effect of the railroads, came not very much but somewhat earlier in England than it did here.

Representative BOLLING. Once the capital formation has taken place to permit a primitive economy to advance into industrialization, is there then an observable reluctance to take less advantage of the most recent technological advances? Is there any lag because of capital already invested in improvement of efficiency?

Dr. GOLDSMITH. It is very difficult to say much about that. This really refers to the speed of introduction of innovations that are technologically available. What you refer to may have happened in England after the turn of the 20th century. We have a tendency to forget that in the middle of the 19th century the United Kingdom was economically regarded in the world more or less as we are now, as the leading and most advanced country. If you read contemporary descriptions by foreigners, you will often find they are astonished at how rapidly the British then innovated. But this may have changed late in the 19th century, and there may have been some tendency to protect existing capital investment and not to push new investment as rapidly as was technologically possible.

Representative BOLLING. My final question is: What figures, if any, do you have, not on the Soviet Union, but on Russia's rate of economic growth?

Dr. GOLDSMITH. We do have some figures, and I shall admit that I did expect this question would be asked. In the case of Russia, we can go back only as far as 1860. It seems that from 1860 to 1918, the average rate of growth in real gross national product was about 2½ percent a year. Population grew at an average rate of 1½ percent a year. Hence the rate of growth of real national product per head was about 1 percent. This is not at all a low rate. It was lower than ours, lower than the British, lower than the German rate, but many underdeveloped countries now would be quite satisfied if they had such a rate for a prolonged period.

It is very difficult to talk about an average for the next 45 years, because there were two long periods which economically were "lost," in which there was no net increase in output at all—from 1918 to 1928 and from 1940 to 1948. If you start by averaging these 45 years from 1918 to 1958—the figures, as you know, are disputed, but a good deal of work has been done on them and I think we have the right order of magnitude—you are led to an estimate that gross national product on the average grew at a rate of 2½ to 3 percent per year, probably



nearer to the lower limit. Population growth, as you know, was very slow because of the great losses in the revolution, the civil war, and World War II—less than one-half percent a year on the average. You thus end with an average increase in gross national product per head, which is the same measure I have been using for the United States, for 1913-58 of between 2 and 2½ percent, a rate somewhat higher than the one we have had. However, if you take the period since the losses of World War II were made good, which in a sense you may regard as more significant, then you find that the average rate of growth from 1951 to 1958, by Soviet terms probably a reasonably normal period, was between 6 and 7 percent per year.

The Soviet Union now has a rate of population growth of about 1½ percent. That leaves a rate of growth of real gross national product per head of 4½ to 5½ percent per year. One may prefer the lower or the higher rate, depending upon one's judgment about a few things we do not know too well, but that is the order of magnitude. In either case, it is well above our rate of growth.

Representative PATMAN. Senator Bush?

Senator BUSH. Dr. Goldsmith, first I would like to congratulate you upon a very interesting presentation. I want to ask you about these statistics again.

Do you regard these statistics you used in making up these charts as sufficiently reliable for us to use as a basis for formulating national policy?

Dr. GOLDSMITH. Yes, I think so, if you are aware of what they measure and of some of the statistical qualifications. I have tried to point out some of them, and I feel it is really very important—well, I should not say very important; everybody overrates what he works on—it is important for people to know what some of these qualifications are. If you want my summary judgment, it is that the order of magnitude is correct when I said the average rate of growth was 1¾ percent. I certainly would not argue strenuously if somebody said: "Couldn't it have been as low as 1½ or as high as 2 percent?" This would lead to a very technical discussion, and I would not want to take an unyielding stand on the one side or the other. But I would be ready to say that it is not very likely that the correct value would be outside of that range. Of course, in recent decades, our information is better than in the earlier period.

Senator BUSH. Our figures show remarkable similarity between long periods in each of the three items of GNP, population, and prices. Over a long period they show very moderate changes within long periods, it seems to me. But of course within some of those long periods, you had tremendous fluctuations. Possibly you brought that out in your statement, which I haven't had a chance to read yet.

Dr. GOLDSMITH. No. I kept out of that on purpose. There are three types of movements in gross national product and similar series. The one to which I have restricted myself is the basic movement, or the trend. The next one is a movement which as yet not all economists accept, about which you will hear on Friday from Professor Abramowitz—the long swing. And the third movement, of course, that everybody accepts, because you cannot argue with the obvious, are the cyclical fluctuations which are sometimes very sharp.

Senator BUSH. Could you put up your chart V, there, just for a moment?

Dr. GOLDSMITH. Certainly, Senator.

Senator BUSH. Now, in that chart V, you have in the period 1919-59, on the extreme right, an average of price increase of 1.4 percent, approximately.

Dr. GOLDSMITH. Yes.

Senator BUSH. But in that same period—that period really began at a very high price level, in 1919, after World War I, and dropped, according to the Wholesale Price Index, by more than 50 percent, by 1939.

Then you had, from 1939 to 1959, another very marked rise, which was induced largely by the war, in one way or another, and since then has also risen to some extent. So that the unevenness of these movements—you can have tremendous swings within these periods. And I presume those are the things that disturb us in connection with formulating economic policies, and I am sure you agree.

Dr. GOLDSMITH. There have been, of course, very substantial swings. Let me give you the figures for the last 10 years, comparing the last 3 years, 1957 to 1959, with the years 1947 to 1959, using 3-year averages.

Senator BUSH. Yes; let us hear those figures.

Dr. GOLDSMITH. During those 10 years, the total aggregate gross national product in current prices, rose at the average rate of 6 percent. That is a somewhat higher rate than we had before. The price rise averaged  $2\frac{1}{2}$  percent per year. Aggregate gross national product in constant prices rose by  $3\frac{1}{2}$  percent, and population rose by 1.7 percent.

Senator BUSH. What period is this, now?

Dr. GOLDSMITH. This is from 1947 to 1949 to 1957 to 1959.

Senator BUSH. I have very limited time, so if you don't mind, I would like to move on.

How does the outlook look to you at the present time, respecting the price level and employment?

Dr. GOLDSMITH. Of the three factors distinguished here, the one most under the control of man, and maybe even Congress, is the price level. So I know less about that outlook than you do, Senator. But obviously we can follow policies which will restrict price rises, possibly at the cost of restricting the growth in real national product per head, or follow policies which permit more of a price rise. One cannot, I think, from this chart or any similar ones draw direct conclusions regarding the relation between the rate of intensive growth, real gross national product per head, and the rise in prices. There have been periods of rapid growth with stable or even declining prices in the 19th century and periods of substantial growth with substantial rises in prices.

Senator BUSH. Let me ask you this question: Do you think that we, as a matter of policy, should foster constant increases in prices such as Dr. Slichter recommended—progressive inflation annually? Do you think that we should set our policy with that objective?

Dr. GOLDSMITH. I do not think that anybody would want to foster an increase in prices for its own sake. The real problem is whether a certain amount of price rise is necessary to produce a certain amount of increase in real gross national product per head—more specifically

an increase which will make full use of the available labor, capital, and natural resources.

Senator BUSH. How do you determine how much is necessary to do that?

Dr. GOLDSMITH. This, of course, is a question you can hardly answer in a minute. This question is, I suppose, the essence of your investigation. You have to do a great deal of digging and shed quite a number of prejudices, I would think. But it is not an easy question to answer, simply because the institutional situation has changed sufficiently so that you cannot, without allowing for it, draw conclusions from the past for the future. The past does, I think, show that a substantial rate of growth is not incompatible with a moderate increase in prices.

Senator BUSH. Let me ask you one more question.

We have pending before the Banking and Currency Committee in both Houses, I believe, an amendment to the Employment Act of 1946, which is called the price stability amendment. The purpose of the amendment is to emphasize the importance of price stability as a matter of national policy and as a stimulant to full employment.

Some feel that such an amendment is important. Others feel that it is implicit in the act and therefore unnecessary. Would you care to express an opinion as to the desirability of such an amendment?

Dr. GOLDSMITH. I would rather not. I do not think it is a crucial matter one way or the other. Obviously, everybody is for the minimum rise in prices that would be compatible with full utilization of resources.

Senator BUSH. I mean stability is desirable in your view?

Dr. GOLDSMITH. Certainly it is desirable, if you can combine it with a reasonable rate of growth.

Senator BUSH. Does it not promote a reasonable rate of growth rather than retard it?

Dr. GOLDSMITH. The record shows, as I said, that a moderate rise in the price level is not incompatible with a substantial rate of growth. It may even have made some positive contribution to it.

Senator BUSH. That does not quite answer my question, then. I mean, maybe you do not choose to answer it, which is your privilege; but my question is: Do you think it would be desirable from a national standpoint to have such an amendment to the Employment Act of 1946, making price stability a recognized objective of national policy?

Dr. GOLDSMITH. If this objective were formulated in an adequate way, if it were not read as a mandate for rigid price stability irrespective of what happened otherwise, I think nobody would object to it.

Senator BUSH. Thank you very much.

Representative PATMAN. Mr. Reuss?

Representative REUSS. Dr. Goldsmith, you indicated in your testimony that in this country, some time before 1839, something happened which quite favorably stepped up the average rate of growth. After that it became on the order of 1½ percent. Before that, it may have been as slow as 1 percent or less. Is that about right?

Dr. GOLDSMITH. That is correct, yes.

Representative REUSS. And you attribute this sudden takeoff to the coming of the industrial revolution, the building of railroads, the tendency towards industrialization.

Getting back to the early remarks you made this morning, both in your paper and orally, is it not distinctly within the realm of possibility that a similar takeoff in the rate of growth could occur sometime in the second half of the 20th century as a result of the release of new sources of energy, developments in automation, electronics, and a lot of other things which might be as spectacular as the building of the railroads, the building of factories, and the other things which occurred around 1839?

Dr. GOLDSMITH. This is, of course, possible. There are two ways in which rapid acceleration could come about. The one is acceleration in technical progress in the narrower sense, new inventions, discovery of new energy resources, and things like that. The second one would be changes in the organization of production which have influence on productivity. Neither of those are ruled out. We cannot say that, because in the last 100 to 120 years we have coasted along at this rate of  $1\frac{3}{4}$  percent, it could not increase. As a matter of fact, there is evidence that in the last decade the rate of growth of productivity has been more rapid than it was before. The problem is whether this is a temporary bulge, which may last another decade or so, or whether this really means a break in the trend. That is really the basic economic problem that we have to face, and I wish that more scientific resources were devoted to studying it, because the answer will decide to a good extent what the economic history of the United States in the second half of the 20th century is going to be, and this in turn will have considerable political effects.

Representative REUSS. In addition to inventions and other things which contribute to a narrow technological advance, as you call it, you talk about changes in economic organization. Would it be a fair summation of those changes in economic organization to say what would be needed as a supplement to invention would be the realization, by whatever means, of the goals of the Employment Act of 1949, namely, maximum production, employment, and purchasing power?

Dr. GOLDSMITH. If you manage to make continuous full use of your labor resources, capital resources, and natural resources, you will get a more rapid rate of growth than if you go through considerable cyclical swings. We have undoubtedly already made progress in the direction of reducing these swings, and we may not be at the end of that. And we hope that by appropriate economic policies we can accelerate economic growth. So it will make a considerable difference, I should think, for the rate of growth in the next several decades, what economic policies we follow.

Representative REUSS. In fact, those are the only two things that mortal man can do, are they not? To invent more ingeniously and to perfect economic organization so that you do not waste the resources that you have?

Dr. GOLDSMITH. Those are the main or the main practical possibilities. You can, of course, always hope that attitudes of people will change. But those are slowly working factors on which you cannot bank and which you cannot influence much by congressional action or economic policy.

Representative REUSS. I have a question on your chart II, Dr. Goldsmith: If you will refer to the heavy per-head line and take a look at around the year 1942, it would appear that the per-head national product at 1929 prices was on the order of—what? \$1,300?

Dr. GOLDSMITH. No, that is about \$1,400.

Representative REUSS. Following the line along, it appears that right after World War II, it declined a good deal, to around 1947, 1948, and 1949, and then slowly rose, but that today, in 1959, real gross national product per head, at 1929 prices, is no higher than it was 15 years ago in 1943. What is wrong with this picture?

Dr. GOLDSMITH. What may be wrong with this picture is a point that has been at issue among technicians, and which traces back to the difficulty of deflating figures in current prices, when there are great changes in the structure of production. I belong to that group which feels that the figures we now have do not sufficiently deflate the value of output registered during the war years; that while the best efforts have been made to reduce the large war production that we then had to peacetime terms, this has not been quite achieved, and that in the then current prices, the bulge you see in Chart II should be scaled down.

Representative REUSS. So that the 1943 figure reflects such items in the national product per head as, let us say, the ill famed—what was it?—Canol project up in Canada, which did not really help the consumer very much.

Dr. GOLDSMITH. Oh, the consumer? The effect of the war on the consumer may, of course, immediately be seen in chart IV, and that is partly why I produced it. Here you will not get that bulge at all.

You can avoid the wartime deflation problem by shifting to real consumption per head, which is a welfare concept. No, the problem is rather that no way has been found satisfactorily to value a tank or battleship produced during the war in terms of peacetime production. This is an extremely complicated technical problem. Statisticians have struggled with it a good deal. And I feel as some other economists do, that the deflation is not sharp enough. Nevertheless, of course, at that time there were long hours worked, the labor force participation was high, and there is reason to assume that there would be some bulge. So it is my feeling, and it is not much more than that, that the bulge now is somewhat exaggerated in these figures, and that we are really further ahead compared to the war period than the observed figures, the figures which are available to us, would indicate. Professor Kuznets, for instance, uses different methods of deflation, and also defines national product differently, and he does not get that bulge.

Representative REUSS. Thank you very much.

Representative PATMAN. Mr. Coffin?

Representative COFFIN. Thank you, Mr. Chairman.

Dr. Goldsmith, would you say that gross national product per head is the most relevant index for us to use in measuring, to devise policies that help us to go where we want to go, rather than gross national product?

Dr. GOLDSMITH. In most cases it is gross national product per head that is relevant, rather than the aggregate. That is not always true. If, for instance, you were in the Pentagon and wanted to make comparisons of a military and political nature, then the aggregate may matter more, because that is what counts when the chips are down. It is a question then of how many tanks the whole country can produce, not how many tanks you can produce per inhabitant. But, let us say,

for most peacetime problems, it is the product per head or the consumption per head, which is the better starting point.

Representative COFFIN. Is there a difference between product per head and consumption per head?

Dr. GOLDSMITH. Oh, yes, certainly. The difference is capital formation. On the average, we have used about one-fifth of our product for gross capital formation. Of that fifth, of course, a part, let us say one-half, has been used to replace capital that is worn out during the period.

Representative COFFIN. If you had to choose, which is the more meaningful index to measure the growth of the country?

Dr. GOLDSMITH. Total national product.

Representative COFFIN. Per head?

Dr. GOLDSMITH. Per head, yes, if as you say measuring growth in general is the objective. Then total product per head is, I think, more meaningful. You might prefer net national product per head, in order to take account of that part of output which has to be utilized to make good the wear and tear of our stock of capital, and hence is not available either for consumption or for addition to the stock of capital.

The ratio between gross and net has been fairly stable. This ratio is one of the adjustment factors which I discuss in my statement. I conclude that if we had used net national product, the rate of growth instead of being 1.7 percent per year, would have been 1.6 percent per year, because as a country grows, and, if, as has been the case in the United States, the average length of life of capital goods declines, a slightly larger proportion of the gross output is needed to make good wear and tear. Statistically, it is a very small difference, about in the order of 0.1 percent per year in the terms I have been dealing with here.

Representative COFFIN. Looking ahead, and looking to future changes in production, automation inject one variable. Population change might inject a variable. And the labor participation element which you mentioned. How about changes in distribution? Would this carry any potential of changing the gross national product per head?

Dr. GOLDSMITH. You mean distribution as between people of different degrees of affluence?

Representative COFFIN. On the aggregate.

Dr. GOLDSMITH. You mean changes in the size distribution of income? Is that what you have in mind?

Representative COFFIN. No; distribution as distinguished from production.

Dr. GOLDSMITH. Costs of distribution are reflected in gross national product. And as we have grown, I think a somewhat higher proportion of the product is used in the distributive mechanism. That is a reflection of increasing size of the market and increasing division of labor. This can be overdone, of course; but there you get into a branch of economics of which I have kept out. Some people say it is not necessary to smoke, and why do we use up all these resources growing tobacco? There we get into very personal value judgments.

Representative COFFIN. My final question is: Do you have any opinion as to a desirable rate of increase of gross national product per head, as a goal at which we could aim?

Dr. GOLDSMITH. That is a very difficult question. The minimum aim you set yourself is to employ, within practicable limits, all the labor, the capital, and the natural resources. But this really leaves most of the question unanswered, because even within that specification you can have substantial differences in the rate of growth. It is probably, however, the first step, and the only one that you can formulate. You can, of course, say that in order to match, or not to fall too much behind, the Soviet Union, or for other reasons, you feel that you need a minimum growth of so and so many percent—

Representative COFFIN. Suppose you were to use resources—not 100 percent, but a reasonable approximation to 100 percent. What would that mean in the immediate future on a per capita basis?

Dr. GOLDSMITH. There are two problems here. At the present time, you have quite a wide gap between our actually employed labor force and the potentially available labor force. We assume, we hope, that in the course of the upswing, a good deal of that margin will be absorbed. Usually the margin in years of prosperity has been very small, and you could not have gotten much more out of the economic machine than it produced so long as it was constructed and managed as it was. The losses have come primarily in years of recession and depression. You can do some arithmetic. What would have happened if we had not had those losses? But I think this is really impermissible, because once you assume that we had operated over a long period of time in the past with virtually no swings, the whole economic world would have been different. Expectations would have been different. Capital investment would have been different. You are then in the realm of speculation. It is quite possible that the rate of growth would have been considerably further ahead of the one we have observed than would appear simply from the arithmetical calculation. But this is a subject where you cannot make any confident statement—and the same goes for the future. If people became convinced that there would be no more cyclical swings—let us stipulate this even if it is unlikely—this might have an effect well beyond the few percent of underutilization that is usually represented by the labor force not employed over the average cycle. By an assumption like that, you change the whole environment for business and for consumers, and it is very difficult to foretell what effect that would have on the rate of growth. That is not a minor change. Economists always are in a better position to say something about the effects of small changes. When you change one of the basic features of the economy, as people have experienced it in their lifetime and their parents' lifetime, you are on much more dangerous ground.

Representative PATMAN. Senator O'Mahoney?

Senator O'MAHONEY. Thank you, Mr. Chairman.

Professor, I have been listening with great interest to your presentation. You seem to be a master of your subject.

I have always been puzzled by the judgment that a Member of Congress should place upon gross national product. Your words and your charts seem to indicate a steady rise in the real gross national product of the country. Am I right?

Dr. GOLDSMITH. That is correct, yes.

Senator O'MAHONEY. Do you mean that we are better off than we were before? Or are we worse off?

Dr. GOLDSMITH. If by "better off," you mean that the average man has at his disposal more goods and services, the answer is "Yes." By that test, we certainly are better off. Chart III which shows real consumption per head tries to give a picture of that improvement.

Senator O'MAHONEY. In giving that answer, Doctor, do you take into consideration the economic war which the Soviet Union is waging against this country and the other free countries, and the economic system that we have?

Dr. GOLDSMITH. I am sorry, Senator, I do not quite get the import of your question. As far as the past record goes, I think it is fairly clear that the consumer's welfare, if we call it that, has increased substantially and reasonably steadily. Now, is your question directed toward the future?

Senator O'MAHONEY. Yes, of course.

Dr. GOLDSMITH. Obviously, we shall always have to make a decision as to which proportion of the output that we can produce we devote to consumption, which we devote to capital formation—

Senator O'MAHONEY. Let me present the problem in a little different way. Are we to assume that this real economic growth which you show on your charts and in your presentation is really for the welfare of all of the people of the United States, considering, for example, the growing debt of the Government—not only the Federal Government but the State governments, the municipal governments, the county governments—and the debt of the consuming public? Do you take into consideration the financing of this growth?

Dr. GOLDSMITH. I feel that finance has relatively—I stress "relatively"—little to do with these secular trends. It can somewhat retard them, and somewhat accelerate them, and it is very important, to say the least, to do nothing in the field of finance to retard, and to do as much as possible to accelerate, economic growth. But I do not think it has retarded it or is about to do so.

As for the debt, of course, there is a substantial volume of debt, nearly \$300 billion by the Federal Government and over \$60 billion by State and local governments. However, first, governments have very substantial assets, as you probably know. If you applied business accounting methods, the State and local governments would be shown to have considerably more assets than they have debt. And they have saved year after year, in the sense any business corporation would show this in its accounts. They have invested more, much more, than what they have borrowed. I do not want to say that the Federal Government has been in the same position. This is, of course, due to a large extent to its war expenditures. Nevertheless, by historical or by international standards, the present Federal debt is not a particularly heavy one in comparison to national income or wealth.

Senator O'MAHONEY. To what extent, let us say, are profits resulting from war expenditures used in framing these lines of growth?

Dr. GOLDSMITH. Is your question whether we include in gross national product the pay of the armed services and the output of military goods? Yes, we do.



Senator O'MAHONEY. You do count that?

Dr. GOLDSMITH. Yes. There are some economists who treat these items somewhat differently, although nobody completely excludes either the military pay or the output of military durables and non-durables. These items are included in our official estimates.

They are, as you know, not decisive, because even at the present time total military expenditures are less than 10 percent of gross national product.

Senator O'MAHONEY. Let us look at chart VI. The ascending line from, let us say, 1930 to date, in the U.S. gross national product, is a very sharp ascent; is it not? A very sharp increase? And it has taken place largely, or generally speaking, during this turbulent war and preparation for war era; has it not?

Dr. GOLDSMITH. The rate of growth in the last period has not been above the long-term average. Of course, this time there has been some more contribution to it from military expenditures than you had, say, in the core period which I used, from 1879 to 1929, in which there were virtually no military expenditures.

Senator O'MAHONEY. Now, you spoke of population losses because of the war.

Dr. GOLDSMITH. In Russia, yes.

Senator O'MAHONEY. Here, too, did you not?

Dr. GOLDSMITH. In the United States, fortunately, they have been very small.

Senator O'MAHONEY. Do you consider production losses because of war?

Dr. GOLDSMITH. It is very difficult to say what our production would have been if we had not had wars. You may argue that there would have been more civilian output, that there would have been somewhat more civilian capital formation, more houses, and so forth. The total output would probably have been smaller than it actually was.

Senator O'MAHONEY. I do not want to take too much time, Dr. Goldsmith, but I am aware you appreciate the problem as it presents itself to me. The Congress must appropriate the funds which are being used to pay the interest on the national debt, and these funds are increasing steadily, year by year. We are postponing to future generations the payment for many of the things that go into this gross national product. And there comes a time when the Government, when the Congress making the laws of the Nation, must consider what steps should be taken to prevent a collapse because of an overburden of debt.

Dr. GOLDSMITH. Historically, if you take the private and the Government debt together, and allow for long-term trends, the ratio of debt to the value of assets in the United States now is not particularly high; it is quite normal.

Senator O'MAHONEY. Well, that is very interesting.

Dr. GOLDSMITH. I did not know this question would come up. This happens to be a subject on which I have done some work. I shall insert an appropriate table in the record.

Senator O'MAHONEY. I would be very much interested in that.

(The table referred to is as follows:)

*Debt-Asset Ratio*

End of year	Assets (excluding military)		Debt	Debt-assets ratio	
	Total	Tangible		Total assets	Tangible assets
	(1)	(2)	(3)	(4)	(5)
<b>All sectors</b>					
	<i>Billions</i>	<i>Billions</i>	<i>Billions</i>	<i>Percent</i>	<i>Percent</i>
1900.....	\$159	\$90	\$47	29.6	52.2
1912.....	300	168	94	30.4	56.0
1922.....	653	326	222	34.0	68.1
1929.....	982	427	324	33.0	75.9
1933.....	733	322	281	38.3	87.3
1939.....	877	395	357	40.7	90.4
1945.....	1,357	570	773	49.6	135.6
1955.....	3,074	1,329	1,265	41.2	95.2
<b>Private sectors</b>					
1900.....	150	83	43	28.7	51.8
1912.....	290	152	87	30.0	57.2
1922.....	611	294	184	30.1	62.6
1929.....	922	384	280	31.0	74.5
1933.....	667	276	232	34.8	84.1
1939.....	773	322	264	34.2	82.0
1945.....	1,309	467	450	32.9	96.4
1955.....	2,793	1,130	910	32.6	80.5
<b>Government</b>					
1900.....	9	7	4	44.4	57.1
1912.....	19	16	7	36.8	43.8
1922.....	42	32	38	90.5	118.8
1929.....	60	43	38	63.3	88.4
1933.....	66	46	49	74.2	106.5
1939.....	104	73	63	89.4	127.4
1945.....	188	103	323	171.8	313.6
1955.....	281	199	355	126.8	178.4

Sources: 1900-45, R. W. Goldsmith, "A Study of Saving in the United States," vol. III, pp. 42 ff. 1955, National Bureau of Economic Research, 37th annual report, p. 36.

**Senator O'MAHONEY.** May I say, Mr. Chairman, that in your statement I found a tremendous interesting sentence. Let me read it:

The average rate of growth, aggregate, not per head (calculated from deflated values at beginning and end of period only) for the entire period is thus about 1½ percent for agriculture, 2¾ percent for transportation and public utilities, and 3¼ percent for services and construction, 4 percent for trade, 4½ percent for manufacturing and mining, and 5 percent for Government, all compared to the 3½ percent rate for the entire economy.

Do you suggest to this committee and to the Congress that any steps should be taken to equalize this rate of growth?

**Dr. GOLDSMITH.** No. I stressed, I think a little before you came in, that the differences in the rate of growth as between industrial sectors, regions, and other divisions, are the essence of economic growth. You cannot visualize—it is virtually impossible to do so—a completely even and balanced growth. If we had insisted on equal and balanced growth, we would still be in 1776 or only a little ahead of that. It is impossible to keep everything in step in the process of

economic growth. The art of economic policy is to facilitate the transition and to take the rough edges off these differences in growth.

Senator O'MAHONEY. Thank you, Doctor.

Representative WIDNALL. Professor Goldsmith, I was very much interested in the comparison between the United States and Great Britain. It made me think about the statement just issued by Great Britain about their own economic situation, where they showed a favorable export-import balance of around \$320 million during the past year.

Now, our country has been showing a decrease in favorable balance for several years in contrast to Great Britain. Will not this factor with respect to Great Britain and also with respect to many other nations have a much more weighted effect on our economy in the future than is projected in these charts related to the past?

Dr. GOLDSMITH. I do not quite know, Congressman, whether I understood you quite correctly. Is the question whether we are likely to have a continuous loss of gold, such as we have had to a certain extent over the past few years, or whether our balance of commodity trade will turn unfavorable, as is said using the old merchantilistic terminology, meaning that exports are lower than imports? Is that what your question related to?

It is difficult to answer. I regard the loss of gold, if that is what you refer to, as a more or less temporary phenomenon, which has specific and fairly well understood reasons, and which I do not think foreshadows a long term trend.

Representative WIDNALL. During the congressional recess, I had several people call to my attention the unfavorable impact on their business of the United States pricing itself out of the world market. Now, this was not in one business, but in a number of businesses.

As one simple example, a man in the cutlery business for years, selling to Latin American countries, found his business was just going to pot completely, because he could not compete. He is now selling English merchandise to Latin America, in order to stay in business.

If this trend continues, which seems to be taking place in so many businesses, will not that have a very material effect upon our gross national product and also on our overall economy?

Dr. GOLDSMITH. I do not think so. This question of pricing ourselves out of the world market has come up a good deal recently. I am not a specialist on it, but at least I know enough to be very skeptical about the claim. You only have to look at movements of price indices in other industrial countries to see that they have gone up about as much as in the United States.

There is, of course, more competition developing as a result of the restoration of the economies particularly of Europe. This is a type of change that probably will go on for a while until more stable relationships are established. We must not forget, after all, that we had the world market almost to ourselves for the first decade after the war, and that was a situation which was very unlikely to continue. As soon as the European industrial countries, particularly, got back on their feet, they gave us more competition.

People complain because they cannot sell as easily abroad as they could 5 years ago; but a more relevant comparison is whether we still

have a larger share of the international market than we had, say, before World War II.

Representative WIDNALL. What I have in mind is this. In the projections of our economy for the future that the economists are making, are they giving full weight to the impact of areas such as the European common market, where you will have 160 million banded together, almost equal to the population of the United States, and operating in a way that will give a different type of competition to the United States than it ever has before?

Dr. GOLDSMITH. No, I do not think it will be a different type. Competition may be a little stiffer, and this may not be so bad. There has been a good deal of complaint about people taking it easy here, believing that they can continuously raise prices and so forth. Imports are, after all, a sort of control, not to let things get out of bounds.

Representative WIDNALL. The thing I was getting at was this: With the increased competition through improved technology and improved research throughout the world, new areas of production, and areas of production where they are most anxious to sell, will that not create the necessity for us to hold prices down here in the United States far more than in the past?

Dr. GOLDSMITH. This is not the primary consideration, I should think. There are other reasons why you do not want to have a large or out-of-control price rise. But I doubt that foreign trade considerations would be determining. After all, other industrial countries have shown about the same price rises in the postwar period.

Representative WIDNALL. That is all.

Representative PATMAN. First, I would like to ask: Do you consider that we are going through a period of inflation now?

Dr. GOLDSMITH. "Inflation" is, I am afraid, a very unfortunate word that everybody uses with his own connotations. You can, of course, call every rise in prices an inflation. But I think intelligent discussion would be fostered by distinguishing types of price rises, making distinctions at least between the rapidity, the continuity, and the areas of price rises.

Representative PATMAN. I do not see any inflation in the economy generally, except for a terrific inflation in interest rates. Do you not think interest rates enter into the costs of production and the cost to consumers in a big way, Dr. Goldsmith?

Dr. GOLDSMITH. If you had left off the last three or four words, "in a big way," I would, of course, have had to say yes, because to some extent interest rates certainly enter into cost, in some branches, like housing, to a quite noticeable extent. By and large, however, they seem to have been a minor factor in price movements.

Representative PATMAN. Well, what about the case of local governments. They are having to pay 3 and 4 percent, even on tax-exempt bonds. The cost of servicing the debts of the States, counties, cities, political subdivisions, has gone up considerably. Don't you think that the enormous increase in the interest charges the last few years have contributed to higher local taxes and the burdens of the people?

Dr. GOLDSMITH. In comparison to the increases in cost of Government which reflects increasing population and other factors, interest rates probably have not been the most important factor. They certainly do add to the cost of running the Government. But it is very

difficult to have a free economy without a free capital market, without a reasonably free movement of interest rates.

Representative PATMAN. Of course, I do not agree with you that there is a free market in Government bonds. I think it is an inflexible market fixed by the Federal Reserve Board. And for that reason I cannot agree with you.

Dr. GOLDSMITH. But if it is fixed, it rather is fixed downward.

Representative PATMAN. They did for a period of time. But more recently I believe you will agree that it has been going upward.

Dr. GOLDSMITH. Certainly, we have had a substantial increase in interest rates. But the movement has been very much that to which we have been accustomed in the past in cyclical movements. Up-swings in business always have been accompanied by rising interest rates.

Representative PATMAN. Now, our committee—this Joint Economic Committee—held the first hearings on automation, back in 1955. We had some revealing testimony from management and labor. No one opposed automation; everyone favored automation. That is still, I think, the attitude of the different groups represented by management and labor, since automation represents progress, and we are all in favor of progress. But do you not see more and more, Dr. Goldsmith, that automation is taking so many jobs that we have a rather difficult problem to solve by reason of it?

Dr. GOLDSMITH. It is undoubtedly a difficult problem. I have already spread myself thinly over many fields. This happens to be a field in which my ignorance is too great.

Representative PATMAN. Do you have any ideas about reducing the hours of work per week? Have you gone into that field?

Dr. GOLDSMITH. No; I do not have any particular ideas about that. Statistically people on the average work considerably fewer hours than I do, so personally I do not regard this as such an urgent problem.

Representative PATMAN. I am sure that is true.

Dr. GOLDSMITH. This is a field in which, again, I have no firsthand knowledge.

Representative PATMAN. Well, it is related directly, I think, to automation.

Dr. GOLDSMITH. Certainly. We have had a tendency in the past for the hours of work to decline; as a matter of fact, even at the substantial rate of between one-fourth and one-half percent a year, which adds up over decades. We can expect a further decline, though not at that rate. There is the big problem of the use of leisure, whether people want to take the increase in potential output partly in more leisure or partly in more consumption. In a democracy, this is decided by what the people do, acting either by themselves or acting through their representatives.

Representative PATMAN. Therefore, recreation could become big business.

Dr. GOLDSMITH. Ah, yes.

Representative PATMAN. We have appreciated and enjoyed your testimony, Dr. Goldsmith. You have made a great contribution to our series of hearings.

Any other question, gentlemen?

Representative COFFIN. I have one clarifying question.

Earlier in your testimony, Dr. Goldsmith, when you were discussing Great Britain and its use of net national income, you skipped over the reasons for Great Britain using this index. You had something to say about net availability, if I remember correctly. I did not catch it.

Dr. GOLDSMITH. I said that I used net national income in Great Britain, and that I used gross national product of the United States. This I have done because we do not have gross national product figures for England for a long period back. The two series are closely connected. The difference consists primarily of capital consumption allowances and indirect business taxes, and gross national product usually is 5 to 20 percent higher than net national income. It just so happens that we do not have entirely comparable figures. For the long-term trend, this difference is not too serious; but I wanted to draw your attention to the fact that the two lines are conceptually not entirely comparable.

Representative PATMAN. Doctor, I do not agree with you about the effect of interest rates, in view of the fact that in our national budget today over 10 percent of it is for servicing the national debt, \$8.1 billion. If we were paying this year the same interest rate that we paid in 1946, the cost of servicing this debt would be \$2,400 million less. When you translate that into what can be done with \$2,400 million—I was figuring it out the other day—you could build a million-dollar schoolhouse in every State of the Union every year with that difference in the interest rate. That really means a lot of money. And whenever you consider, too, that the people are paying each year about \$10 billion more in interest charges than they were paying, say, 7 years ago, I think it is a matter of great importance.

Dr. GOLDSMITH. It is a serious problem. But, as I said, it is very difficult to run what we call a free economy without a free capital market and a reasonably free movement of interest rates. Your point apparently is that the movement of interest rates has not been free. That is something different, and I suppose something you may want to go into in your hearings. No market is completely free, in the textbook sense, of course. The question is whether inhibitions on freedom are more pronounced in the capital market than those we find throughout the economy.

I suppose everybody would wish that the Government could borrow at a lower rate; that, for some reason or other, people would give the Government a greater differential compared to other borrowers. But that is one of the prices you have to pay for letting people operate in the way they feel like, for good or poor reasons.

Representative PATMAN. The total amount of tax-exempt securities now outstanding, is about \$55 billion. The holders of those securities do not even have to make a report on their income tax forms as holders of these securities. They pay no tax of any kind whatsoever. That is increasing at the rate of from \$7 to \$8 billion a year. Do you not think, Dr. Goldsmith, that the Government and the Congress could well consider setting up some sort of a procedure to support such bonds at a low rate of interest, say 2 percent which would, of course, be equal to 4 percent to a person in the 50-percent-income bracket? It might thereby aid people in the local communities,

who vote bonds for different purposes, since a large part of the money collected locally, through the ad valorem system to pay the local interest, is collected from people who are paying taxes on what they owe rather than on what they own?

In other words, people buy homes and farms and property which is subjected to taxation locally. They render that property for taxation as though they own it. They do not actually own it; they owe for it instead. Say he has only paid 10 percent—a veteran buying a home—nonetheless he pays taxes as though he owned the whole thing. He does not; he just owns one-tenth of it. And since the most burdensome tax on earth comes from the local taxes, where people pay such a large part of it on what they owe rather than on what they own, do you not think that the Federal Government has some responsibility in protecting those people against an extortionate rate of interest?

**Dr. GOLDSMITH.** There are great problems in the whole regime of tax exemption for State and local Government securities. If the Federal Government collected taxes on them, it could compensate the borrowers for more than the present market difference in the yield, and thus reduce the net cost to them, and still have money left over, compared to the present situation where it does not collect anything on the interest received from State and local government securities. This is a very difficult problem. It involves constitutional questions. I agree with you that the whole field of the treatment of State and local government securities is an important one. And as a statistician, of course, I am very unhappy that the holders do not even have to report the income from them. Hence, we are in great ignorance as to who actually owns them. Our ignorance, of course, is by no means complete. We do know that a large proportion of the \$60 billion outstanding is held by financial institutions, and most of the rest is held by people in the high-income brackets, as is indicated by estate-tax returns, and estimates of personal trust fund holdings. Nevertheless, as a statistician, I would like to have more information about who owns these tax-exempt securities.

**Representative PATMAN.** I realize, Doctor, that it would be almost impossible to eliminate the exemption feature. I was here in Congress when President Roosevelt advocated doing away with tax-exempt securities. And it was at a time when he was at the height of his popularity. And the administration put all the steam behind it that it was possible to put behind it; but it did not get anywhere. It did result in the elimination of the tax-exempt feature in the Government's own bonds only.

Therefore, I do not know that we would be justified in making a further attempt to eliminate the tax-exempt feature, but I do think that we should do something to protect those people against extortionate interest rates and what I consider to be a fixed market. Tax-exempt securities could result eventually in having two classes of citizens in our country, one class paying the taxes and supporting the Government, and another class paying no tax of any kind whatsoever.

**Mr. Widnall?**

**Representative WIDNALL.** Dr. Goldsmith, do you have any chart or any figures to show the comparison of the growth of debt in Great Britain and in the United States?

**Dr. GOLDSMITH.** I did not prepare that, but that is quite easy to do. The ratio of the national debt to either national wealth or national income, of course, is higher in Great Britain than in the United States, and always has been.

**Representative WIDNALL.** Has their debt been growing as proportionately as ours recently?

**Dr. GOLDSMITH.** You mean since the war?

**Representative WIDNALL.** In the last 10 years.

**Dr. GOLDSMITH.** The growth in our national debt in the last 10 years is very small. So I would have to look carefully at the British figures, because the movement there also has not been very large, and I would not want to say now—

**Representative WIDNALL.** I am just interested in the fact that they have been using an austerity program to promote prosperity in their country, and we have not been using an austerity program. And what is the relationship, as you watch the national growth of income?

**Dr. GOLDSMITH.** Of course, the growth of national product and income in Great Britain in recent years has been quite slow. There has been a considerable amount of clamor, and the British Government now is following a less restrictive policy. They apparently feel they now have established their external position sufficiently safely so that they can afford some internal relaxation.

The British have a basic problem which we do not have; they must carefully watch their international balance of payments. The present government apparently felt it was its first duty to restore the international balance of payments situation, accumulate more gold and foreign exchange than they had. They seem to feel that they have done that now. From what I read in the papers, I conclude that they intend to be less restrictive in their domestic credit and other policies than they have been over the last few years.

**Representative WIDNALL.** They are probably going to reduce taxes, too, are they not?

**Dr. GOLDSMITH.** Well, in view of the coming election among other considerations, that is not impossible.

**Representative WIDNALL.** And those things happen here in the United States, too.

**Dr. GOLDSMITH.** They have been known to happen, yes.

**Representative WIDNALL.** That is all.

**Representative PATMAN.** And it has been known to happen that a President even vetoed a tax reduction bill. That is one of the unusual things that happen.

Returning for a moment to the previous question: Do you know of any country in the world where tax exempt securities are allowed except in the United States, Doctor?

**Dr. GOLDSMITH.** I do not think there is any other country where they have the same importance. There have, however, always been countries that granted tax exemption to certain specified issues. This has usually been done, of course, to foster their sale. In some foreign countries the special attraction is not so much tax exemption as treatment under the foreign exchange regulation and other advantages which would not be relevant in the United States.

Tax exemption is not a device that has been unknown abroad. It has usually been used in countries where the central government was



in financial straits, but I do not know of any other country where the central government's securities are not tax exempt but those of the lower level governmental units are. Here, of course, the situation is the result of our Federal organization. I would have to check countries that also have a federal form of organization, like Brazil and a few other countries, as I do not know what the situation is there.

Representative PATMAN. One final question: Do you happen to know the total aggregate national debts of other countries besides the United States?

Dr. GOLDSMITH. The national debt figures, meaning the central governments', are known and have been reported in various United Nations publications and are quite easily available.

Representative PATMAN. We often say, and of course, we make the statement after making some investigation, that we owe today in the United States, a larger national debt, than the aggregate debts of all the other nations in the world. And I assume you would be willing to say that is a correct statement?

Dr. GOLDSMITH. It may be a correct statement, but it is rather irrelevant, because debt, government as well as private, has to be measured against each country's income and wealth.

Representative PATMAN. Thank you very kindly, Doctor.

(The prepared statement of Dr. Raymond W. Goldsmith is as follows:)

#### STATEMENT OF RAYMOND W. GOLDSMITH

##### NATIONAL PRODUCT AND INCOME: LONG-TERM TRENDS

###### I. CONCLUSIONS

The growth of this country's national product per head—the best simple measure of economic growth that we have—has averaged about 1¾ percent a year over the last 120 years after adjustment for price changes, and has shown remarkable steadiness if periods of at least 40 years' duration are considered. This trend under which real income per head doubles every 40 years and increases almost sixfold every century, is far above the growth rate experienced by the United States in its earlier history; has hardly if ever been equaled for as long a stretch of time in any other country or period; and has been the vehicle which has propelled the United States to its present eminence in the world as the country with the largest aggregate output, the most advanced technology and the highest standard of living; and as the main source of foreign capital for less developed areas.

The fact that the secular trend in real output and income per head of the population has been fairly steady at 1¾ percent per year since the middle of the 19th century must not be used as the basis for either of two conclusions, one referring to the past and the other to the future. It must not be interpreted as denying the possibility or asserting the easy achievement of a higher rate of growth during the past century if our economy had been able to operate at a higher average rate of utilization of its labor, capital, and natural resources. Nor must it be regarded as forecasting the future rate of growth, even if peace prevails and even if the average rates of utilization of resources follows their customary trends. An economist may be permitted to point out, however, that if the future trend of real output and income per head is to average considerably above its level of the last 120 years, either technological progress in the narrow sense must become much more rapid than it has been in the past; or far-reaching changes—whose nature and chance of success cannot as yet be specified with confidence—must take place in the economic and financial organization of the United States.

The rest of this statement will be limited to explaining, qualifying, and occasionally interpreting some of these assertions.

## II. THE MEANING OF NATIONAL PRODUCT AND TREND

Let me begin by explaining what is meant by gross national product how the current estimates are reduced to a constant price basis, why per head instead of aggregate figures are used, and what economically significant facts are measured by real gross national product per head.

Gross national product can be defined very simply and quite accurately, as the heap of finished goods and services produced each year. To use more learned language, gross national product is the total final unduplicated output of an economy. Unduplicated in this connection means that, for instance, the sale of bread by the grocery store to the housewife is counted as part of the value of gross national product, while the sale of the bread by the bakery to the grocery store, the sale of flour by the mill to the bakery, the sale of wheat by the farmer to the elevator, are all excluded from gross national product.

Since we are primarily interested in changes in the quantities of goods and services produced rather than in the fluctuations of their current monetary values, particularly when we are studying long-term growth, we must deflate the current values with the help of appropriate price indexes. The result of the division of the current values of output by these price indexes is the value that a given year's production of goods and services would have had at the prices prevailing during the base period—in our case during the year 1929.

The estimation of gross national product does not allow for the fact that some of the stock of capital, in the sense of durable reproducible assets, is used up during the year and is, so to speak, transformed into a part of final output. If capital consumption allowances are deducted from gross national product we obtain net national product, the amount of goods and services produced during a given period that could be used up while keeping capital intact.

Chart VII illustrates these and other main relations among the chief national accounting aggregates and their principal components. I shall not specifically discuss these relationships, but have added this chart to facilitate orientation in the sometimes a little complicated national accounting terminology.

An economy may grow in two ways which must be carefully distinguished. It may grow, first, by adding to the number of producers and consumers while average output or consumption per unit remains unchanged. This we may call extensive, or more graphically amoebic growth. An economy may, secondly, increase output and consumption per head with or without concurrent expansion of the number of producing and consuming units. This may be called intensive growth. Most observed increases in total national product or income are the result of both extensive and intensive growth. The two components may be separated by dividing aggregate output or income by the appropriate number of units.

From some points of view interest may center on aggregate growth, for instance when a comparison of the actual or potential economic strength of different countries is wanted as a part of the evaluation of the political or military situation. In studying the trend in either productive efficiency or economic welfare we are, however, primarily interested in intensive growth. Since tomorrow's session will be devoted to the subject of productivity I shall not discuss what denominator ought to be applied to total output to measure productive efficiency. If we want to measure the trend in the standard or level of living as an indicator of economic welfare, consideration should be given only to that part of output that reaches consumers, and allowances should be made for the fact that consumption requirements vary among consumers of different age and sex. Hence, in measuring the trend in the level of living we should use consumer expenditures reduced to a constant price basis as the numerator and the number of equivalent full consumers as the denominator. This is what we shall actually do a little later. For the broader picture of the trend in intensive growth of the American economy, we shall however use total real gross national product divided by the number of inhabitants. This, it should be noted, is not an ideal concept theoretically as it measures neither productivity—in the sense of output per unit of input—nor economic welfare. Real national product per head is, however, the broadest simple measure of intensive economic growth that we have and is therefore used as the basis of our discussion.

By "trend"—also called secular trend or basic movement—economists understand a movement in one direction of reasonable regularity, i. e., without very wide or irregular deviations, continuing for a period at least as extensive as the longest authenticated wavelike movement in the series, and preferably several times as long as it. As you will hear at a later session, economic statis-

ticians now feel that a wavelike movement of about 20 years' duration has been fairly well established in many basic American economic series for a period back to the early 19th century. Hence, the minimum period for which a trend in national product or income should be calculated is about two decades. Periods covering an integral multiple of these so-called long swings, i.e., periods of 40, 60, 80, or more years are, however, much to be preferred as a basis of trend analysis.

It is not as yet possible in studying the long-term trend of national product and income in the United States to go back to the founding of the Republic, let alone to the beginning of white settlement. We are, however, in a position to study the long-term trend for a period of approximately 120 years. I want to stress immediately, so as not to have to repeat it, that the available data are considerably more reliable beginning with the late 1870's on than for the preceding 40 years for most of which estimates can be derived only at 5-year intervals. This presentation, therefore, will have to be limited to the period from 1839 to 1959. Fortunately this period, as well as the two 60-year and the three 40-year subperiods into which it can be divided, have considerable internal unity as distinctive phases in our economic history. This justifies studying the trends in national product and income during the subperiods as well as the trend observable over the entire 120-year period.

By starting our series in 1839 we are able to reach back virtually to the time when industrialization started in earnest and thus to cover the entire period of what may be regarded as the modern economic history of the United States. It is well to remember that in 1839 the area of continuous settlement ended at approximately the 95th meridian; railroads were but 10 years old; steamships were far outnumbered by clipper ships; petroleum, gas, and electricity were as yet unheard of; and the thought of moving men, goods, or messages through the air was regarded as chimerical.

If we divide the entire period for which we have statistics into two 60-year subperiods, the first of these running from 1839 to 1899, encompasses the interval between the time "the Nation took shape" and the "watershed of the nineties," to use the characterization of two eminent historians. The second subperiod extending from 1899 to the present may have less unity, but it represents economically speaking all that we have witnessed of contemporary America.

Fortunately, a division into three 40-year subperiods also seems to make historical sense. The first of them, from 1839 to 1879, can be regarded as the formative period of modern America, politically and economically. The second subperiod, stretching from 1879 to 1919, witnessed the creation of the country's industrial and financial system as we still know it notwithstanding all the extensive and intensive changes that have since taken place. The last subperiod, extending from 1919 to the present, circumscribes fairly accurately the period of economic preeminence of the United States, a position characterized by a share in total world production of not less than one-fourth; the highest standard of technology and of consumer welfare found anywhere in the world; and the role as the chief supplier of capital and technical assistance to less developed countries.

### III. THE TREND OF NATIONAL PRODUCT AND INCOME

We are now ready to look at the figures. We shall deal first with gross national product and then with consumption, and shall progress from aggregates in current prices to aggregates in constant (1929) prices, to per head values in constant prices, so that you may see the extent to which observed growth in total national product or consumption is due to (1) changes in the price level, primarily a monetary phenomenon; (2) increases in population, reflecting extensive growth; and (3) increases in average real output or consumption, the basic measure of intensive growth.

The estimates of gross national product and personal consumption shown in the chart are a combination of two or three sets of data. For the last 50 years use is made of the estimates of the National Income Division of the Department of Commerce. The figures for 1879 to 1908 (for consumption for 1879 to 1929) are taken from an unpublished study by Professor Kuznets,<sup>1</sup> but they are very similar to estimates contained in some of his earlier work.<sup>2</sup> For estimates of

<sup>1</sup> "Capital Formation and Its Financing" (unpublished National Bureau of Economic Research, mimeograph, 1958).

<sup>2</sup> See, e.g., "Long-Term Changes in the National Income of the United States of America Since 1870" in "Income and Wealth," series II (1952), ch. I.

gross national product during the four decades before 1870, I have used estimates of the value of the commodity product; i.e., the output of agriculture, manufacturing, mining, and construction which have been prepared recently by Professor Gallman for every fifth year between 1830 and 1890.<sup>3</sup> Since commodity product, which excludes transportation and services, increases less rapidly than gross national product these estimates have been adjusted for the difference as reflected in the percentage of the labor force engaged in commodity production.<sup>4</sup>

To bring out differences in the rate of growth and in changes in it, all charts depicting time series are plotted on a ratio (logarithmic) scale under which a steady rate of growth is reflected by a straight line sloping upwards, and the rapidity of growth is proportional to the steepness (slope) of the line.

Chart I shows the course of aggregate gross national product over the last 120 years, cyclical variations, long swings and extraneous disturbances all being reflected in the unadjusted annual data plotted from 1869 on. The light line follows the current value of gross national product while the heavy line represents the result of an attempt to reduce these current values to the measuring rod of the price level of 1920. Since the trend of prices has been upward during much of the past century, the light line rises more rapidly than the heavy line—deflated aggregate gross national product.

Chart II permits us to segregate intensive from extensive growth. The lower (thin) line is aggregate deflated gross national product, the heavy line of chart I. The upper (heavy) line shows annual real gross national product per head, our key measure of intensive growth.

Chart III presents comparable information for consumer expenditures, the upper (light) line again showing aggregate real consumption while the lower (heavy) line represents real consumption per full consumer (i.e., in terms of adult males), the closest simple approach to a welfare measure of national product that we have.

In chart IV we reach the heart of our subject, the long-term trend in intensive economic growth as reflected in real (deflated) gross national product per head. To minimize the effects of cyclical fluctuations, the light line shows 5-year moving averages of real gross national product per head for the period from 1869 on when annual estimates are available. The heavy straight line is the trend of 1% percent a year determined by mathematical fitting for the period 1870 to 1920, and extended forward to 1950 and backward to 1830.

Because the two main disturbers of the secular trend—the great depression and the Civil War—lie just beyond and slightly before the core period of 1870 to 1920, it has seemed preferable to calculate the trend for the entire 120-year period from the core period rather than to determine the secular trend by means of an algebraic fit to all annual values between 1830 and 1950 (apart from the difficulty that before 1869 figures are available only at 5-year intervals). This is justified only if the extensions from the trend, forward and backward for three or four decades, produce values close to the actual observations for 1950 and 1830. The trend based on the core period meets this test. The extrapolated value for 1950 is only 2 percent away from the observed value; similarly, the difference between the extrapolated and the observed values for 1830 is only 1 percent. This close coincidence should permit regarding a growth rate of 1% percent a year as the trend not only for the core period 1870–1920, but also for the more extended period from 1830 to 1950. The probably more familiar rate of growth of aggregate real gross national product averages a little over 3½ percent a year for the entire period, but shows a declining trend reflecting the slowing down of population growth, and thus comes to 3 percent for the final 40-year period of 1910–50.

A second test of the appropriateness of a 1% percent trend as an expression of the growth in real national product per head throughout the entire 120-year

<sup>3</sup> "Commodity Output in the United States, 1830–90" (to be published in National Bureau of Economic Research, "Studies in Income and Wealth," vol. 24).

<sup>4</sup> Professor Kuznets' estimates are available back to 1869, and Professor Gallman's series could have been linked in 1869 (or 1874) rather than in 1870. The decision to effect the link in 1870 was influenced by the unusually sharp upward movement shown in Professor Kuznets' estimates between 1869 and 1870. Use has not been made here of the older estimates by Martin ("National Income in the United States, 1790–1938") that are available for decennial census years back to 1790 since the criticism by Professor Kuznets ("Income and Wealth," series II, pp. 221 ff.) as well as the behavior of other series, such as national wealth (op. cit., p. 306) cast very grave doubt on the reliability of Martin's series for the first half of the 19th century. If Martin's estimates had been used the growth of gross national product between 1830 and 1870 would be considerably smaller than shown in the charts, viz, 1.2 percent against 1.6 percent for real national product per head.

period, is to observe the closeness of the annual values, or their 5-year moving averages, to the trend. This comparison is helped by plotting a trend line 10 percent above and another 10 percent below the trend line as is done in chart IV. It will then be seen that only in three instances do the observed values fall outside the band of 10 percent above or below the trend. The first of these is the period of the Civil War and its aftermath; the second, the great depression; and the third, the years of World War II. The third of these exceptions is subject to doubt. If a deflation had been applied to the current national product estimates for these years that eliminated the effect of the relatively high cost of armaments more completely, real gross national product per head for the war years might fall within the 10-percent band, or exceed it only to a negligible extent. The existence of these two or three exceptions, of course, is hardly astonishing as they occur exactly at those periods in our economic history where they would be expected.

The conclusion thus seems justified that an average growth rate of real national product per head of 1½ percent is a satisfactory description of the basic movement of national product and income throughout the last 120 years.

The story is a very similar one for real consumption per full consumer. The trend here is about 1½ percent per year for the period 1879 to 1959, only slightly below the trend for real gross national product per head. The small difference between these two measures of intensive growth reflects the near-constancy of the ratio of consumption to gross national product and the slight upward trend in the ratio of full consumers to total population, which in turn is due to slow ageing of the population.

Chart V based on the figures of table I illustrates how increases in population, changes in the price level, and increases in output per head have combined to produce the observed rates of growth of aggregate gross national product in current prices during the last 120 years and during the two and three subperiods of 60 and 40 years duration respectively. These rates have been calculated on the basis of the values at the beginning and the end of the period, not as in chart IV by determining mathematically the average rate of growth that fits all annual figures within the period as closely as possible. The differences between the rates of growth determined in the elementary and the more sophisticated way, however, are usually quite small.

TABLE 1.—Trend of gross national product and personal consumption, 1839-1959

[Percent increase per year <sup>1</sup>]

	Entire period 1839-1959	60-year subperiods		40-year subperiods		
		1839-99	1899-1959	1839-79	1879-1919	1919-59
		(1)	(2)	(3)	(4)	(5)
<b>A. Gross national product:</b>						
1. Aggregate, current prices.....	4.85	4.13	5.69	4.48	5.69	4.40
2. Price level.....	1.18	-0.10	2.42	0.16	1.91	1.40
3. Aggregate, constant prices.....	3.66	4.23	3.09	4.31	3.72	2.97
4. Population.....	1.97	2.50	1.45	2.71	1.91	1.30
5. Per head, constant prices.....	1.64	1.67	1.62	1.55	1.76	1.64
<b>B. Personal consumption:</b>						
6. Aggregate, current prices.....			5.48		5.27	4.49
7. Prices.....			2.18		1.53	1.28
8. Aggregate, constant prices.....			3.22		3.68	3.17
9. Consumers (equivalent adult males).....			1.46		2.01	1.30
10. Per full consumer, constant prices.....			1.74		1.64	1.85

<sup>1</sup> Calculated from values in first and last year of period.

Let us start with the simplest series, current aggregate gross national product. Its average rate of growth over the entire period is 4.8 percent. In other words, over the last 120 years on the average, this year's gross national product in current prices has been almost 5 percent above last year's. I do not need to expand on the buoying effects of such a tendency on many economically relevant

factors, not the least businessmen's expectations of a noticeable increase in volume of sales as the normal course of events.

The difference in the rate of growth of aggregate current gross national product between subperiods are not negligible, but they are not radical either. Even if we take subperiods of 40 years' length—probably the shortest period for which one ought to calculate trends—the average rate of growth of aggregate current gross national product varies only between 4.4 and 5.7 percent per year. More interesting, there does not appear to be a trend toward acceleration in the rates of growth of the monetary value of aggregate national product. If 40-year periods are used, the rate of growth is highest in the period from 1870 to 1919, not in that from 1919 to 1959 or that from 1839 to 1870.

Population is the only one of the three factors to show a definite change in trend over the full period, declining from an annual average rate of growth of 2.7 percent in 1839-79 to one of only 1.3 percent in 1919-59. This trend, as you know, appears to have been reversed or at least halted recently the average rate of growth of the population for the postwar decade reaching 1½ percent not far below the level which prevailed early in this century.

The largest variations in the average rate of change are shown by the price level, more specifically by the gross national product deflator which is a weighted average of the prices of all final goods and services produced. For the 120 years as a whole, prices have increased on the average at the rate of 1¼ percent per year, a rate which probably now would be regarded as within the range of price rise characterizing a "creeping inflation." Price trends in the first half of the period, when the average rate of change was virtually zero, differed considerably from those observed during the second half starting in 1899, during which the rise in prices averaged 2½ percent per year, probably near the upper boundary of what is thought to be compatible with a creeping inflation. However, if subperiods of 40 years' duration are taken, prices advanced most rapidly from 1870 to 1919 when the rise averaged 1.9 percent per year rather than in the last 40 years, during which the average rise amounted to only 1.4 percent.

The result of these variations in rates of increase of total gross national product in current prices, in the price level, and in population is that the residual, the rate of growth in real national product per head, shows more stability within the range of 1½ to 1¾ percent than any of the other three series. The contribution of the three factors—real output per head, population, and prices—to the average rate of growth of aggregate current output thus has differed greatly in the different periods.

For the entire 120 years population growth has accounted for two-fifths of the total increase in the monetary value of aggregate output; the rise in the price level for one-fourth; and intensive growth, the rise in real output per head, for one-third. In some of the subperiods the change in the price level has contributed nothing to the increase in aggregate gross national product at current prices, as for instance from 1839 to 1899; or has even offset part of the increase in population and intensive growth, e.g., from 1869 to 1899. There is no period during which the rise in the price level accounted for as much as one-half of the rate of growth in total current aggregate output. During the last 40 years the rise in the price level has been responsible for fully one-third of the rate of growth of current aggregate output, while population growth has contributed three-tenths and intensive growth almost two-fifths.

No clear relation seems to exist between the rate of intensive growth—to repeat, the magnitude in which we are primarily interested—and either price level movements or the rapidity of population growth. Intensive growth proceeded at approximately the same rate during the first and the second half of the 120-year period although the price level showed no trend during the first half but advanced at an average rate of 2½ percent per year during the second half. The only instance in which a relationship between the movement of the price level and the rate of intensive growth can be observed—without detailed analysis no such relationship can be regarded as reflecting cause and effect—is the period from 1869 to 1899 during which the rate of intensive growth at 2.2 percent per year was the highest one observed during any period of 30 years' or more duration while the price level declined at the rate of 1.7 percent per year, the only case of a downward trend in prices for any period of such length. All that possibly needs to be added to avoid misunderstanding is that substantial sustained intensive growth and an upward trend in prices, at a moderate rate, are obviously not incompatible.

The movements in the rate of growth of aggregate consumption in current prices and the contributions to it made by increases in real consumption per

full consumer, growth in the number of consumers, and changes in the price level are so similar to those observed in the case of gross national product, that a separate discussion is unnecessary. The relevant figures, however, are given in table 1.

#### IV. THE GROWTH OF THE PRINCIPAL COMPONENTS OF NATIONAL PRODUCT AND INCOME

Stability in the rate of growth of gross national product per head (or, for that matter, stability in the rate of growth of real income per full consumer) does not mean stability in the rate of growth of the components of gross national product or income. Specifically, it does not mean stability of the rate of growth of the different industrial sectors of the economy (such as agriculture, manufacturing, trade and services); of the private and the Government sector; of the different regions of the country; of the different types of commodities and services produced; of the different forms of income, particularly labor and property income; and of incomes of different size. As a matter of fact, we know that the rates of growth over the past century have been quite different for different industrial sectors, for the Government as against the private sector, for different types of commodities, and for different regions; and it is at least possible that considerable differences have existed also in the rates of growth of different types of income and of different income size classes.

These differences in the rate of growth of the different constituents of national product or income are the essence of the process of economic development. The national rate of growth is nothing but an average of the rates of growth in different sectors, regions, etc. The national rate of growth, therefore, is influenced by two sets of factors. The first is the rate of growth prevailing in the different sectors of the economy; the second, the share of the different sectors in aggregate national product or income. The national rate of growth can remain the same even if sectoral growth rates change, increasing rates in some sectors being offset in their effect on the national average by decreasing rates of growth in other sectors. Similarly, the national rate of growth can and will change although there is no change in the rates of growth of any sector. If the share of one sector in national product or income increases over a given period, this shows that the sector has been growing more rapidly than the national aggregate. Similarly, a decline in the share of a sector indicates that the sector has been growing less rapidly than the Nation as a whole.

It would go far beyond my assignment and ability—and at times would exceed the reliable statistical material now available—to trace in detail the differences that have existed during the last century in the rates of growth of the constituents of national product and income. I shall have to limit myself to summarizing in a few sentences the main features of these differences in growth rates insofar as they are known.

##### 1. Capital formation versus consumption

While rates of growth have differed greatly for the different specific commodities and services that make up the national product, with the consequence that the distribution of total national product among groups of commodities and services has changed substantially, one relation—and possibly the most important single relation in this field—has shown a remarkable degree of constancy over the last 100 years.

When the total national product is divided into two parts, one consisting of durable goods (including changes in business inventories and in net foreign investment) and the other made up of all nondurable goods and services, it is found that the two parts have grown over the long run at approximately the same rate. Hence, the share of durable goods in total gross national product, a relation often referred to as the gross capital formation ratio, has been fairly constant since the Civil War. If consumer durables are included in capital formation its share in gross national product has deviated but little from 80 percent from decade to decade with the sole exception of the decade including the Great Depression. Eliminating consumer durables, but still including residential housing and Government construction, the gross capital formation ratio has in most decades been slightly above one-fifth without showing a definite upward or downward trend. The decade of the Great Depression is again the main exception.

The equality of the long-term rate of growth of the production of durable goods on the one hand and of nondurable goods and services on the other, and the consequent stability in the gross capital formation ratio, however, do not mean that the same relationships persist when account is taken of capital consump-



tion allowances. Capital consumption allowances have been increasing in proportion to gross capital formation, partly because of the shortening of the average life of durable goods which reflects the increasing share of producer and consumer durables and the decline of the share of construction expenditures in total gross capital formation. The long-term rate of growth of net capital formation, has, therefore, been somewhat smaller than that of the output of non-durable goods and services or of total gross national product. As a necessary consequence the share of net capital formation in net national product has declined somewhat, the exact extent of the decline depending on assumptions made regarding the length of life of the different components of capital formation, the method of depreciation applied and the price indexes used to deflate the original data.

Considerable changes have taken place in the structure of capital formation. The output of producer and consumer durables has risen more rapidly than that of residential or nonresidential construction. From 1870 to 1950 average rates of growth have been fully 4 percent for producer durables;  $2\frac{1}{2}$  for residential construction and for other private construction; and over  $4\frac{1}{2}$  for public construction. (All rates calculated from values at beginning and end of period; they are aggregate deflated, not per-head, values.) The share of gross capital formation represented by increases in inventories has shown a slight decline reflecting a somewhat slower growth of additions to inventories than of total gross capital formation.

### 2. Sectoral differences in growth

No economist is needed to tell you that rates of growth of the main sectors of the economy have differed considerably since changes in the distribution of gross national product among sectors, which reflects these differences in rates of growth, are obvious even to the casual student of American economic history. The outstanding feature of these changes in industrial structure, of course, have been the declining shares of agriculture; and the increase in the shares of manufacturing and mining and of government. Between 1830 and 1950 the share of agriculture in national product has declined from about one-third to about 5 percent. On the other hand, that of manufacturing and mining has risen sharply from about one-tenth to one-third, while that of Government has shot up even more rapidly from only 2 percent to approximately one-eighth of total national product.

Obviously, very pronounced changes in average rates of growth underlie these changes in the sectoral structure of gross national product. The average rate of growth (aggregate—not per head, calculated from deflated values at beginning and end of period only) for the entire period is thus about  $1\frac{3}{4}$  percent for agriculture;  $2\frac{3}{4}$  percent for transportation and public utilities;  $3\frac{3}{4}$  percent for services and construction; 4 percent for trade;  $4\frac{1}{2}$  percent for manufacturing and mining; and 5 percent for Government—all compared to the  $3\frac{1}{2}$  percent rate for the entire economy. It would take us too far afield to explore the trends in the rate of growth of each of these sectors, the more so as some of them do not by any means move along the regular straight path which we have observed in the case of total national product.

### 3. Regional differences in growth

Substantial differences also exist in the rates of growth of real income per head among different regions of the United States. The outstanding feature here has been the tendency toward a reduction of the differences existing between the level of real income per head in the different parts of the country. This, of course, means that the average rate of growth of real income per head has been more rapid in those regions in which income was relatively low in the mid-19th century than in those in which it was then high compared to the national average. Thus, to take the extremes, the Southeastern and Southwestern States have shown an average rate of growth of real income per head between 1920 and 1957 of almost 3 percent per year, while the rate of growth has been as low as  $1\frac{1}{4}$  percent for the Mideastern States and  $1\frac{1}{2}$  percent for New England.<sup>6</sup>

<sup>6</sup> The regional differences in the rate of growth of current aggregate and per head income can now be traced back to 1840 thanks to Professor Easterlin's recent investigations (to be published in "Studies in Income and Wealth," vol. 24). For the early periods the use of these figures as measures of the growth of real income per head is impaired by the obviously substantial differences in the level and movements of prices in the different regions, a factor which diminishes in importance as we get closer to the present and which probably may be disregarded for the period from 1920 on. (Cf. Hurwitz and Stallings in "Studies in



#### 4. Differences among types of income

In contrast to the pronounced differences in the rates of growth observed among different industrial sectors, different regions and different types of commodities and services, the differences in the rates of growth of the main functional types of income seem to have been rather moderate. Great caution, however, is necessary in making statements in this field as the figures are subject to considerably more disagreement among experts than is the case for the divisions of national product with which we have dealt so far.

If total national income is divided only into the part going to labor and that accruing to property, entrepreneurial income being allocated throughout the period in the ratio of 2 to 1 between labor and property, then there appears to have been a slight increase in the share of labor, possibly from seven-tenths in the 1800's to nearly four-fifths in the last decade, if recent, not uncontested estimates by Professor Kravis are used. Within property income the share of interest and rent has declined sharply while entrepreneurial property income has held its own, corporate profits, of course, gaining rapidly at the expense of property income from unincorporated business enterprises. These changes, of course, reflect differences in rates of growth.

#### 5. Changes in income size distribution

Finally, there have also been changes in the rate at which the average real income of people of different affluence has increased, differences which are reflected in changes in the shape of the size distribution of personal income. In this case, unfortunately, reliable figures do not go back beyond 1929.

In the last 30 years the per head real, before-tax income of the lowest two-fifths of the population, arrayed by size of income, has tended to increase at a more rapid rate (2.6 percent per year) than average personal income (1.7 percent), while the rate of growth has been below the national average for the top fifth of income recipients (1.0 percent). The result, of course, has been some reduction in the degree of inequality of incomes. Most of the net change occurred during the few years of World War II.

In interpreting these figures it is well to remember that 1929 was a year of a particularly high degree of relative income inequality. If comparable figures were available for a longer period of time, preferably back to the middle of the 19th century, differences in the rates of growth of the different strata of the population might therefore be smaller, on an annual basis, than they now appear to be when we can follow them for only a 30-year period. Notwithstanding all the qualifications that must be made, it appears likely that even for the entire last century the rate of growth has been higher for the lower than for the higher income groups, and that in consequence the degree of inequality in income distribution has diminished somewhat.

### V. STATISTICAL QUALIFICATIONS

I now reach a section of my presentation which, I am afraid, may tax your patience. After having presented briefly the statistical record on the rate of growth of national product during the last 120 years I now must discuss, be it ever so incompletely, the qualifications to which these figures are subject. This I shall do, as far as possible, in nontechnical terms.

To spare you any discussion of the statistical limitations of the figures I have used in this presentation would, I feel, be a disservice to this committee. Before you can judge the significance of the average rate of growth of national product and income for the last century or parts of it you should be aware of some of the statistical limitations to which the figures are subject and to some of the qualifications which must be made in their interpretation.

I have told you that the gross national product per head, reduced to the constant price level of 1929, has increased over the past 120 years, and through the three 40-year subperiods into which it can be divided, at an average annual rate of 1% percent. How accurate is this figure as a measure of the trend in the physical output of the U.S. economy?

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Income and Wealth," vol. 21.) For the period from 1880 to 1929, for which the qualification on account of variations among regional price movements may not yet be too serious, the differences in regional rates of growth of income were generally in the same direction (but not identical in all cases), as those observed for 1929-57. Growth of income per head was considerably higher than the national average in the South Atlantic States, but markedly lower in New England. In general the growth differentials were, however, much less pronounced from 1880 to 1929 than in the shorter period from 1929 to 1957.

Of the many factors which make the observed average rate of growth of real gross national output per head differ from a perfect measure of the growth of physical output, if such exists, I shall discuss only half a dozen; three factors which make the observed rate of growth appear higher than a perfect measure would show it to be, and three others that have the opposite effect of reducing the observed rate below the perfect one. This restriction is, of course, dictated partly by limitations of time and the desire to avoid overly technical points, but it seems justified by the likelihood that the six factors to be mentioned cause the most important discrepancies between the observed and the perfectly measured rate of growth.

To begin with factors which tend to make the observed rate of growth appear higher than it should be, the first is the increase in the share of those economic activities that can be brought within the measuring rod of money, and hence, are covered by our measures of national product. To put it in a different and possibly more easily understandable way, the part of economic activities that takes place within the household, including cooking, baking, dressmaking, home repairs, vegetable gardening, and so forth, and is not included in our measures of national product has been declining over the past century. Omission of this part of national product means that the rate of growth in measured national product is somewhat higher than it would be if these intrahousehold economic activities had been included. There are no reliable or close estimates of the relative size of these activities—this is one of the reasons why they are not covered by the usual measures of national product—but it is unlikely that their inclusion would reduce the average annual rate of growth of real national product per-head by as much as one-eighth of 1 percent.

A second factor tending to make the measured rate of growth too high is the increasing share of output that is required to make good the consumption of capital. In the longrun only that part of gross national product can be regarded as available either for consumption or addition to the stock of capital that exceeds the current using-up of part of the stock of capital. In this case we are fortunately in a position to make a reasonably close estimate of the magnitudes involved. If our calculations had been based on net national product, that is, gross national product less capital consumption allowances, the average annual rates of growth for the entire period from 1830 to 1950 would have been one-tenth of 1 percent lower than the figures presented.

The third of the factors that tend to overstate the observed rate of growth of national product is more difficult to define and almost impossible to measure. It concerns certain increases in the economic cost of producing the national output, expenditures which are not treated in our statistics as cost because they are borne by consumers rather than by producers. The most important item in this category probably is the increased cost of transportation borne by consumers as the distance between home and place of work has increased. Others are various expenses necessitated by the increasing strain of participation in the modern production process. These items, which are now included in gross national product, but according to many national income experts should not be, are difficult to measure exactly even if agreement could be obtained as to their scope. It is unlikely, however, that their elimination from gross national product would significantly reduce its long-term rate of growth.

Let us now turn to the factors which tend to make the calculated rate of growth of national product smaller than it ought to be if appropriate definitions were used and all necessary information were available.

The first, and probably the most important of these factors, is the improvement in the quality of goods and services which has not been taken into account in the price indexes which are used to reduce the estimates of national product in current prices to the constant price figures you have seen. In principle, of course, price indexes should be based on items of identical quality so that the difficulty we are now discussing would not arise. Actually, however, it has proved impossible to take account fully of the process of quality improvement that goes on continuously though not as constant speed nor in all sectors of the economy. (I am doubtful, for instance, whether the quality of bread or hair-cuts is superior now to what it was a century ago.) As a result, the price indexes we use as deflators have a tendency to overstate the rise in prices (or to understate the decline in prices) that has actually occurred. Exactly how important this failure to take full account of quality improvement may be, it is impossible to say. While it is undoubtedly substantial for certain types of commodities, particularly producer and consumer durables, that are mass produced, it would seem to be slight or nonexistent or negative for a considerable

proportion of national product particularly many custommade products and services. While failure to take account of quality improvement leads on balance to some understatement of the measured rate of growth of national product, the understatement would seem not to have been very large in proportion to the level of the observed rate.

The second of the factors, inclusion of which would increase the rate of growth above its observed level, is the omission in all available estimates of the services rendered by the stock of consumer durables, of durable assets of nonprofit institutions, and of Government structures, civilian as well as military. Since these categories have increased in importance over the last century the omissions of the services they provide to the population imparts a slight downward bias to the observed rate of growth of national product. Even at the present time, however, inclusion of these services would add only a few percent to measured gross national product. Hence, their omission can influence the rate of growth of national product over the past century to only a minor extent.

The third factor that tends to make the observed rate of growth appear smaller than it should be is unfortunately both important and highly technical. The price indexes that have been used, directly or by a process of linking, to reduce gross national product in current prices to a constant price level are based on the relative importance of the different commodities and services near the end of the period of observation. Specifically, they are based on the relative prices of 1879 for the period from 1839 to 1879; on the prices of 1929 for the period of 1879 to 1909; and on the relative prices of 1954 for the period from 1909 to 1959. Statisticians have found that price indexes using weights at or near the end of the period tend to overstate the rise in prices. Hence, estimates of current national product deflated by means of these indexes tend to show too low a rate of growth, too low that is in comparison to the figures that would be obtained by using relatives for the middle or the average of the period as weights. The reason for this phenomenon is a fact of which every housewife is aware even if but hazily, the tendency for commodities and services that increase in price less than the average to grow in volume more than the average. This negative correlation between relative price and relative quantity movements, to use the technical expression, necessarily leads to an understatement of the rate of growth of national product when a weight system based on the situation at or near the end of the period of observation is used. While an exact measure of the effect of the use of late period weights on our estimates of gross national product in constant prices is not available for most of the period, scattered observations indicate that while far from negligible this factor is unlikely to have led to an overstatement of the rate of growth of national product by an amount that is substantial in proportion to that rate.

It is not easy to evaluate to what extent the three factors which tend to make the observed rate of growth of gross national product larger than it should be, offset the three factors operating in the other direction; nor to assess the net effect of other factors working in both directions which have not been discussed specifically. It is, therefore, not more than a personal judgment to say that on balance the economically relevant factors that are not, or not adequately, reflected in the figures on which we base the calculation of the observed rate of growth would result in a slight increase of the observed annual average rate of growth for the entire period from 1839 beyond the level of  $1\frac{3}{8}$  percent. The adjusted rate is likely to be at least as high as  $1\frac{3}{4}$  percent. It may even have been a little higher than that. It is very unlikely, however, that adjustment for all the factors discussed would raise the adjusted rate of growth to 2 percent a year or even very close to it. This conclusion, however, I repeat, is to a good extent a matter of personal judgment.

#### VI. A LOOK BACKWARD AND ABROAD

Although our usable statistical record does not go back beyond 1839—and the data have already been stretched to the utmost for the 40 years before 1879—I cannot well evade the question whether the trend in national product and income that has been observed over the last 120 years and has shown considerable longrun stability at the rate of about  $1\frac{1}{8}$  percent per year for real national product per head is likely to, or could have extended into the period before 1839, possibly as far back as the coming of the white man.

There are two ways of obtaining if not a reliable answer to this question at least an idea about it. The first approach is provided by the very rough estimates by students who have worked on the quantitative aspects of the earlier

periods of American economic history. They feel that average real income per head in 1760 is very unlikely to have been below one-half of the level of 1800. This judgment—and it is not more than that—implies an average rate of growth in real income per head between 1760 and 1830 of not more than 0.6 percent per year. Granting all possible errors in the evaluation of the figure for 1760, these are rates of growth radically lower than those observed for any substantial period over the next 120 years.

The second approach is along the lines of the logician's indirect proof. Let us start from the level of real income per head in 1830, and see where we shall arrive on the assumption that the measured rate of growth actually had averaged 1½ percent before 1830 as it has since. This is very easy to do, since an annual growth of 1½ percent implies a halving of national income every 43 years as we go back. Average real income per head in 1830 may be estimated at about \$400 in present prices. If the trend observed since 1830 had been in force before that date, average income per head in today's prices would have been about \$145 in 1776, \$80 in 1730, and less than \$30 in 1676. It takes only a little consideration of the minimum requirements for keeping body and soul together, even in the simpler conditions prevailing in colonial America, to conclude that at present prices for individual commodities an average level of income below \$200 is fairly well ruled out for 1776 or even the early 18th century. Indeed, we do not have to rely entirely on speculations of this type, but may recall that the average real income per head, in current American prices, is in the order of \$200 in countries such as Mexico, Turkey, and Portugal, whose present standard of living for the mass of the population is hardly higher than that prevailing in colonial America.

There seems little doubt, then, that the average rate of growth of real income per head was much lower than 1½ percent before 1830. If we consider periods of at least 50 years' length, it is questionable that we would find an average rate of growth as high as 1 percent for any of them. There thus must have occurred a fairly sharp break in the trend of real national product per head sometime before 1830. Exactly when this break occurred we cannot yet say, on the basis of the statistical data available. I would hazard a guess, however, which may shock scrupulous economic historians, that the break occurred not very long before 1830 and that it reflects both the transition of the United States from a predominantly agricultural to a more and more industrial country and the advent of the railroads.

In the case of the United States we can study the trend of national product and income for a period of only 120 years unless we want to lose ourselves in the realm of speculation—at least in the present state of the statistics. There exists, however, fortunately a country, not incomparable in its industrial structure and its economic development to the United States, in which we are able to measure the trend in national income for a period of almost 300 years—Great Britain. It may therefore be worth while to review very briefly the British record illustrated in chart VI, if only to bring out one salient fact, viz, that the rate of growth in real product per head was much slower before the 19th century than over the last 150 years.

British real product per head has increased at an average rate of about 1.2 percent between 1870 and 1957. The average rate of growth for the entire period from 1830 to 1959 is likely to have been close to 1½ percent. This rate, while substantially lower than that observed in the United States for the same period, is of the same order of magnitude. The average rate of growth for the 150 years before 1840—specifically, from 1688, the year for which we have the remarkable estimate of Gregory King—appears to have been below 0.5 percent, according to the studies of P. Deane. While we cannot use this sharp break in the trend of national product and income in England, which seems to have occurred a few decades before 1840, to infer a similar movement in the United States, it may at least be not without value as collateral evidence.

It is also interesting to see how the seemingly small difference of one-half of 1 percent between the trend of intensive growth of national product in the United States and in Britain—1½ percent against 1¼ percent—has sufficed to produce within one century the present very substantial difference in the level of average real output per head in the two countries. If we assume that at the present time output per head in the United States is 60 to 100 percent above that in Britain, as specialized inquiries indicate (Gilbert and Associates, Comparative National Products and Price Levels) then it would have taken not more than 100 and 140 years respectively, for a difference of one-half of 1 per-

cent per year in the rate of intensive growth to result in the present large difference in level of average income. In other words we should expect average real income per head to have been the same in the United States and Britain as late as 1860 or 1820. This conclusion is quite compatible with the fragmentary direct evidence of relative output per head we have for those dates—another example of the power of even small differences in compound interest rates, if operating over long periods of time.

Representative PATMAN. Tomorrow, in the House caucus room, 362 House Office Building, we will have as our witness, Mr. Solomon Fabricant, Director of Research, National Bureau of Economic Research.

And without objection, the committee will stand in recess until tomorrow morning at 10 o'clock, when we will assemble in the House caucus room.

(Whereupon, at 12 o'clock noon, the committee was recessed, to reconvene at 10:15 a.m., Wednesday, April 8, 1959.)



## EMPLOYMENT, GROWTH, AND PRICE LEVELS

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WEDNESDAY, APRIL 8, 1959

CONGRESS OF THE UNITED STATES,  
JOINT ECONOMIC COMMITTEE,  
Washington, D.C.

The committee met at 10:15 a.m., pursuant to recess, in the House caucus room, 362, Old House Office Building, Hon. Paul H. Douglas presiding.

Present: Senators Douglas, Bush, and Javits; Representatives Bolling, Curtis, and Widnall.

Representative BOLLING (presiding). The committee will be in order.

Other members of the committee are attending a steering committee meeting and will be along shortly.

Our witness today is Mr. Solomon Fabricant, the director of research, National Bureau of Economic Research, and professor of economics, New York University.

Mr. Fabricant, you may proceed as you wish.

### STATEMENT OF SOLOMON FABRICANT, DIRECTOR OF RESEARCH, NATIONAL BUREAU OF ECONOMIC RESEARCH, INC., AND PROFESSOR OF ECONOMICS, NEW YORK UNIVERSITY

Mr. FABRICANT. Thank you.

I greatly appreciate this opportunity to be of assistance to the Joint Economic Committee, especially in these deliberations on what is surely the most important economic question confronting the American people, the economic growth of the country.

It is also interesting to me, as one concerned with economic research, that the Committee is devoting a set of hearings to a review of the historical facts on the performance of our economy. This is recognition by an important body of the fact that systematic examination of the past provides the basis for sound policy on balanced growth, and I must confess that I am delighted with this attitude toward economic and historical research.

In accordance with my assignment, my remarks will be devoted to a review of the essential facts on trends in productivity, production, and related economic developments, and in keeping with the spirit of this set of hearings, I shall try to confine myself to an objective presentation of the historical developments and avoid interjecting opinions on policy. If my opinions creep in, I hope you will consider them as purely personal and not necessarily reflecting the views of the organizations with which I am connected.

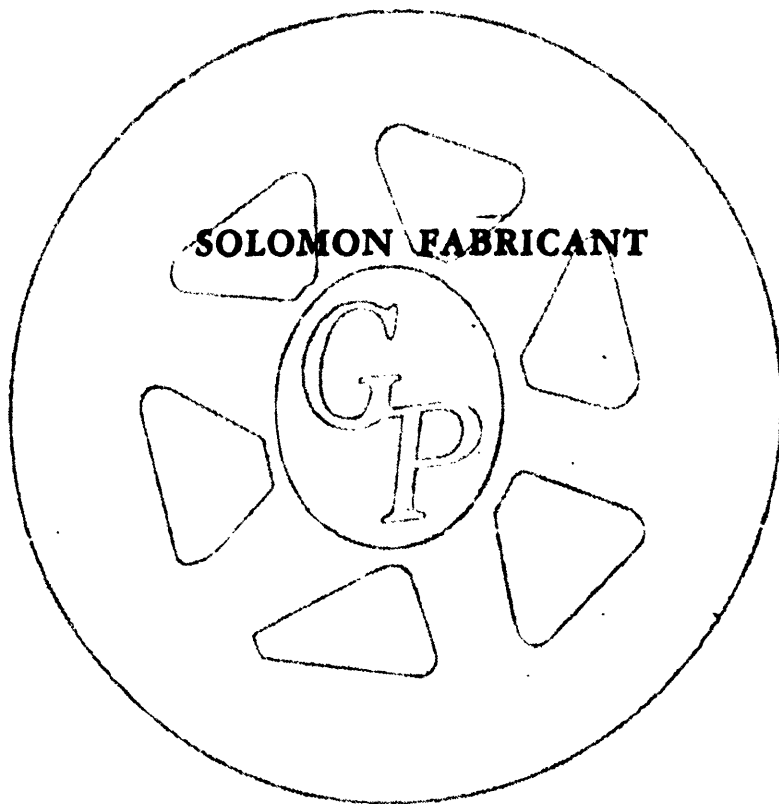
To expedite matters I shall with your permission offer for the record a recent publication of the National Bureau of Economic Research. This study, as the title indicates, sets forth the basic facts on productivity change. It summarizes a great deal of research by many people, directly relevant to the matter before us. The paper includes in fact all the essential statistics to which my time permits reference. I supplement it only with a few additional charts which I also offer for the record.

Representative BOLLING. Without objection, that publication<sup>1</sup> will be accepted.

(The information follows:)



# Basic Facts on Productivity Change



**OCCASIONAL PAPER 63**

**NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.**

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1958

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*(Resolution adopted October 25, 1926  
and revised February 6, 1933 and February 24, 1941)*

**PREFACE**

Among the facts on productivity presented here, some are new and some are old. For the old facts, I am obligated to many. For the new facts, and for confirmation of the old, my obligation is especially to the authors of several National Bureau studies, the main results of which I have attempted to weave together. Particular mention must be made of my debt to John W. Kendrick, upon whose work I have been able to draw very freely, and to Thor Hultgren for a similar favor.

Kendrick and Hultgren also made helpful comments on a first draft of this paper, as did Moses Abramovitz, Jack Alterman, Gary S. Becker, Leon Greenberg, Oswald W. Knauth, Geoffrey Moore, and Theodore W. Schultz. I am deeply grateful also to Maude E. Pech, who was in charge of the calculations. The charts were skillfully drawn by H. Irving Forman. Mary Phelps carefully edited the manuscript and saw it through press.

The paper, as well as a good deal of the research upon which it is based, was made possible by a grant from the Alfred P. Sloan Foundation, Inc. However, the Sloan Foundation is not to be held responsible for the conclusions.

SOLOMON FABRICANT

November 14, 1958

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**BASIC FACTS ON  
PRODUCTIVITY CHANGE**





## IMPORTANCE OF THE FACTS

Productivity has been much discussed in recent years, and too frequently misunderstood.

Productivity deserves the attention that it has received, for it is a measure of the efficiency with which resources are converted into the commodities and services that men want. Higher productivity is a means to better levels of economic well-being and greater national strength. Higher productivity is a major source of the increment in income over which men bargain and sometimes quarrel. And higher — or lower — productivity affects costs, prices, profits, output, employment and investment, and thus plays a part in business fluctuations, in inflation, and in the rise and decline of industries.

Indeed, in one way or another, productivity enters virtually every broad economic problem, whatever current form or new name the problem takes — industrialization, or research and development, or automation, or tax reform, or cost-price squeeze, or improvement factor, or wage inflation, or foreign dollar shortage.

Despite its importance and the wide attention paid it, productivity is a subject surrounded by considerable confusion. For this there are a number of reasons. First, people employ the same term but mean different things. As a consequence, various figures on productivity change come into use, and these often differ in significant degree. Further, the rate of productivity change is not a fixed quantity. Our figures will show that it varies from one period to another. What the past or current rate of productivity change is will depend on the particular period for which the calculation is made. If no reference is made to the period, and if the period varies considerably from one context to another, confusion results. In addition, the statistical information available for calculating productivity indexes is deficient in various respects. Better or worse — or merely different — methods of meeting these deficiencies, enumerated below, often yield results that differ appreciably. Failure to specify the methods and the assumptions involved in the process of estimation, or failure to understand them, adds to the confusion.

As I have said, the questions into which productivity enters are important. They are also difficult. We all have far to go before any

of us can claim to understand fully the process of productivity change, its causes, or its consequences, or to see clearly the way to deal with the issues involved. But surely the way to more effective policy would be clearer if the basic facts of productivity change were established and widely known.

Establishing important economic facts is an objective of the National Bureau. Because the facts bearing on productivity are important, the Bureau has for a long time devoted a portion of its efforts to their determination and analysis. Its completed studies of national income, capital formation, production trends, mechanization, employment, and productivity have contributed essential pieces of information.

Currently, the task of cultivating this significant area of economic knowledge is being undertaken at the National Bureau in a number of separate, though related, projects: a study of trends in wages and productivity; a study of trends in national product, capital formation, and the relation between capital and product; and a study of cycles in productivity, costs, and profits. Some of the results of these current investigations have already been published; some are in press; others are in various stages of preparation.<sup>1</sup> The studies are rather technical in character, devoted as they are to the examination of concepts, the sifting of evidence, the preparation of estimates, and the analysis of complex results. All are, or will be, spread over

<sup>1</sup>The reports already published and those soon forthcoming are as follows:

John W. Kendrick, *Productivity Trends: Capital and Labor*, NBER, Occasional Paper 53, 1956

John W. Kendrick, "Productivity Trends in the United States" (typescript, 1958)

Clarence D. Long, "Wages and Earnings in the United States: 1860-1890" (mimeograph, 1958)

Albert Rees, "Real Wages in Manufacturing, 1890-1914" (typescript, 1958)

Simon Kuznets, "Capital in the American Economy: Its Formation and Financing" (mimeograph, 1958)

Leo Grebler, David M. Blank, and Louis Winnick, *Capital Formation in Residential Real Estate: Trends and Prospects*, Princeton University Press, 1956

Alvin S. Tostlebe, *Capital in Agriculture: Its Formation and Financing since 1870*, Princeton University Press, 1957

Melville J. Ulmer, *Capital in Transportation, Communications, and Public Utilities: Its Formation and Financing*, in press

Daniel Creamer, Sergei P. Dobrovolsky, and Israel Borenstein, "Capital in Manufacturing and Mining: Its Formation and Financing" (mimeograph, 1958)

Thor Hultgren, "Changes in Labor Cost during Cycles in Production and in Business" (typescript, 1958)

the many pages needed to expose to public scrutiny the evidence on which they are based — essential if they are to merit the confidence needed for wide acceptance.

It is useful, in these circumstances, to put together some of the main results of this substantial research effort, state the findings in a minimum of technical language, and make the results available promptly. This is the purpose of the present paper.

Even a summary of facts will have to cover a good deal of territory. Something needs to be said about each of the following matters: the long-term average rate of growth of national productivity; the degree to which growth of productivity has experienced change in pace; productivity increase in relation to the rise in the nation's real output; the extent to which increase of productivity has been the general experience of the various industries of the economy; and the relation between productivity increase and the increase in real wages. To each of these subjects, therefore, a brief section is devoted which lists the main facts and provides such discussion of concepts, data, alternative measurements and findings as is necessary to make the results intelligible. We conclude with a word on recent changes in productivity.

### THE LONG-TERM RATE OF INCREASE IN NATIONAL PRODUCTIVITY

Over the sixty-four years between 1889 and 1953 — the period which has been examined most closely and for which presently available statistics are most adequate — the rate of increase in productivity has been as follows:<sup>2</sup>

*Physical output per manhour in the private economy has grown at an average rate that appears to be about 2.3 per cent per annum.*

*Comparing output with a measure of labor input in which a highly paid manhour of work counts for proportionately more than a low-wage manhour yields a measure of productivity for the private economy that grew at a significantly smaller rate — about 2.0 per cent per annum.*

*A measure of productivity for the private economy that compares output not only with labor input (so determined) but also*

<sup>2</sup>Average annual rates for the slightly longer period 1889-1957 (utilizing preliminary estimates for 1954-57) are not significantly different.

*with tangible capital, each weighted by the market value of its services, grew still less rapidly — about 1.7 per cent per annum.*

*All these indexes of productivity in the private economy rose somewhat more rapidly than the corresponding indexes for the economy as a whole, including government, when the usual measurements of government output and input are utilized. For the total including government, productivity rose about 1.5 per cent per annum.*

This list presents the main broad measures of long-term productivity increase that John Kendrick has calculated for the American economy. It is by no means complete. Kendrick goes to some trouble to provide still other measures that differ in definition of output or input, in the degree to which they cover the economy, or in details of estimation. However, as Table 1 indicates, these alternative calculations yield results similar to those just given and we may therefore concentrate on the above measures. They differ enough among themselves to raise a serious question about the meaning and measurement of productivity.

Productivity, I have mentioned, is a measure of the efficiency with which the nation's resources are transformed into the consumption, investment, and other goods that satisfy individual or collective wants. Now we can become more (or less) efficient in the use of a particular type of resource, say, plant and equipment, as well as of resources taken as a whole. A given volume of product might be obtained from a smaller amount of plant and equipment, used in conjunction with an unchanged amount of labor, land, inventory, and other resources. This would be a real gain. It would be proper to consider it the result of an increase in efficiency (if fluctuations due to weather and the like were not the cause); and we could measure the increase in efficiency by calculating the ratio of an index of physical output to an index of the volume of plant and equipment. We could also refer to this ratio as a productivity index, as is frequently done. It is necessary to note, however, that we would have to be sure that all resources other than plant and equipment had in fact remained constant (or equivalently, that we had been able to eliminate the effect of changes in them by appropriate statistical techniques), before we could interpret the index as reflecting change in efficiency.

We would also have to recognize that the importance of the change so calculated depended on the size of the particular input — in this case, the services of plant and equipment — relative to other

TABLE 1

Broad Measures of the Long-Term Rate of Increase in  
Productivity in the United States  
Average annual percentage rates of change, 1889-1953

	<i>Aggregate of Industries for which Individual Productivity Indexes Are Available</i>		<i>Entire Economy, including Government</i>		
	<i>Entire Private Domestic Economy</i>	<i>"National security" version of output</i>	<i>"Peace- time" version of output</i>	<i>Dept. of Commerce version of output</i>	
Gross physical output per unweighted manhour	2.3	2.3	2.2	2.0	2.2
Net physical output per unweighted manhour		2.3	2.2	2.0	2.2
Gross physical output per weighted manhour	1.9	2.0	1.8	1.6	1.8
Net physical output per weighted manhour		2.0	1.8	1.6	1.8
Gross physical output per unweighted unit of tangible capital	1.0	1.2	1.0	0.9	1.0
Net physical output per unweighted unit of tangible capital		1.2	1.0	0.9	1.1
Gross physical output per weighted unit of tangible capital	1.0	1.0	0.8	0.7	0.8
Net physical output per weighted unit of tangible capital		1.1	0.9	0.7	0.9
Gross physical output per weighted unit of labor and tangible capital combined	1.7	1.7	1.5	1.4	1.5
Net physical output per weighted unit of labor and tangible capital combined		1.7	1.6	1.4	1.6

Source: John W. Kendrick, "Productivity Trends in the United States" (a forthcoming report of the National Bureau of Economic Research), especially Chapter 3 and Appendix A. The underlying indexes, reproduced in part in Tables A and B, below, are subject to some revision. Use was made by Kendrick of estimates developed in other National Bureau studies by Kuznets, Goldsmith, Blank, Tostlebe, Ulmer, Creamer, Borenstein, and Barger, among others, as well as of data published by the Departments of Commerce and of Labor.

Gross output differs from net output by the amount of depreciation and other items of capital consumption, in the case of the national indexes; and also by the amount of materials, fuel, and supplies consumed, in the case of the industries covered in the first column of figures (except agriculture). See Kendrick for a fuller explanation of those differences; and also for a detailed explanation of the difference between the weighted and unweighted indexes.

Industries for which individual productivity indexes are available for 1889-1953 include farming, mining, manufacturing, transportation, and communications and public utilities. The detailed list is given in Table B.

The three sets of indexes for the entire economy differ mainly in the treatment of defense outlays in the calculation of national product and of inputs. The "national security" and "peace-time" versions of national product are based largely on concepts developed by Kuznets; the Department of Commerce version is that currently published by its Office of Business Economics.

inputs. If the services of plant and equipment constituted a small fraction of total input, doubling the ratio of product to plant and equipment would have much less significance than if these services constituted a large fraction. In other words, an adequate index of productivity for a single resource requires not only eliminating the effect of changes in other resources, but also somehow taking into account the relative importance of the resource.

When other resources are used in significant volume, and change occurs in the volume of such resources used (which is almost always the case), a measure of productivity based on a single resource might tell us little or nothing of change in the efficiency with which this resource was being utilized. It might not even point in the right direction. For example, output per unit of plant and equipment might have fallen because plant or equipment was being substituted for labor or other resources. Yet the efficiency with which plant and equipment was being used might have risen.

Nor would the index of output per unit of plant and equipment (or any other single resource) provide reliable information on the efficiency with which all resources were being used. Only if all other resources were of small importance, or moved in the same direction (indeed, in virtually identical proportion) as plant and equipment would an index of productivity based on plant and equipment alone provide a reasonably accurate answer to that question. Yet that is the question with which we are primarily concerned.

As a general rule, therefore, it is better not to limit productivity indexes that purport to measure change in efficiency to a comparison of output with a single resource. The broader the coverage of resources, generally, the better is the productivity measure. The best measure is one that compares output with the combined use of all resources.

Information on all resources is not available, however. Until rather recently, economists interested in measuring the rate of increase in national productivity had to make shift with labor input alone — first, in terms of number of workers, then in terms of man-hours. This is still true for most individual industries, narrowly defined, even on a historical basis, and for both individual industries and the economy as a whole on a current basis.

For this reason, the most widely used index of productivity — the one I cited first — is simply physical output per manhour. It is a useful index, if its limitations are recognized. Because in the economy at large and, as we shall see, in most — not all — individual industries, labor input is by far the most important type of input

(measured by the fraction of income accruing to it), the index based on manhours alone is not often in serious error. It is a fair approximation to a more comprehensive index of efficiency. But as such it is usually subject to an upward bias, as the figures cited indicate.

The bias in output per manhour results not only from the omission of capital input. The usual index of output per manhour fails also to take into account change in the composition or quality of labor.<sup>3</sup> That is, manhours worked by persons of different skills, levels of education, and lengths of experience are treated as if equivalent, thus ignoring important forms of human capital that aid in production and contribute to wage and salary differentials. The index of output per weighted manhour — the second index cited — catches some of this intangible capital, for the labor in industries with high rates of pay is given a heavier weight than that in low-pay industries. However, the procedure of weighting is only a step in the right direction. All the labor within an industry is still assumed to be homogeneous. Perhaps more important, broad advances in education and the like, which improve the quality of labor in industries generally, are not taken into account. And differences in labor quality are imperfectly measured by pay differentials, since these are influenced by such other factors as the non-economic advantages and disadvantages of particular occupations, differences in the cost of living, and uncompleted adjustments to changes in demand and supply. The figures previously given — the difference between the rate of increase in output per manhour and in output per unit of labor (weighted manhours), which is 0.3 per cent per annum — therefore indicate the direction but not the degree of bias arising from the neglect of change in the quality of labor.

With respect to tangible capital, we are in a better position. In recent years the available information on tangible capital has been broadened, worked over, pieced out, and put into usable form, and this has helped greatly to expand the coverage of inputs for productivity indexes. The data on tangible capital are still far from perfect. In calculating them, difficulties of all sorts are involved — the treat-

<sup>3</sup>If the index relates output to manhours of work done only by "production workers" — which is frequently the case for individual industries — there is a further source of error. In that case, the index will usually rise more rapidly than output per manhour of work done by all workers, for "nonproduction workers" have, over the years, generally increased in relative importance. Our indexes relate output to the work done by all workers, including proprietors, supervisory employees, and clerical workers, as well as wage earners. The only exception is the index in Table 4, which gives output per production worker.

ment of depreciation, the problem of allowing for changes in prices, and the proper valuation of land, among others. These problems have not been entirely solved, but we appear to be sufficiently close to a solution to warrant use of the data. With them, output per unit of tangible capital may be computed (Table 1).<sup>4</sup> This is informative; but, like output per unit of labor, it is an incomplete index of productivity. It tells only part of the story.

Indexes of productivity based on the comparison of output with the input of both labor and tangible capital are better measures of efficiency than those based on labor input or capital input alone.

Indeed, the best currently available approximation to a measure of efficiency is such an index. As we have seen (it is the third index cited initially in the text), it indicates a rate of growth of productivity that is significantly below the rate for output in relation to labor input alone. That it is lower will not be a surprise, since it is well known that tangible capital has increased substantially more than the labor force: tangible capital per weighted manhour has risen at the average annual rate of 0.9 per cent. Because the services of labor have become more and more expensive relative to those of tangible capital, there has been a strong incentive for business firms and other producers to substitute capital for labor. Yet — and this may be surprising — capital increased less rapidly than did output. On net balance, output per unit of tangible capital rose by about 1 per cent per annum. Technological advance and the other means to improved efficiency have led to savings of capital as well as of labor.

Surprising, also, may be the fact that the difference between productivity measured in terms of labor and tangible capital combined and productivity measured in terms of labor alone is no more than the three-tenths of one per cent per annum that we have found. The reason is the relatively high weight given labor in combining it with

<sup>4</sup>The index of output per weighted unit of tangible capital in Table 1 differs from the index of output per unweighted unit of tangible capital for reasons analogous to those accounting for the difference between output per unweighted manhour and output per weighted manhour. (However, the difference between the average annual rates for output per unit of capital — about 0.2 per cent — is somewhat smaller than the difference for output per manhour. In part at least, this is probably because the number of separate industries or divisions to which the weights can be applied is much smaller in the case of capital than in the case of manhours.) More specifically, the weighting allows for interindustry differences, over the base-period, in ratios of total capital (including intangibles) to tangible capital. The base-period weighting cannot take into account such changes in these ratios of total capital to tangible capital as may occur in years after the base-period; and it has other limitations in accounting for forms of capital other than tangible.



tangible capital. Obviously, manhours cannot be combined with dollars of tangible capital without translating each of them into comparable units. The appropriate unit is a dollar's worth of services in a reference base period. If a manhour of labor commands two dollars in the base period and a hundred dollars of capital equipment commands six dollars of net revenue per year (whether in rent, profits, or otherwise is immaterial), we count the hundred dollars of equipment as equivalent to three manhours. Because, in production, use is made of many more manhours than of even hundreds of dollars of capital, labor as a whole gets a much greater weight than does capital. The weights for the private economy are currently as 8 to 2. The index of output per unit of labor and capital combined — which rose at the rate of 1.7 per cent per annum in the private economy — is thus, in effect, a weighted average of the index of output per unit of labor — 2.0 per cent per annum — and of the index of output per unit of capital — 1.0 per cent.<sup>5</sup>

I have called this weighted index the best available approximation to the measure of efficiency that we seek. It is approximate for more reasons than those already given. One is the problem of measuring output, which involves combining into a meaningful aggregate a changing variety of old and new goods. A special difficulty arises in putting a figure on the quantity of services produced by government to meet collective wants. This accounts for the greater confidence most statisticians have in the estimate of productivity for the private economy, exclusive of government, and explains the plurality of estimates given in Table 1 for the economy inclusive of government.

A general deficiency of all the measures of output — and thus of productivity — is their failure to take adequate account of change in the quality of output. This, it is likely, subjects them to a downward bias. And, to repeat, the indexes of output per unit of labor and tangible capital combined, though broader than any other indexes now available, fail to cover adequately the investment in education, science, technology, and social organization that serves to increase production — a point to which we shall have to return.

The technical questions raised above (which I have selected from

<sup>5</sup>Output may be compared also with a *weighted* combination of *unweighted* manhours and of *unweighted* tangible capital. This is one of the possible alternative calculations not given in Table 1. So measured (see Table A, in the appendix), the rate of increase in productivity turns out to be 2.0 per cent per annum between 1889 and 1953. This is, in effect, the weighted average of the 2.3 per cent for output per unweighted manhour and the 1.2 per cent for output per unweighted unit of capital shown in Table 1.

a host) are, of course, matters primarily for the producer rather than the user of productivity statistics. But for the user it is important to be aware of the sharp differences made in the rate of growth of productivity by technical choices not always specified: whether output or input is defined in one way rather than another, or weights of components of output and input are determined by this rather than that method, or data are selected or estimated from one or another source.

Measured in any of the ways listed above, however, productivity in the United States has grown at a remarkable average rate over the past two-thirds of a century. The more comprehensive indexes, in which output is compared with both labor and capital input, indicate a doubling of efficiency every forty years. The index of output per (unweighted) manhour indicates a doubling even more frequently — every thirty years. Not many of the countries for which corresponding records might be constructed would show average rates as high or higher over so long a period. Over shorter periods, it is very likely, our long-term rate has been exceeded in various countries. This has happened here, as well as elsewhere, as we shall see in a moment. But it is safe to say that the United States' long-term rate is not low in relation to the experience of other countries over comparable periods. It may appear low only in comparison with aspirations — the long-term rates dreamt of by countries embarked on ambitious programs of economic development, or the rates some of our own citizens believe we need to reach and maintain if we are to meet some of the urgent problems that confront us.

#### FLUCTUATIONS IN THE RATE OF PRODUCTIVITY INCREASE

Productivity did not grow at an even rate. Its rate of growth was subject to a variety of changes, which may be characterized as follows:

*A distinct change in trend appeared sometime after World War I. By each of our measures, productivity rose on the average more rapidly after World War I than before.*

*Over the whole period since 1889, productivity fluctuated with the state of business. Year-to-year rises in productivity were greater than the long-term rate when business was generally expanding, and less (or often, falling), when business was generally contracting.*

*The slow rates of increase (or decline) in productivity appear to have been largely concentrated in the first stages of business contraction. Productivity rose most rapidly, as a rule, towards the end of contraction and during the early stages of expansion.*

*Year-to-year changes in productivity were appreciably influenced also by random factors.*

The change in trend that came after World War I is one of the most interesting facts before us. There is little question about it. It is visible not only in the indexes that Kendrick has compiled for the private domestic economy, to which Chart 1 is confined.<sup>6</sup> It can be found also in his figures for the whole economy, including government, as well as in his estimates for the group of industries for which individual productivity indexes are available. Some readers of the chart might prefer to see in it not a sharp alteration of trend, but rather a gradual speeding up of the rate of growth over the period as a whole. The latter reading is not entirely out of the question, but it seems to fit the facts less well than the former. By either reading, it is clear, the rate of growth in productivity witnessed by the present generation has been substantially higher than the rate experienced in the quarter-century before World War I.

The numerical rates of increase in Table 2 help to sharpen up the differences.

<sup>6</sup>Sources of the figures in this and later charts are Tables A, B, and C, in the appendix, unless otherwise noted. For recent years, estimates are preliminary.

TABLE 2

Average Rates of Increase in Productivity before and after 1919  
Private Domestic Economy

	<i>Average Annual Percentage Rate of Change</i>		
	1889-1957	1889-1919	1919-1957
Physical output per unweighted manhour	2.4	2.0	2.6
Physical output per weighted manhour	2.0	1.6	2.3
Physical output per weighted unit of tangible capital	1.0	0.5	1.3
Physical output per unit of labor and capital combined (weighted)	1.7	1.3	2.1

Source: Table A.

Alternative choices of the boundary year (which is rather arbitrarily set at 1919), and of the technical method of calculating the average rate,<sup>7</sup> would not eliminate the difference between the two periods.

The change in trend came in each of the indexes shown, and about the same time in each — in output per unit of labor (weighted or unweighted), in output per unit of tangible capital, and in output per unit of labor and capital combined. There is this difference, however: the quickening of pace was greater for capital productivity than for labor productivity, though it was by no means negligible for the latter. For output per unit of labor and capital combined, the rate of growth since World War I has been as much as 50 per cent higher than during the earlier period.

The chart shows also the cyclical pattern of change in productivity, in so far as this is revealed by annual figures. As a rule, whenever national output rose — which is virtually whenever business was generally expanding — productivity grew more rapidly than the trend rate; whenever output fell, productivity grew less rapidly than its trend rate, or actually declined.

It is obvious why this is so when input is measured by the resources available for use, as it is in the case of tangible capital. The total volume of tangible capital in existence seldom declines even during business contractions, for net additions to capital have rarely become negative in this country; nor does the volume of tangible capital rise nearly as rapidly as output during business expansion, for additions to capital are small relative to the existing stock. For similar reasons, the labor force — and even more so, the population of persons of working age — also is very stable. Output per unit of available resources, whether of labor, capital, or labor and capital combined, will therefore show pronounced cyclical fluctuations. These will be more pronounced than the fluctuations in the chart, for only capital input is there measured by available resources.

<sup>7</sup>All average annual rates of increase given in this paper are in effect based on geometric means of the year-to-year relatives. They were calculated by the compound-interest method from the indexes for the first and last years of the period covered. For output per unit of labor and capital combined, in both subperiods, Kendrick calculated the average rates also by the method of least squares applied to logarithms. These are: 1889-1919, 1.0; 1919-57, 2.2.

Because productivity fluctuates cyclically and otherwise, it is usually somewhat better to derive rates of increase from averages for several years, rather than from the figures for single years. For the long periods covered in Table 2, the differences would be negligible, however. In the final section of this paper, which concentrates on the shorter postwar period, we do calculate average rates of change between averages for several years.

CHART 1

Indexes of Productivity in the United States, 1889-1957  
 Estimates for the Private Domestic Economy

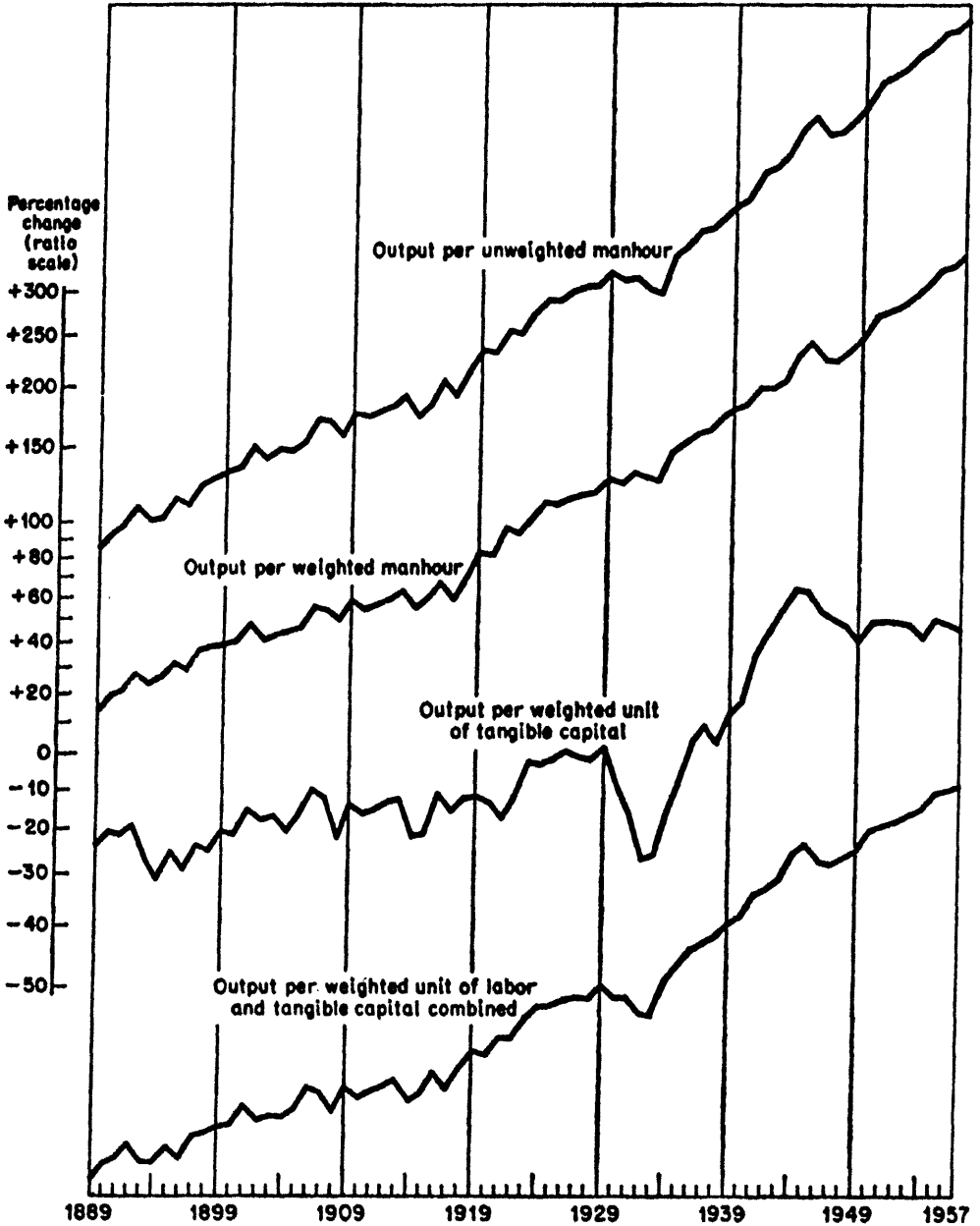


TABLE 3

Direction of Change in Output per Manhour during Years  
of Rising and of Falling Output, 1889-1957  
Private Domestic Economy

	<i>Number of Year-to-Year Changes</i>	
	When output rose	When output fell
Output per unweighted manhour		
Rose	44	7
Remained unchanged	1	0
Fell	6	10
Output per weighted manhour		
Rose	42	8
Remained unchanged	1	0
Fell	8	9

Source: Table A.

Much less obvious is the cyclical fluctuation of output per unit of resources actually put to use, which we can measure for labor.<sup>8</sup> There were 51 year-to-year rises and 17 falls in the output of the private domestic economy. Accompanying these rises and falls in output were the changes in labor productivity shown in Table 3. The average of the rates of growth in output per weighted manhour during the years of expansion in output equaled 2.7 per cent. During the years of contraction in output, the average annual rate of growth of output per weighted manhour equaled only 0.1 per cent.

Because Kendrick's annual indexes involve a great deal of estimation and the piecing out of scanty data, it is encouraging to find some confirmation of the results in a sample of individual industries (largely manufacturing) compiled by Thor Hultgren for the period

<sup>8</sup>It is not possible to construct an adequate measure of capital input that takes account of the rise and fall in the intensity with which capital is used as business improves or worsens. There is, at present, insufficient information on the opening up or shutting down of plants or production lines, the movement of stand-by equipment into and out of use, and the change in number of shifts per day. Nor would using the rate of employment of the labor force and of hours of work per employee to approximate the rate of use of tangible capital add anything to what the index of output per manhour tells us.

Even for labor, the measure of actual use leaves something to be desired in the case of salaried workers. The measure of output, too, probably has some cyclical bias, for a variety of reasons; for example, it does not cover some types of maintenance and repair to which workers can be diverted when business is slack.

TABLE 4

Percentage of Industries with Rising Output per Manhour<sup>a</sup>  
between Successive Stages of Business Cycles

From Stage <sup>b</sup>	<i>Business Cycles</i>				
	Mar. 1933- May 1938	May 1938- Oct. 1945	Oct. 1945- Oct. 1949	Oct. 1949- Aug. 1954	All Four of the Cycles <sup>c</sup>
I to II	67	100	42	89	77
II to III	67	91	46	67	67
III to IV	100	36	46	67	63
IV to V	67	36	54	83	63
V to VI	17	85	47	47	48
VI to VII	25	77	47	58	53
VII to VIII	71	58	66	83	68
VIII to IX	100	46	68	72	69

Source: Thor Hultgren, "Changes in Labor Cost during Cycles in Production and in Business" (proposed Occasional Paper). Covers up to fifteen industries in manufacturing, two in mining, and the railroads.

<sup>a</sup>One-half of the percentage of industries with unchanged output per manhour is included with the percentage that showed rises.

<sup>b</sup>Stages are defined as follows: I, average of three months centered at trough; II, average of first third of expansion; III, average of second third of expansion; IV, average of last third of expansion; V, average of three months centered at peak; and similarly for the contractions, VI-IX.

<sup>c</sup>Includes also three earlier cycles for the railroad industry.

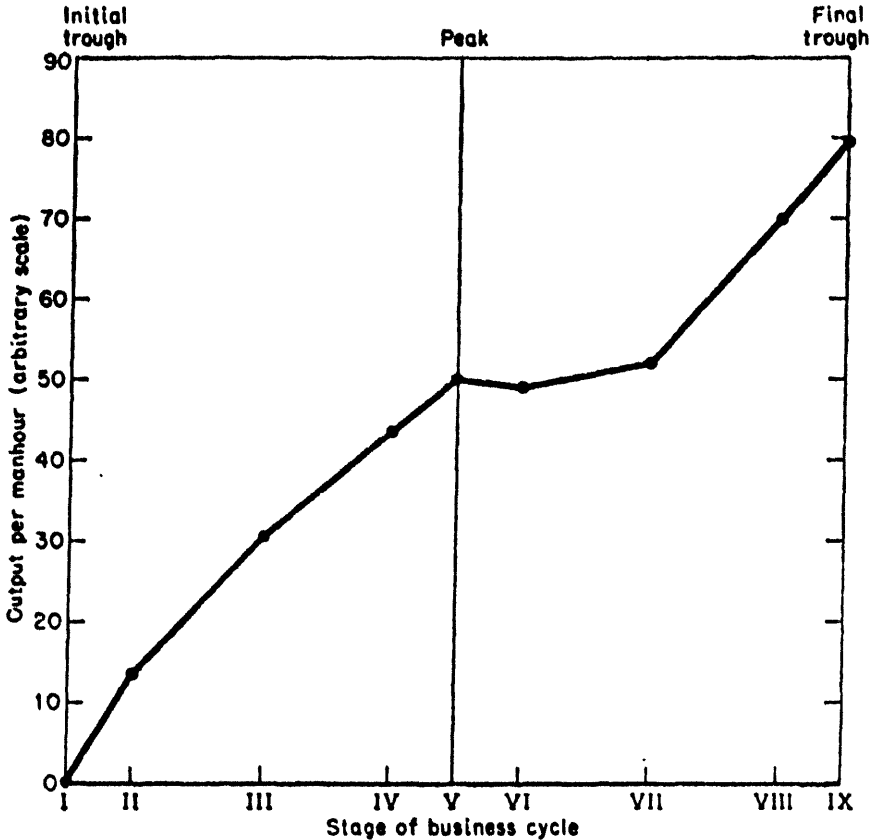
1933-54. In gathering these statistics, Hultgren made a special effort to obtain adequate and comparable data on output and the man-hours worked by wage earners. His sample has the further advantage of providing information on a monthly basis, far more satisfactory for the study of cyclical fluctuations than annual data.

Hultgren's data, set forth in Table 4 and Chart 2,<sup>9</sup> point to a most striking fact, something that we miss in the annual figures. As was shown by Kendrick's annual data, interruption of the rise in output per manhour came mainly during contraction. But the monthly data suggest, further, that most of the interruption may have usually been concentrated in the first half of contraction. After contraction had been under way for a while, and well before general business revival, output per manhour as a rule resumed its upward march, and increased at a rate even greater than the rate of increase during the latter part of expansion.

<sup>9</sup>Chart 2 is derived from Table 4, last column, by assuming that the percentage of industries with rising output per manhour (minus 50 per cent) is equal to the rate of increase in output per manhour.

## CHART 2

Average Business Cycle Pattern of Output per Manhour



Hultgren's results are not altogether consistent, and his sample of industries and cycles is thin and needs to be broadened. But if confirmed, his findings have interesting implications for the causes and consequences of productivity change. For example, they suggest that the most rapid rates of increase in output per manhour appear during that portion of the business cycle — the last stages of contraction and the early stages of expansion — when replacement and increase of plant and equipment are proceeding most slowly; and that during the initial stages of contraction, decline in output per manhour joins with increase in wage rates to push unit labor costs up.

Beyond the cyclical fluctuations in the rate of growth of productivity, other changes may be noticed in Chart 1. These include occa-



sional spurts and slow-downs that extend over a period of years. Kendrick's estimates, and similar data compiled earlier by Kuznets and Abramovitz for the full period following the Civil War, suggest the existence of a long cycle in the rate of change of productivity.<sup>10</sup> High rates of increase in net national product per unit of total input came, it seems, during periods of a decade or more centered in the late 1870's, the late 1890's, the early 1920's, the late 1930's, and the late 1940's or early 1950's. Low rates of increase came during periods centered in the late 1880's, the late 1910's, the early 1930's, and the 1940's.<sup>11</sup>

Some of the irregular changes in Chart 1 undoubtedly reflect inadequacies of the figures. Productivity change is measured by the ratio of two indexes, each subject to error, and even slight errors in these will sometimes combine to produce considerable error in the ratio, just as they will sometimes cancel one another. We cannot be sure whether or not the change between any particular pair of years is the result simply of statistical error. On the other hand, that the errors are on the whole not overwhelming is suggested by the fairly systematic business-cycle behavior that we have noticed. We know, also, that some of the irregularities reflect not statistical error but the impact of weather, strikes, and the other real random factors to which life is subject.

The picture emerging from the information gathered by Kendrick and Hultgren is one of a persistent and powerful tendency towards improvement in efficiency. Sometimes the outcome was a fast, sometimes a slow, rate of growth in productivity. Sometimes the tendency was entirely offset for a while by cyclical and random factors. But only twice was the interruption long enough to prevent productivity from reaching a new high within five years.

Because the rate of increase in productivity has been far from uniform, the user of productivity figures must know the period to which they relate. Rates of productivity increase derived from one period will differ, sometimes considerably, from those derived from a longer, or shorter, or altogether different period.

<sup>10</sup>See Moses Abramovitz, *Resource and Output Trends in the United States since 1870*, National Bureau of Economic Research, Occasional Paper 52, 1956. A section of Kuznets' forthcoming report on *Capital in the American Economy* is devoted to long waves in output, capital and the ratio of capital to output. Abramovitz is currently studying this class of phenomena and related factors; for a progress report see the *38th Annual Report* of the National Bureau, 1958, pp. 47-56.

<sup>11</sup>A word of caution: The dating is very rough; and the levels of peaks in rate of increase vary greatly among themselves, as do the levels of troughs.

### PRODUCTIVITY AND THE INCREASE IN NATIONAL PRODUCT

The nation's product or real income — the terms are interchangeable — may be said to have grown through increase in the volume of resources available for use in production, and through increase in productivity or the efficiency with which these resources are turned into product. Measurement of these two sources of increase in product suggests their relative importance over the past sixty-eight years:

*Each year's increase in productivity accounted, on the average, for about half of the year's increase in product. The other half reflected, of course, increase in resources — labor and tangible capital.*

*Productivity increase accounted for a larger fraction — about nine-tenths — of each year's increase in per capita product, with the rise in per capita resources contributing the other tenth.*

*Prior to World War I, both per capita resources and productivity grew significantly, and thus both contributed to the rise in per capita product. Since World War I, per capita resources have fallen slightly, but productivity has risen even more rapidly than before — rapidly enough, in fact, to keep per capita product growing at an average rate not far below the rate for the earlier period.*

The full set of statistics for the private domestic economy is set forth in Chart 3, and the average annual rates are given in Table 5.<sup>12</sup>

These results — and the results presented earlier — can be properly understood only if certain qualifications are kept in mind.

It is evident, to begin with, that the relative contributions to growth of product, of productivity on the one hand and of resources on the other, that emerge from these and similar calculations, depend on what is included in product and what is included in resources. More exactly, they depend on the importance and relative growth of the borderline items that are or are not included in each of these. What is in fact included is in part influenced by convention and in part by the availability of statistical data.

With respect to output, we have already noticed the question of governmental services. Similar questions arise with respect to certain expenditures by families — trade union fees and costs of getting to work are examples; and with respect to certain expenditures by

<sup>12</sup>The decline in labor input per capita during the period 1919-57, which may appear puzzling, is due largely to a decline (0.6 per cent per annum) in hours per employed worker.

TABLE 5

**Average Rates of Increase in Output, Input, and Productivity, 1889-1957  
Private Domestic Economy**

	<i>Average Annual Percentage Rates of Change</i>		
	1889-1957	1889-1919	1919-1957
<i>Total Output and Input</i>			
Physical output	3.5	3.9	3.1
Labor input (weighted manhours)	1.4	2.2	0.8
Capital input (weighted tangible capital)	2.5	3.4	1.8
Total input (weighted manhours and tangible capital)	1.7	2.6	1.0
<i>Per Capita Output and Input</i>			
Physical output	1.9	2.1	1.8
Labor input	-0.1	0.5	-0.5
Capital input	1.0	1.6	0.5
Total input	0.2	0.8	-0.3
<i>Productivity</i>			
Output per unit of total input	1.7	1.3	2.1

Source: Table A, and the census estimate of population growth as extrapolated to 1889 by Simon Kuznets.

business — for example, subsidies to factory cafeterias, “expense accounts,” and medical services provided employees.<sup>18</sup> The main problem, however, appears to be with respect to defense expenditures by government (which has reached large proportions), and for this reason we have presented estimates that differ in its treatment (Table 1). Because the results turn out to be fairly similar, however we measure output inclusive of governmental services (and input inclusive of the labor and capital employed by government), I have not taken the space to show the trends. They will be given in detail in Kendrick’s report.

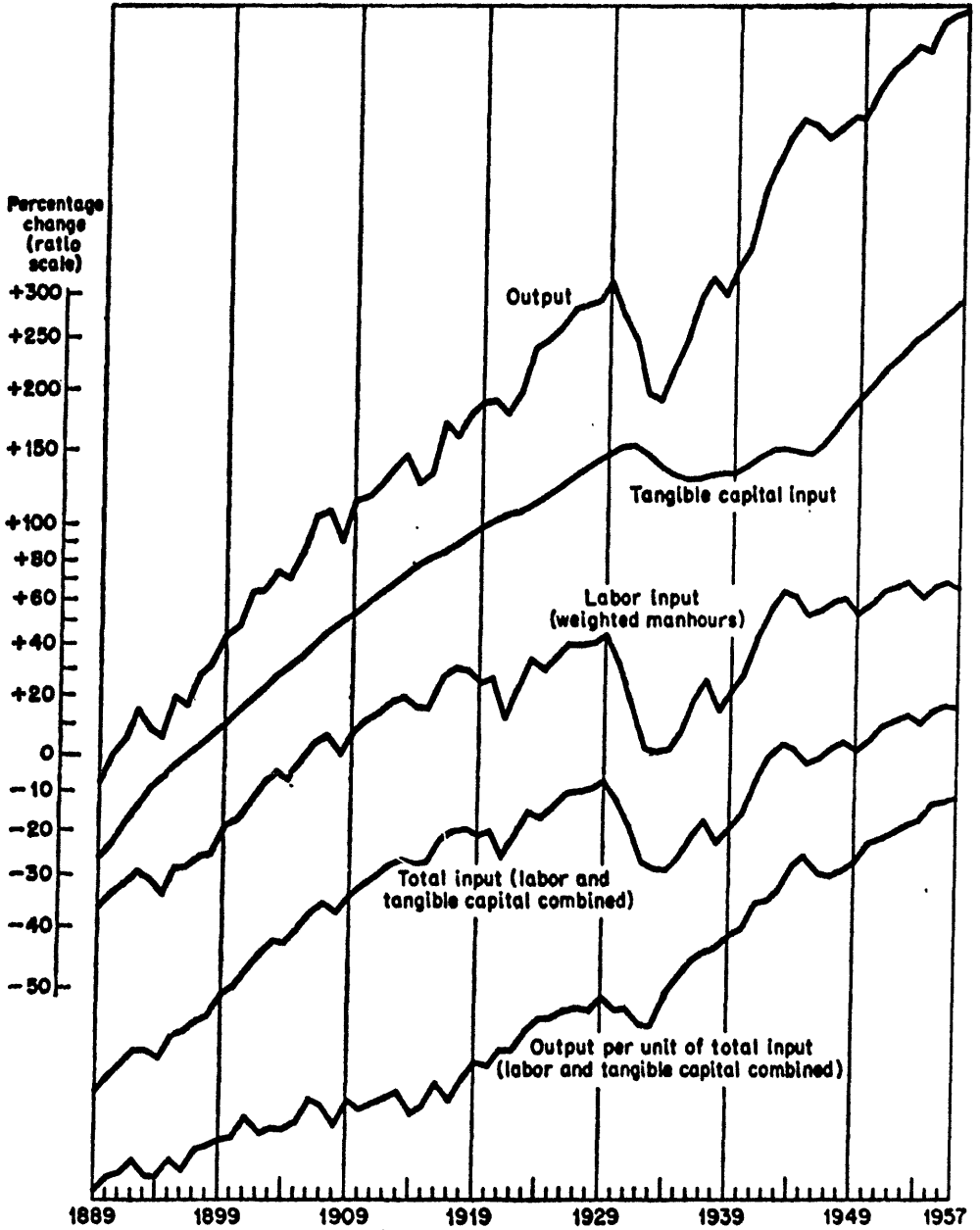
More important seems to be the definition of resources. We have measured these by weighted manhours of work done and tangible capital available, and have thus largely excluded intangible capital. This results in some understatement of the contribution of resources, for it is likely that intangible capital has risen in relation to the resources we include. There is a corresponding overstatement of the rise of productivity. It is possible that the upward shift in the

<sup>18</sup>For recent discussions, see *A Critique of the United States Income and Product Accounts*, Studies in Income and Wealth, Vol. 22, and *The National Economic Accounts of the United States: Review, Appraisal, and Recommendations*, both issued by the National Bureau in 1958.

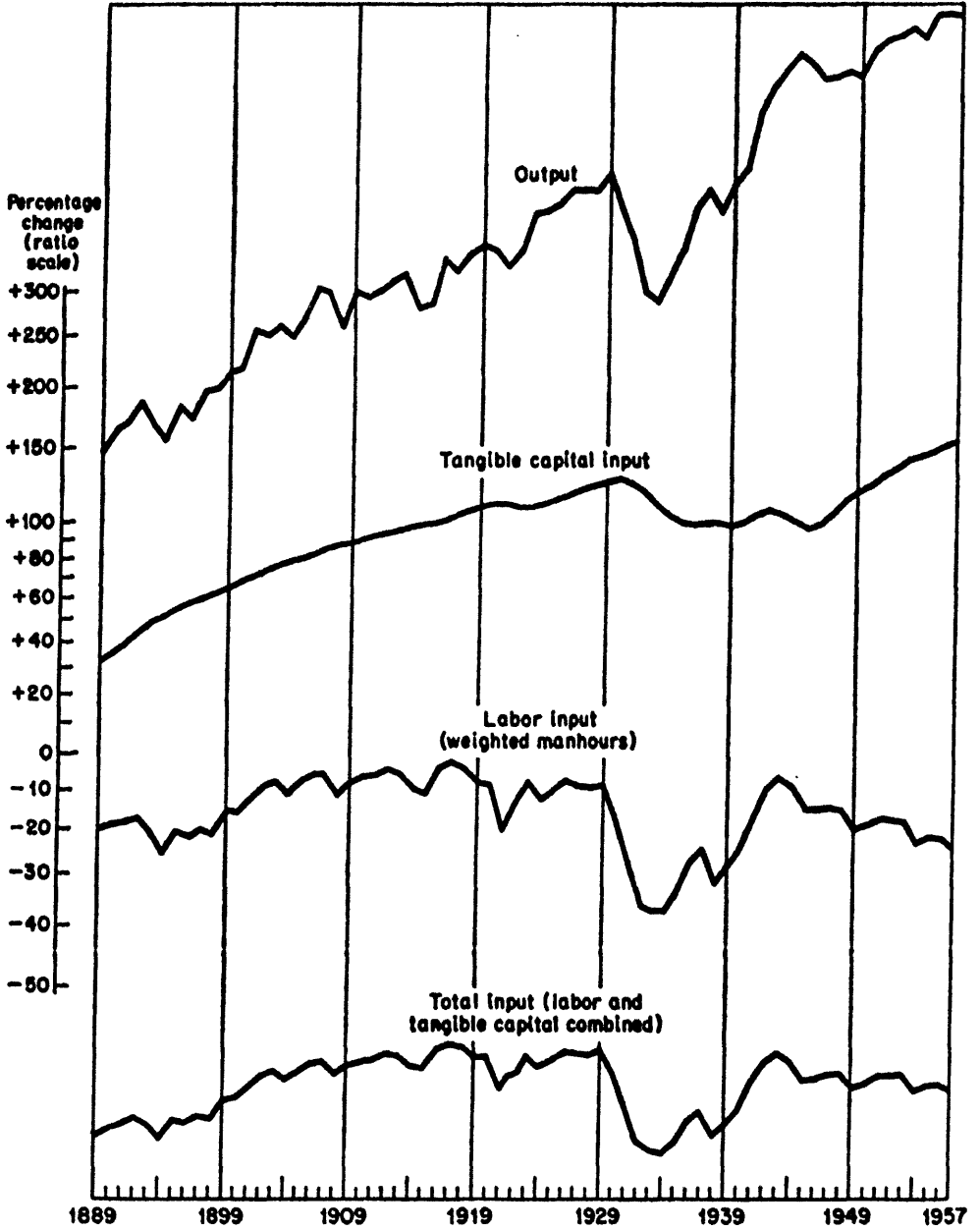
CHART 3

Output, Input, and Productivity, 1889-1957  
Estimates for the Private Domestic Economy

A. Totals



B. Per Head of the Population



rate of growth of productivity after World War I, and the downward shift in the rate of growth in per capita tangible capital at about the same time, reflect some substitution of investment in intangible capital for investment in tangible capital.

In an important sense, society's intangible capital includes all the improvements in basic science, technology, business administration, and education and training, that aid in production — whether these result from deliberate individual or collective investments for economic gain or are incidental by-products of efforts to reach other goals. If intangible capital were so defined, it would probably follow that much (not all) of the increase in product would reflect increase in resources. But so wide a definition of intangible capital would get us no closer to determining the causes of increase in product.

With the statistics presently available we have been able to measure the direct effects, on output, of increase in labor time and increase in volume of tangible capital. The indirect effects of the increases in these resources, and the effects of all other causes, we have been forced to lump together under the heading of productivity and to measure as a whole. The residue includes the contributions of the several forms of intangible capital mentioned; the economies resulting from increased specialization within and between industries, made possible by growth in the nation's resources and its scale of operations generally; the improvement (or falling off) of efficiency in the use of resources resulting from change in degree of competition, in volume, direction and character of governmental subsidies, in the nature of the tax system, and in other government activities and regulations; and the greater (or smaller) benefits resulting from change in the volume, character, and freedom of commerce among nations.

The simple calculation presented in this section does no more than suggest the high relative importance of the factors grouped under productivity. But that is significant. It is, as Abramovitz has pointed out, a "measure of our ignorance" concerning the causes of economic growth, and an "indication of where we need to concentrate our attention."<sup>14</sup> It is well to know how far short we are of determining the sources of increase in national product.

<sup>14</sup>*Resource and Output Trends in the United States since 1870*, National Bureau of Economic Research, Occasional Paper 52 (1956), p. 11.

## PRODUCTIVITY IN INDIVIDUAL INDUSTRIES

The rate of growth in the entire economy's productivity is the prime fact with which we are concerned. The facts on productivity in individual industries are worth presenting here, however, because they help us to understand the process by which national productivity has been raised.

*Rise in productivity has been a general industrial phenomenon. Virtually every individual industry for which a reasonably adequate index can be calculated shows an upward trend in output per manhour, and this was almost as universally true of output per unit of tangible capital and of output per unit of labor and capital combined.*

*Among individual industries, as for the economy as a whole, the rise in output per manhour — the index most commonly available — nearly always exceeded the rise in productivity with capital as well as labor taken into account. For some industries the difference between the two measures was considerable.*

*Though virtually all industries showed rises in productivity, there was great variation among them in average rate of rise. Also, as might be expected, individual industries generally experienced greater temporal variation in the rate of productivity increase than did the economy as a whole.*

*The industries whose productivity advanced more rapidly than productivity in industries generally, were more often than not also those that expanded their output and employment of labor and capital more than industry at large. Industries in which productivity lagged, usually had a smaller growth in output and employment of labor and capital than industry at large — or even a decline.*

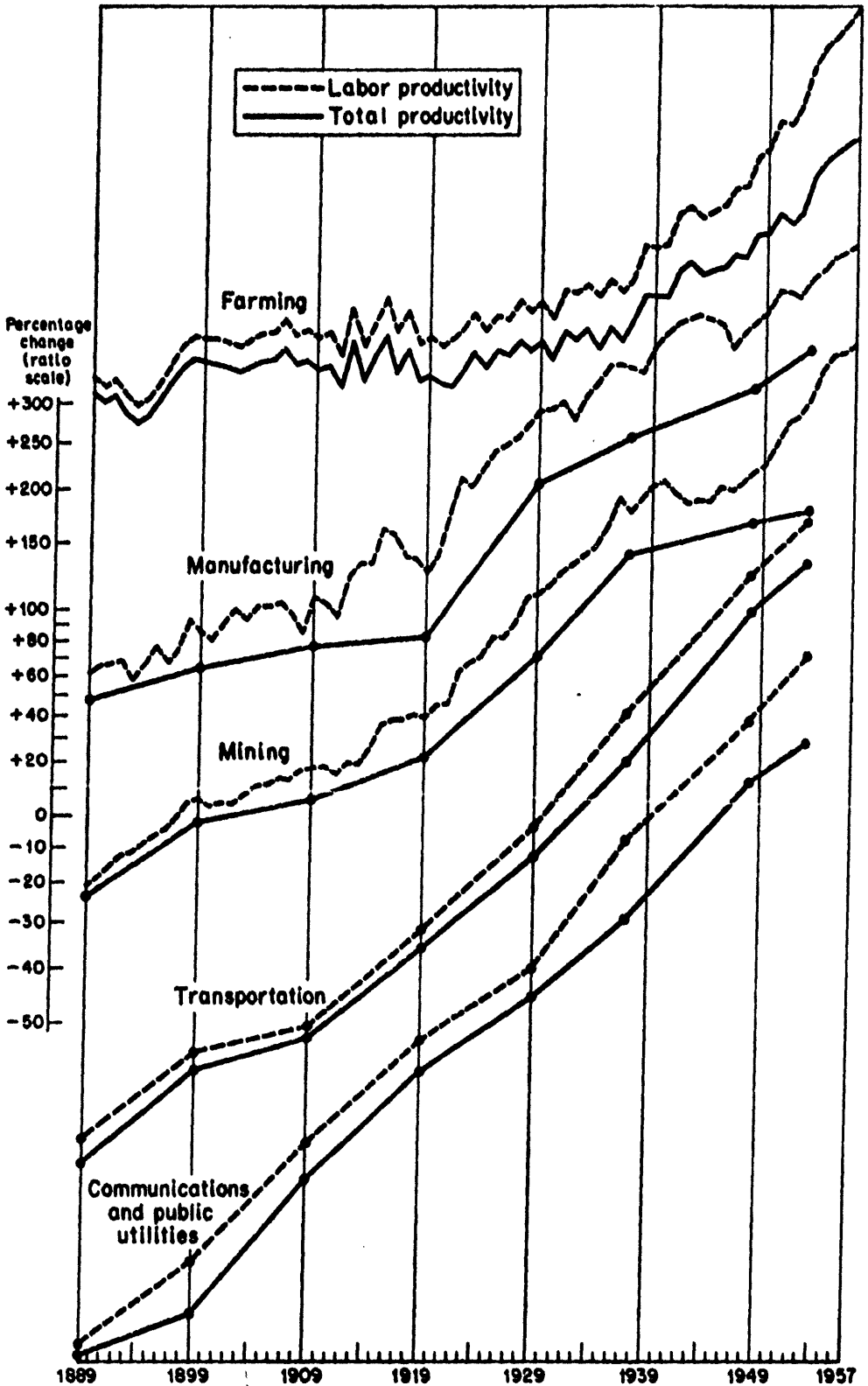
The generality of rise in productivity is the outstanding fact that emerges when individual industries are studied. It is illustrated by the detailed figures for five major divisions given in Chart 4, and by the changes between 1899 and 1953 in thirty-three industries or divisions.<sup>15</sup>

It is true that the statistics relate to a limited number of industries. The thirty-three industries for which individual productivity indexes are available make up less than half the entire economy, measured either by output or input. These industries, some nar-

<sup>15</sup>The detailed data are given in Table B, in the appendix.

CHART 4

Indexes of Productivity in Five Major Industrial Divisions  
 Estimates for 1889-1957 or 1889-1953





rowly and some broadly defined, are largely from the commodity-producing sectors of the economy, and observations are for the period beginning with 1899. Lack of data prevents giving similar information for earlier years and for other industries — the service industries, construction, trade, and government, and even some individual manufacturing, mining, and utility industries.<sup>16</sup>

However, it is very likely that productivity has increased not only in the industries for which separate productivity indexes could be calculated, but also in the others, including the service industries. This is indicated by Kendrick's comparison of the productivity rise in the "covered" industries with the rise in the economy as a whole (Table 1). The implied rate of increase of productivity in the industries not covered is of the same order of magnitude as the rate for the aggregate of those covered. Since this estimate is subject to considerable error, it cannot be conclusive in itself. But what we know of technological developments and the other immediate causes of productivity change in the service industries, for example, supports the impression of a rise.<sup>17</sup> We know, too, that the factors that make for increasing efficiency in the use of resources are general in character, felt everywhere in the economy. Virtually all industries use mechanical power and have reaped some advantages from broadened national markets. More fundamentally, no industry has been free of the drives that improve efficiency.

Since the indexes for individual industries are often put to specific use, it is well to recognize that they are often less reliable than the indexes for the economy at large. In part, the deficiency arises from the diversity of sources from which the data on output and input come. This causes discrepancies in the matching of output and input. And other statistical errors are imbedded, which tend to cancel out in the indexes for the economy as a whole.

<sup>16</sup>Kendrick's index for manufacturing as a whole, like all such indexes, is based on a sample of manufacturing industries. This is also true, in greater or lesser degree, of the other industries he could cover.

<sup>17</sup>See, for example, the interesting discussion of developments in trade in Harold Barger's *Distribution's Place in the American Economy since 1869*. Princeton University Press for the National Bureau of Economic Research, 1955.

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#### NOTES TO CHART 4 ON FACING PAGE

Labor productivity: output per weighted manhour (in the case of farming, per unweighted manhour).

Total productivity: output per weighted unit of labor and tangible capital combined.

Output is measured gross, except for the farming index which is net.

Probably more important is the difficulty created by interindustry flows of materials, fuel, services, and semifabricated components. For a single industry, output is generally measured on a gross basis: that is, output is not only the value (at base-period prices) of work done by labor and tangible capital on the goods and services supplied by other industries, but the sum of the value of the work done and the value (also at base-period prices) of these supplies from other industries.<sup>18</sup> Subtraction of these supplies from gross output to yield an index of net output (as is in effect done to get the economy-wide index of output), would solve the problem. But only a few attempts to measure the net output of individual industries have been made, and these (except possibly for agriculture) must be viewed as still largely experimental and subject to considerable error.<sup>19</sup> With output measured gross, the supplies from other industries constitute an input on a par with the services of the labor the industry employs and the services of the tangible (and intangible) capital it uses. Labor and tangible capital alone thus fall short of measuring total input — much more so than in the case of the private economy as a whole. The usual productivity index for an individual industry, even if broad enough to include capital in the measure of resources used, is therefore correspondingly deficient. For many industries, perhaps, the resulting error is small. But this is by no means always the case, as is indicated by figures available for agriculture (Table B).

There is good evidence, further, that improved efficiency in the use of materials, fuel, and the like has been significant in certain industries — for example, electric power plants — and for these, the index of productivity based on gross output relative to input of labor and capital alone will understate the rise of efficiency. On the other hand, industries have generally become more specialized, and many now purchase materials and services formerly produced on their own premises — power used in manufacturing is an example. This works in the other direction.

Connections of these sorts between individual industries and other industries not only create difficulties of productivity measurement, but point also to the sources of productivity increase and

<sup>18</sup>Gross output in this sense is "grosser" than gross national product, which differs from net product only by the amount of depreciation and other capital consumption.

<sup>19</sup>This and other problems of measurement were discussed in the most recent meeting of the Conference on Research in Income and Wealth (October 1958). The proceedings will be published under the title, *Output, Input, and Productivity Measurement*.

diffusion. The connections provide channels along which new or improved or lower-cost materials, fuel, power, services, and equipment, as well as ideas, flow in to improve efficiency. What happens in an industry is influenced by the diligence, enterprise, and ability of its workers, management, and investors. It is influenced also by the quality and quantity of what the industry obtains from the rest of the world, domestic and foreign.

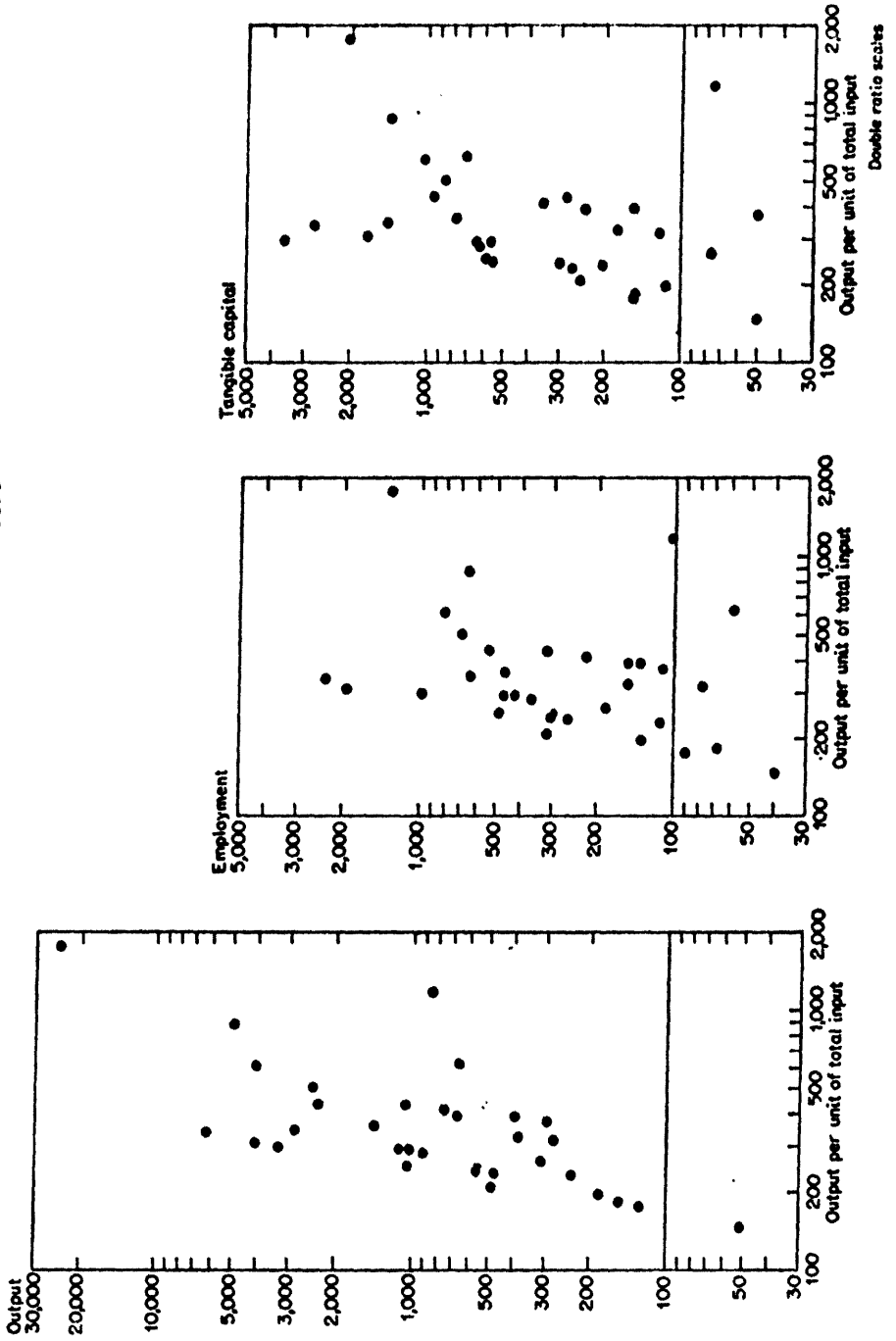
The fact that the individual industry indexes are subject to greater error than the national indexes partly accounts for the differences among industries in average rate of productivity increase. It also contributes to the greater temporal variability of the industry indexes as compared with the fluctuations of the over-all indexes. But these deficiencies can hardly account for all the variation in average rate or for all the differences in degree of fluctuation. Technological development and the other immediate factors that impinge on labor, capital, or total productivity often affect different industries at different times and in different degrees. Some of the time and space variation in rate of productivity increase must be "real."

Industrial differences in the behavior of output per unit of capital, especially striking, deserve comment. We noticed earlier that progress in the economy at large has led to reductions in the quantity of capital used per unit of product, despite substitutions of capital for labor. Over the period as a whole the phenomenon has been a general one, but the exceptions have been many. For example, output per unit of capital fell in agriculture over the twenty years 1899-1919, and more recently during 1948-53; rose during most of the other years of the period 1899-1953; and remained unchanged on net balance between 1899 and 1953. In manufacturing industries, also, output per unit of capital fell rather generally during 1899-1919, and in a fair number of them this was true also for 1948-53; but for the period as a whole, there was a net rise in output per unit of capital in the great majority of manufacturing industries. In the case of the railroads and public utilities, the figures suggest rather clearly that increase in the scale of operations led to important economies in the use of fixed capital. The tendency may have been operating in other industries also, but if so, it was overshadowed by other developments.

Increased efficiency in the use of supplies, materials, fuel, or equipment, and substitution of one input for another, already mentioned, altered relations among industries and caused differences in rates of growth of output and input. Further, a better than average increase in an industry's productivity usually meant lower relative

CHART 5

Relation between Change in Productivity and Output, and Productivity and Input, 33 Industry Groups: Indexes for 1953 Relative to 1899



costs, lower relative prices (as we shall see later), and therefore a better than average increase in its output (Chart 5). Better-than-average increases in output were usually accompanied by better than average increases in employment of workers and tangible capital, despite the more rapid rise in productivity. Correspondingly, less-than-average increases in productivity were usually accompanied by less-than-average increases (or even decreases) in output and in the use of labor and capital resources.<sup>20</sup>

These relations do not exhaust the channels through which productivity and the forces back of it caused diversity in growth of industries. The general increase in productivity and the increased income it brought per capita raised the demand for the output of industries that produce the goods and services on which people spend more freely as they grow richer, and thus helped push their output up more than that of other industries less favored — even when their productivity lagged behind that of other industries and their costs and prices rose. The service industries are examples.

No one concerned with the rise and fall of industries, or — to single out a currently discussed problem — with the effects of "automation" on employment, may ignore these basic facts.

### PRODUCTIVITY AND THE RISE IN REAL HOURLY EARNINGS

Productivity increase means more goods and services — more real income — available for distribution per unit of resources. Has the rise in productivity been reflected in the hourly real earnings of workers, as would be expected?

*Real earnings per hour of work in the private domestic economy rose over the period since 1889 at an average annual rate about equal to the rate of increase in product per manhour, and greater than the rate of increase in product per weighted unit of labor and capital combined.*

*During recent decades, real hourly earnings have increased more*

<sup>20</sup>Coefficients of rank correlation between the changes compared in Chart 5 are as follows: between productivity (output per unit of total input) and output, 0.64; productivity and employment, 0.34; productivity and tangible capital, 0.40.

It should be noted that "better than average" in the text above refers to a comparison with the unweighted median of the thirty-three industry changes covered in the correlation, not to a comparison with the weighted average for the entire private domestic economy.

*rapidly, on the average, than during earlier decades. The change in the trend of real earnings thus matches the change in the trend of productivity noticed earlier, though the data do not permit a confident conclusion on their relative timing.*

*Long-term trends in hourly earnings in individual industries roughly paralleled the trend in the general average of hourly earnings. There was little systematic difference in rate of increase in hourly earnings between industries in which productivity rose very rapidly and those in which productivity rose slowly; or between those industries with high or low, or relatively rising or falling, capital per manhour.*

These facts support the conclusion of generations of economists that over the long run the dominant factor in the general rise of real hourly earnings has been the increase in national productivity, and that the more rapid rise in earnings generally than in output per unit of labor and tangible capital combined has resulted largely from greater scarcity of labor relative to capital and from improved quality of labor.

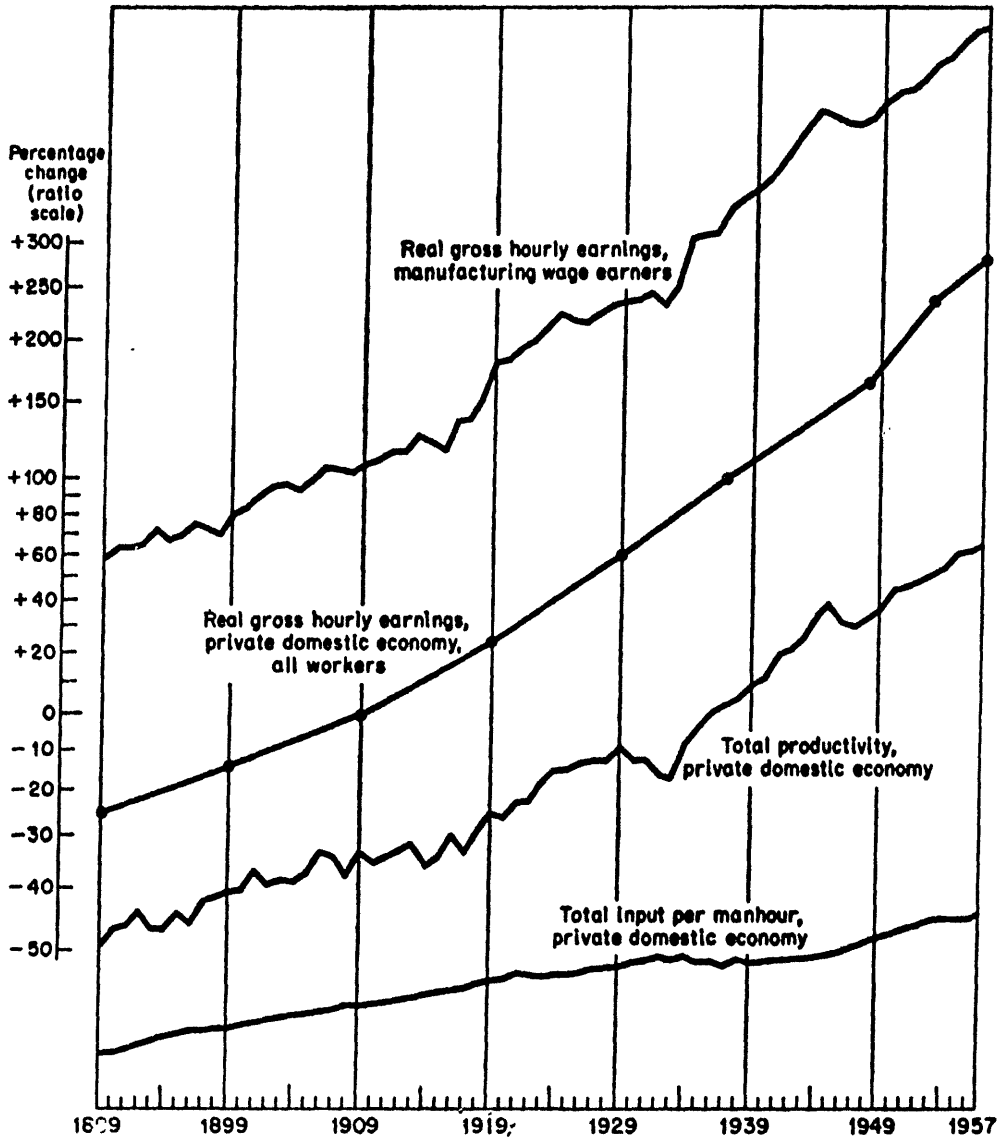
The facts on real earnings in the economy at large may be inferred from the information already presented, plus one other piece of evidence. This is an estimate of the percentage of national income received in the form of wages and salaries, including allowances for the labor of farmers and other proprietors. The percentage seems to have fallen somewhat between 1889 and 1899, moved along a horizontal trend over the period to 1929, and then returned to the 1889 level in recent decades.<sup>21</sup> The index of real earnings per hour of work is obtained simply by multiplying an index of this percentage by the index of real national product per manhour. The derived index of real hourly earnings is shown in Chart 6, and its rate of growth, in Table 6.

The same facts lead also, it should be noted, to the conclusion that the rate of return on capital — total non-labor income per dollar of tangible capital, both in constant prices — has fallen considerably in relation to the real hourly earnings of labor, but not absolutely. This is consistent with such other information as is available on trends in interest rates and in rates of return on property. Productivity increase thus offset the effects of the rise in capital per worker,

<sup>21</sup>See J. Burkhead, *Journal of the American Statistical Association*, June 1953; D. G. Johnson, *Review of Economics and Statistics*, May 1954; and Edward C. Budd, *Studies in Income and Wealth*, Volume 24, in preparation for press. The underlying data are those of W. I. King, Simon Kuznets, and the Department of Commerce.

CHART 6

Real Hourly Earnings Compared with Productivity and Total Input per Manhour, 1889-1957  
 Estimates for the Private Domestic Economy



and prevented the appearance of the absolute long-term decline in the rate of return on capital that might otherwise have been expected.

The upward drift of real earnings in relation to total productivity does not appear to be seriously in doubt, despite gaps in the under-

TABLE 6

Average Rates of Increase in Productivity, Total Input per Manhour, and Real Hourly Earnings, 1889-1957

	<i>Average Annual Percentage Rate of Change</i>		
	1889-1957	1889-1919	1919-1957
Output per unit of labor and capital combined, private domestic economy	1.7	1.3	2.1
Total input per manhour, private domestic economy	0.6	0.7	0.5
Real hourly earnings, private domestic economy, all workers (including proprietors and family workers)	2.4	1.7	3.0
Real hourly earnings, manufacturing, wage earners	2.3	1.9	2.6

Source: Tables A and C.

lying statistics, difficulties in distinguishing labor income from property income (as in agriculture), and differences of opinion on a variety of questions (such as whether income should be measured before or after income tax). But it is well to check the crudely derived data on earnings, available at best for occasional years only, with direct evidence on the annual movement of real hourly earnings.

For this purpose we make use of the index of real hourly earnings of manufacturing wage earners since 1889 shown in Chart 6 and summarized in terms of its average annual rate of increase in Table 6. The index, greatly improved over that previously available, we owe to Albert Rees and Clarence Long, who re-examined the available wage statistics for the period prior to World War I, reconsidered the methods and weights used in combining them into an index, and constructed a new cost of living index.

The agreement between the two indexes is surprisingly good. Of course, the index of real hourly earnings for the entire private economy covers also the real hourly earnings of manufacturing wage earners, and some degree of similarity must therefore be expected. However, wage earners in manufacturing have seldom numbered more than a fourth or fifth of all workers, and the parallelism is so close as to indicate virtual identity of the long-term percentage change in the real hourly earnings of manufacturing wage earners with the percentage change in the real hourly earnings of all other workers — that is, those in non-manufacturing and the salaried



workers and proprietors of manufacturing — except possibly in the recent period.<sup>22</sup>

The parallelism is all the more surprising because the economy-wide index reflects the increase in wages caused by the shift of workers from low-pay industries, such as agriculture, to high-pay industries, whereas the manufacturing index reflects such shifts only within the manufacturing sector. Further, the manufacturing index relates to wage earners alone, and thus cannot reflect adequately the rise in hourly earnings that might be expected to result from investment in education.<sup>23</sup> However, the index of hourly earnings of factory wage earners has undoubtedly been affected by factors peculiar to manufacturing, and these might have worked to push up relative earnings in factories. It is tempting to speculate further about the complex of factors that lies behind the similarities between the two indexes of hourly earnings, but this is hardly worth while before more work has been done to improve the estimates;<sup>24</sup> and in any case speculation can only prompt — not take the place of — the hard labor of unraveling and weighing the factors involved.

This much seems clear and is important: Both the manufacturing index and the index for the entire private economy show that real hourly earnings rose substantially more rapidly than productivity over the period 1889-1957.

<sup>22</sup>Even for the recent period the difference is less than appears in Chart 6 and the figures underlying it. The earnings index for the entire private economy includes certain supplementary wage benefits that the index for wage earners in manufacturing does not. (See the brief discussion in the last section of this paper.)

<sup>23</sup>On the other hand, it is possible that the portion of hourly earnings earned on investment in education has risen no more rapidly, on net balance, or perhaps even less rapidly, than the earnings of labor of a constant "quality" — just as the return to tangible capital has risen no more rapidly.

This possibility has been suggested by Gary Becker, who is in charge of the National Bureau's study of investment and the returns on investment in education. Becker will deal with many questions over which I must slur — the effect of education on length of working life, the fraction of earnings that represents amortization of invested capital, etc. Some of these questions have been discussed in the National Bureau's study of *Income from Independent Professional Practice* by Friedman and Kuznets (1945).

<sup>24</sup>The new index for manufacturing prior to 1914 is probably as good an estimate as we shall have. How much change will be made in the manufacturing index after 1914, which is being re-examined by Leo Wolman, remains to be seen.

The index for the private economy as a whole is quite rough, as has been indicated. One question not mentioned relates to the deflator, for which several alternatives are available. These move rather differently, as is shown in a note to Table C, although not so differently as to alter our main conclusions.

The new index of real hourly earnings in manufacturing, as well as the derived index of real hourly earnings for the entire private economy, leads to a substantial revision of prevailing impressions concerning the historical relation between productivity and real wages prior to World War I. It has long been thought, for example, that real hourly wages in manufacturing rose by only 8 per cent between 1890 and 1914, despite much greater concurrent increases in productivity. Rees's index for the twenty-four-year period shows a much larger gain in real wages, a rise that is much more in line with the productivity increase of the time.<sup>25</sup> The present data indicate that real hourly earnings have normally, not always, moved up more rapidly than national productivity — output per unit of labor and tangible capital — and that, as in the case of national productivity, the rate of increase in real hourly earnings was greater in recent decades than in earlier decades.

To help explain the greater rise in real hourly earnings than in productivity two factors were singled out at the beginning of this section: increasing scarcity of labor relative to capital, and improved quality of labor. The trend in both combined is suggested by the rise of total input (weighted manhours and tangible capital) per manhour, in Chart 6. On each of the two factors a comment is necessary.

First, the decline in labor input relative to capital (or to total input) is not unambiguous evidence of increasing labor scarcity. The technological and other changes that have played a part in raising efficiency might also have altered the relative usefulness of labor and capital — an essential ingredient in their scarcity — in favor of the one or the other. If the technological and other changes back of productivity increase were not neutral in this respect, they would have tended to push the rate of return for labor relative to that for capital in one or the other direction.

Second, the shift of labor from lower- to higher-pay industries is at best a very rough measure of the improvement in the quality of the labor force. If more adequate allowance could be made for quality improvement, our measure of labor input would probably rise more than is now indicated; labor input relative to tangible capital would decline less; and productivity would rise less. Our inability — as yet — to measure quality of labor adequately thus probably leads us to overemphasize in some degree the contribution of productivity and labor scarcity to the rising trend of real hourly

<sup>25</sup>See his comment in the National Bureau's *38th Annual Report*, p. 60.

earnings, and correspondingly to underemphasize the contribution of investment in education and other forms of personal capital.

The information we have on the economy as a whole provides strong evidence of the competition in the markets for goods, labor, and capital that causes real hourly earnings to rise with national productivity and the other factors mentioned. Additional important evidence is provided by the developments in individual industries (Chart 7).

As we should expect to find in a competitive economy, the trends in productivity in individual industries and the trends in their hourly earnings are only weakly correlated. That is, hourly earnings in different industries moved up at fairly similar rates. The parallelism we noticed between the trend of real hourly earnings in manufacturing and in the economy at large is a fairly general phenomenon.

We find also, as we should expect, that there is a stronger relation between an industry's trend in productivity and the trend in its product prices.<sup>26</sup> As a rule, in industries with high rates of productivity increase, product prices fell in relation to the prices of other goods, while in industries with low rates of productivity increase, relative prices of products usually increased.

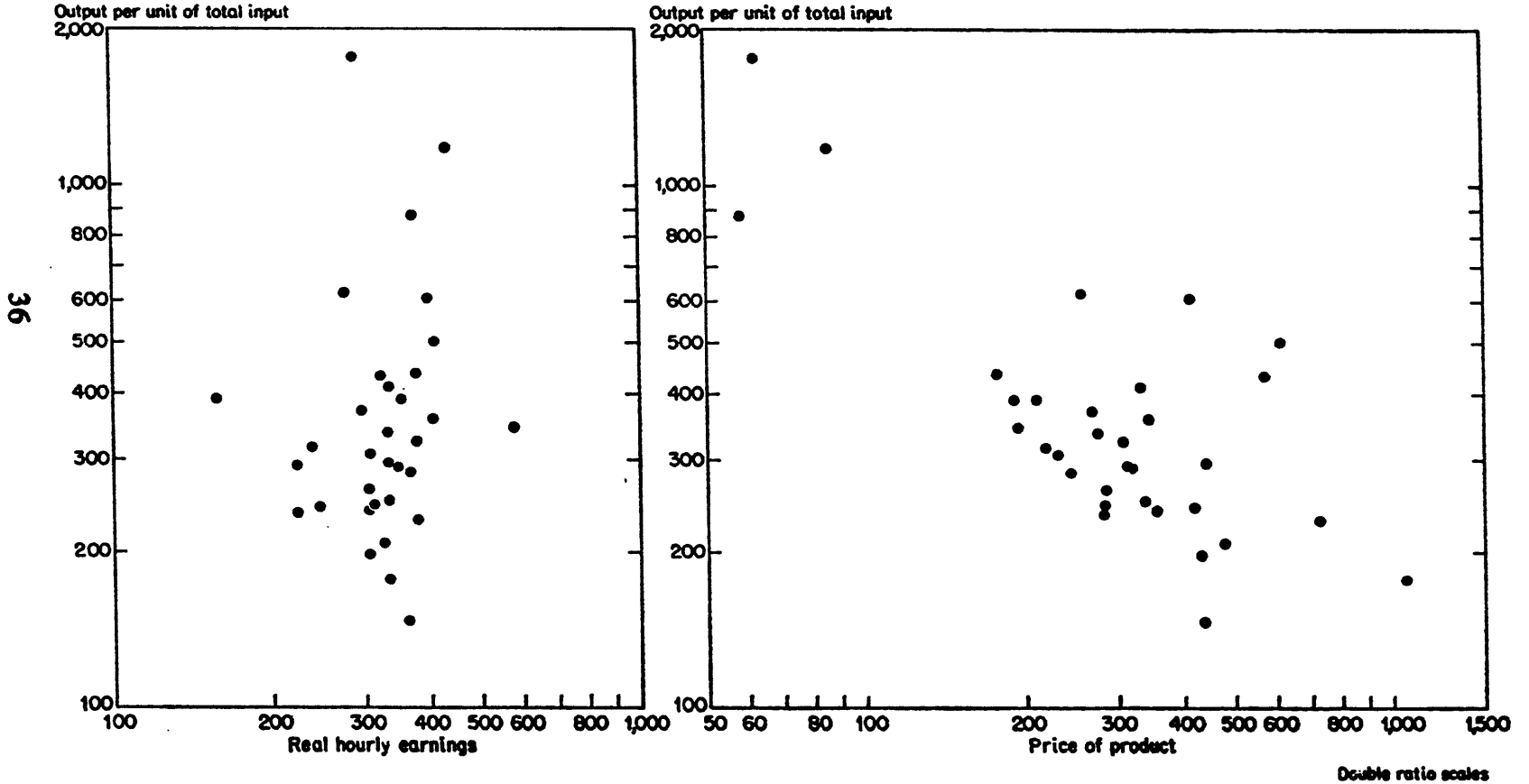
To find *closely* parallel changes in the average rates of wages and salaries paid by different industries would be surprising. The American economy is one in which economic advance has brought not only greater efficiency but also other changes — in the type of labor used by different industries, in the relative scarcity of the skills they employ, in the values placed on the various noneconomic advantages and disadvantages of working in them, and in other determinants of demand and supply. So continuous has the flow of changes been that adjustment to them has never stopped. The exceptions to the rule are therefore many in Chart 7, and they invite study.

As for the general level of real wages, a fuller explanation of its historical changes must take account also of the behavior of money wages, retail prices, and productivity during the business cycles and periods of inflation and deflation that are found in the record of the past seven decades. And it is hardly necessary to add that it must take account of still other factors peculiar to particular periods, as well as of the more or less gradual changes in the markets for labor, goods, and capital that have taken place over the years.

<sup>26</sup>The strength of each of the relations is measured by the coefficient of rank correlation. Between change in productivity and in hourly earnings, it is +0.23, according to Kendrick's calculations. Between change in productivity and in price, the coefficient of correlation is much higher, -0.56.

CHART 7

Relation between Change in Productivity and Real Hourly Earnings,  
and Productivity and Price of Product, 33 Industry Groups  
Indexes for 1953 Relative to 1899



36

Double ratio scales

But the chief determinants of the longer-run trends in the general level of real wages and in the level of real wages in individual industries appear to be those with which we began our discussion.

### RECENT PRODUCTIVITY TRENDS IN PERSPECTIVE

Recent events are always of special interest. We therefore now take a closer look at productivity and a few related changes since World War II, viewing them in the perspective of the full record. For the private domestic economy we find that:

*Output per manhour (and much the same may be said of output per weighted manhour) rose between 1945 and 1957 at an average rate that was high, though not unprecedently so, for a twelve-year period. The postwar rate was significantly higher than the average rate over the full period 1919-57, and still more so than the rate over 1889-1957.*

*Tangible capital was pushed up at an extraordinarily high rate — faster than in any preceding period of similar length. Since output rose at a rate only moderately better than average, output per unit of tangible capital fell.*

*Output per unit of labor and capital combined rose during 1945-57 at a rate slightly better than the long-run average and about the same as the average for 1919-57.*

*Real hourly earnings in manufacturing — not including certain types of supplementary employee remuneration — rose about as rapidly as over the full period 1919-57, and therefore less rapidly over the postwar period than output per manhour and more rapidly than total productivity. The postwar difference between the annual rates for real hourly earnings in manufacturing and total productivity appears to have been about the same as the difference over the longer period 1919-57 and between 1889 and 1919.*

Most of these facts have already been presented in the charts above. The set of calculations provided in Table 7 may be helpful. It should be emphasized that because of cyclical and other fluctuations in the figures, the average rates of change over the postwar period were calculated by comparing the average level in 1945-48 with the average in 1953-57; and that we are focusing on output, input, and earnings expressed only in real terms (that is, adjusted

for price change), and are thus passing over aspects of recent developments that are crucial for the problem of inflation.

It may surprise those people who have heard of the "new" technological age that output per manhour (and also output per weighted manhour) rose during the period after the war at an average rate that, though high, was within the range of experience for earlier periods of similar length. Even if the average postwar rate is calculated for the period beginning with 1947 and ending with 1955, it is not without an earlier parallel.

The index of output per unit of labor and capital combined is, of course, a weighted average of the labor and capital productivity indexes. Since output per unit of tangible capital fell substantially between 1945 and 1949, and then fluctuated about a fairly constant level, output per unit of labor and capital combined rose much less rapidly than output per manhour. The considerable diversity of experience to which total productivity was subjected during the postwar period averaged out to an annual rate of 2.1 per cent for the period as a whole — the same, as has been mentioned, as the average for the longer period 1919-57.

The rise in real hourly earnings relative to total productivity came mainly in the second half of the period. In manufacturing, for example (which appears to have had a fairly typical experience),<sup>27</sup> real hourly earnings rose between 1948-53 and 1953-57 about five per cent more than total productivity. Over the full postwar period — comparing 1945-48 with 1953-57 — real hourly earnings in manufacturing rose at a rate approximately halfway between the

<sup>27</sup>Indexes of real average (gross) hourly earnings of production workers or nonsupervisory employees in the nonagricultural industries for which data are available are as follows for selected periods:

	1945-1948	1948-1953	1953-1957
Metal mining	100.0	112.7	137.9
Railroads (Class I)	100.0	119.3	137.7
Bituminous coal mining	100.0	115.7	134.0
Building construction	100.0	111.1	131.0
Electric light and power	100.0	107.7	126.7
Manufacturing	100.0	109.2	125.5
Retail trade	100.0	108.0	123.6
Hotels (year-round)	100.0	107.1	123.3
Wholesale trade	100.0	106.4	123.1
Telephone	100.0	105.9	122.5
Laundries	100.0	101.0	107.6

(The hourly earnings are those reported by the U.S. Bureau of Labor Statistics, deflated by the BLS consumer price index. The averages are calculated with the terminal years — for example, 1945 and 1948, in the case of 1945-1948 — given half weight.)

TABLE 7

Rates of Increase in Productivity in the Private Domestic Economy,  
and in Real Hourly Earnings in Manufacturing, 1945-1957

PRIVATE DOMESTIC ECONOMY					
	<i>Output per unweighted manhour</i>	<i>Output per weighted manhour</i>	<i>Output per unit of tangible capital</i>	<i>Output per unit of labor and capital combined</i>	<i>Real Hourly Earnings in Manufacturing</i>
Annual Percentage Rate of Change					
1945-46	-5.1	-5.2	-6.5	-5.5	-2.1
1946-47	0.4	-0.6	-2.4	-1.0	-0.5
1947-48	3.4	2.9	-1.4	2.0	1.4
1948-49	3.8	4.4	-4.6	2.3	4.8
1949-50	7.8	6.5	5.5	6.3	3.6
1950-51	2.5	1.5	0.3	1.3	0.5
1951-52	2.1	1.5	-0.3	1.1	2.7
1952-53	4.0	3.2	-0.2	2.4	5.1
1953-54	2.4	3.1	-4.4	1.2	1.9
1954-55	4.8	4.7	5.7	5.0	4.2
1955-56	0.8	0.6	-1.2	0.2	3.8
1956-57	2.5	2.4	-1.9	1.3	1.0
Average Annual Percentage Rate of Change					
1945-48 to 1948-53	3.4	2.8	-1.0	2.0	2.2
1948-53 to 1953-57	3.2	2.9	0.0	2.2	3.1
1945-48 to 1953-57	3.3	2.9	-0.5	2.1	2.7

Source: Tables A and C. The estimates for the more recent years are preliminary. In calculating the averages for 1945-48, 1948-53, and 1953-57, terminal years were given a weight of one-half.

corresponding rates for output per manhour and output per unit of labor and capital. Real hourly earnings in the economy as a whole seem to have risen more rapidly than in manufacturing, however, and therefore more rapidly than both output per manhour and total productivity during the postwar period. Since the economy-wide index of earnings covers supplementary employee benefits, and the manufacturing index does not, some difference in this direction is to be expected.<sup>28</sup> But the estimate for all workers is probably too rough to be taken seriously as an accurate indication of the trend over so short a period.

Indeed, in any analysis of trends in the postwar period it is necessary to keep in mind not only that there have been considerable year-to-year variations in the rate of growth in real wages, in pro-

<sup>28</sup>See the discussion in the second paragraph following.

ductivity, and in the relation between the two, but also that the figures are subject to a considerable margin of error, especially large in proportion to the annual changes. Although the data for recent years are, as a rule, more complete and of better quality than those for the earlier decades, they suffer in some degree from the usual statistical deficiencies.

Further, the recent period has seen a number of developments that serve to feed doubts about the precision of the estimates. These include a growing disparity between hours worked and hours paid for, a matter stressed first by the presentation of two alternative estimates of output per manhour in the January 1958 Economic Report of the President and second by the prospective initiation by the Bureau of Labor Statistics of a periodic survey to measure the difference between hours paid for and hours worked in manufacturing industries.<sup>29</sup>

Also of growing importance have been items of supplementary employee remuneration — “fringe benefits” — that do not enter the usual calculations of hourly earnings. In 1953 manufacturing establishments reporting such items to the Bureau of Labor Statistics paid out 7 cents per payroll hour for private pensions credits, 3 cents for “insurance, health, and welfare,” and 6.5 cents for such legally required payments as Old Age and Survivors insurance, unemployment and workmen’s compensation, and state temporary disability insurance.<sup>30</sup> The total of these amounted to almost 9 per cent of the 1953 payroll of reporting establishments. The percentage was undoubtedly smaller in earlier years and larger in later. The rise

<sup>29</sup>The two Economic Report estimates of average annual percentage change in output per manhour in the private economy differ as follows with respect to growth between 1948-53 and 1953-57. (Year-to-year changes, of course, differ even more widely.) Based on manhours paid for (as estimated on the basis of Bureau of Labor Statistics data), output per manhour rose at an average annual rate of 3.0 per cent. Based on manhours worked (as estimated on the basis of Bureau of the Census data), the rate of increase was 3.5 per cent.

Kendrick’s series falls about midway between the two, though his index, like the second one above, is based primarily on hours worked. But there are other sources of difference between his and the other indexes in the choice of the weight-base and of employment estimates, and in the treatment of income on foreign assets.

<sup>30</sup>*Problems in Measurement of Expenditures on Selected Items of Supplementary Employee Remuneration*, Bulletin No. 1186, Department of Labor, 1956. The study was undertaken by the Bureau of Labor Statistics with financial assistance from the National Bureau.

Kendrick’s index of real hourly earnings in the economy at large includes an allowance for these items, as estimated by the Department of Commerce.



in the real hourly earnings of factory workers in recent years has thus been understated.

Less clear in their effect on the postwar statistics are difficulties in the estimation of tangible capital. These have been caused by inflation, coupled with the prevalence of original-cost depreciation accounting; and by a number of temporary and permanent revisions in the internal revenue code governing the calculation of depreciation changes.

Developments since the war have affected not only the statistics that one must use to describe the course of events. As is always the case, these developments have also generated new factors that played a part in recent events. Some are factors that will persist and influence the trends of the future. Others will turn out to be peculiar to the period. A detailed study of the period is essential if the nature and significance of these new factors are to be assessed. Essential also is a study of the longer record. For only in the light of the longer record can the new factors be recognized and weighed.

Even our brief survey of this record suggests, however, that the postwar period probably resembles past periods more than it departs from them. In the recent, as in the early decades of the period since 1889, the *main* source of the rise in real wages is to be found not in special factors but in the persistent features of our economic development — the upward trend in productivity and the upward trend in tangible and other capital per worker.

TABLE A

Annual Indexes of Output, Input, and Productivity, 1889-1957  
Estimates for the Private Domestic Economy

YEAR	GROSS PHYSICAL OUTPUT	I N P U T					
		<i>Manhours</i>		<i>Tangible Capital</i>		<i>Total Input, Weighted<sup>a</sup></i>	
		Un- weighted	Weighted	Un- weighted	Weighted	Estimate A	Estimate B
1889	22.3	51.1	44.6	30.7	29.8	44.5	39.8
1890	24.2	53.0	46.2	32.2	31.1	46.3	41.3
1891	25.3	54.3	47.6	34.0	32.8	47.8	42.8
1892	27.7	56.1	49.5	36.0	34.8	49.6	44.8
1893	26.3	55.5	48.6	37.8	36.6	49.9	44.8
1894	25.5	53.5	46.1	39.1	37.7	49.0	43.6
1895	28.8	56.8	49.9	40.6	39.2	51.8	46.7
1896	28.1	56.8	49.9	42.1	40.6	52.3	47.2
1897	31.0	58.6	51.7	43.4	41.7	53.9	48.7
1898	31.6	58.9	51.9	44.8	43.1	54.6	49.3
1899	34.6	63.2	56.7	46.2	44.4	57.9	52.9
1900	35.5	63.9	57.5	47.7	46.1	58.9	54.0
1901	39.6	66.7	60.7	49.1	47.6	61.3	56.7
1902	39.8	69.6	64.3	50.6	49.3	63.7	59.7
1903	41.9	71.6	66.6	52.4	51.3	65.6	61.9
1904	41.2	70.6	64.9	53.7	52.8	65.4	61.3
1905	44.3	74.0	69.0	55.2	54.2	68.2	64.4
1906	49.6	77.0	72.4	57.4	56.3	71.0	67.5
1907	50.5	78.7	74.3	59.5	58.6	72.8	69.5
1908	46.0	75.3	70.1	61.2	60.4	71.2	67.4
1909	52.1	79.4	74.9	62.6	61.8	74.4	71.0
1910	52.5	81.5	77.5	64.4	63.7	76.4	73.3
1911	54.5	83.0	79.0	66.1	65.7	77.9	75.0
1912	57.3	85.6	82.2	67.5	67.3	80.2	77.7
1913	59.7	86.3	83.2	69.2	69.4	81.2	79.0
1914	54.8	84.7	80.7	71.0	71.5	80.7	78.0
1915	56.4	83.9	80.4	72.5	73.2	80.6	78.3
1916	65.1	90.0	88.3	73.6	74.4	85.1	84.1
1917	63.0	91.9	90.7	75.0	76.3	86.8	86.3
1918	67.5	91.1	90.0	76.3	78.4	86.7	86.5
1919	69.7	88.2	86.7	77.5	80.3	85.1	84.9
1920	70.0	89.4	87.9	78.9	82.0	86.4	86.2
1921	67.5	80.5	77.8	79.8	83.2	80.3	79.3
1922	71.8	86.5	84.6	80.8	83.8	84.9	84.4
1923	82.0	93.4	93.0	82.9	85.5	90.4	90.9
1924	83.6	91.2	90.0	85.5	87.7	89.6	89.3

Source: John Kendrick, "Productivity Trends in the United States" (in preparation), Appendix A.

<sup>a</sup>Estimate A is a weighted combination of unweighted manhours and unweighted tangible capital. Estimate B is a weighted combination of weighted manhours and weighted tangible capital.

## PRODUCTIVITY: OUTPUT PER

<i>Manhour</i>		<i>Unit of Tangible Capital</i>		<i>Unit of Total Input (weighted)</i>		<i>YEAR</i>
<i>Un-weighted</i>	<i>Weighted</i>	<i>Un-weighted</i>	<i>Weighted</i>	<i>Estimate A</i>	<i>Estimate B</i>	
43.6	50.0	72.6	74.8	50.1	56.0	1889
45.7	52.4	75.2	77.8	52.3	58.6	1890
46.6	53.2	74.4	77.1	52.9	59.1	1891
49.4	56.0	76.9	79.6	55.8	61.8	1892
47.4	54.1	69.6	71.9	52.7	58.7	1893
47.7	55.3	65.2	67.6	52.0	58.5	1894
50.7	57.7	70.9	73.5	55.6	61.7	1895
49.5	56.3	66.7	69.2	53.7	59.5	1896
52.9	60.0	71.4	74.3	57.5	63.7	1897
53.7	60.9	70.5	73.3	57.9	64.1	1898
54.7	61.0	74.9	77.9	59.8	65.4	1899
55.6	61.7	74.4	77.0	60.3	65.7	1900
59.4	65.2	80.7	83.2	64.6	69.8	1901
57.2	61.9	78.7	80.7	62.5	66.7	1902
58.5	62.9	80.0	81.7	63.9	67.7	1903
58.4	63.5	76.7	78.0	63.0	67.2	1904
59.9	64.2	80.3	81.7	65.0	68.8	1905
64.4	68.5	86.4	88.1	69.9	73.5	1906
64.2	68.0	84.9	86.2	69.4	72.7	1907
61.1	65.6	75.2	76.2	64.6	68.2	1908
65.6	69.6	83.2	84.3	70.0	73.4	1909
64.4	67.7	81.5	82.4	68.7	71.6	1910
65.7	69.0	82.5	83.0	70.0	72.7	1911
66.9	69.7	84.9	85.1	71.4	73.7	1912
69.2	71.8	86.3	86.0	73.5	75.6	1913
64.7	67.9	77.2	76.6	67.9	70.3	1914
67.2	70.2	77.8	77.0	70.0	72.0	1915
72.3	73.7	88.5	87.5	76.5	77.4	1916
68.6	69.5	84.0	82.6	72.6	73.0	1917
74.1	75.0	88.5	86.1	77.9	78.0	1918
79.0	80.4	89.9	86.8	81.9	82.1	1919
78.3	79.6	88.7	85.4	81.0	81.2	1920
83.8	86.8	84.6	81.1	84.1	85.1	1921
83.0	84.9	88.9	85.7	84.6	85.1	1922
87.8	88.2	98.9	95.9	90.7	90.2	1923
91.7	92.9	97.8	95.3	93.3	93.6	1924

*(table concludes on next pages)*

TABLE A, *concluded*

YEAR	GROSS PHYSICAL OUTPUT	I N P U T					
		Manhours		Tangible Capital		Total Input, Weighted <sup>a</sup>	
		Un- weighted	Weighted	Un- weighted	Weighted	Estimate A	Estimate B
1925	86.6	94.5	93.6	88.2	89.8	92.7	92.5
1926	92.0	97.8	97.5	91.6	92.7	96.0	96.1
1927	93.0	97.2	97.3	94.6	95.4	96.5	96.8
1928	93.9	98.1	97.9	97.5	97.7	97.9	97.8
1929	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1930	90.8	93.1	91.9	101.7	102.0	95.2	94.3
1931	84.0	85.4	82.3	101.9	102.1	89.4	87.1
1932	71.8	75.6	71.2	100.3	99.9	81.5	78.1
1933	70.0	74.9	70.5	97.6	96.5	80.3	76.7
1934	76.9	73.6	70.8	95.2	93.8	78.8	76.3
1935	83.8	77.6	74.9	94.2	92.5	81.6	79.1
1936	94.5	83.4	82.6	94.1	92.5	86.0	85.0
1937	101.0	88.6	87.4	95.3	93.8	90.2	88.9
1938	95.4	81.0	79.3	95.9	94.6	84.4	82.8
1939	104.1	85.2	84.2	96.0	94.3	87.7	86.6
1940	110.2	88.9	88.6	97.3	95.9	90.9	90.3
1941	130.4	96.9	99.3	99.7	99.0	97.6	99.3
1942	142.6	104.4	108.6	101.6	101.7	103.9	107.1
1943	153.1	108.2	114.2	101.6	101.8	106.8	111.5
1944	162.8	106.7	112.7	100.7	100.9	105.5	110.1
1945	160.4	100.9	106.3	99.7	99.8	100.7	104.9
1946	153.5	101.7	107.3	100.9	102.1	101.6	106.2
1947	157.4	103.9	110.6	104.0	107.3	104.0	110.0
1948	163.8	104.5	111.9	108.0	113.3	105.4	112.3
1949	162.9	100.1	106.6	112.2	118.1	102.8	109.1
1950	178.7	101.9	109.8	116.3	122.8	105.0	112.6
1951	188.5	105.1	114.4	121.5	129.1	108.6	117.5
1952	194.0	105.7	115.7	125.8	133.2	110.0	119.4
1953	202.9	106.3	117.2	129.6	139.6	111.3	121.9
1954	199.5	102.1	111.8	133.0	143.6	108.6	118.5
1955	217.3	106.1	116.3	137.1	148.0	112.6	122.9
1956	222.6	107.8	118.4	142.1	153.4	115.0	125.7
1957	225.2	106.4	116.9	146.5	158.2	114.8	125.5

## PRODUCTIVITY: OUTPUT PER

<i>Manhour</i>		<i>Unit of Tangible Capital</i>		<i>Unit of Total Input (weighted)</i>		<i>YEAR</i>
<i>Un- weighted</i>	<i>Weighted</i>	<i>Un- weighted</i>	<i>Weighted</i>	<i>Estimate A</i>	<i>Estimate B</i>	
91.6	92.5	98.2	96.4	93.4	93.6	1925
94.1	94.4	100.4	99.2	95.8	95.7	1926
95.7	95.6	98.3	97.5	96.4	96.1	1927
95.7	95.9	96.3	96.1	95.9	96.0	1928
100.0	100.0	100.0	100.0	100.0	100.0	1929
97.5	98.8	89.3	89.0	95.4	96.3	1930
98.4	102.1	82.4	82.3	94.0	96.4	1931
95.0	100.8	71.6	71.9	88.1	91.9	1932
93.5	99.3	71.7	72.5	87.2	91.3	1933
104.5	108.6	80.8	82.0	97.6	100.8	1934
108.0	111.9	89.0	90.6	102.7	105.9	1935
113.3	114.4	100.4	102.2	109.9	111.2	1936
114.0	115.6	106.0	107.7	112.0	113.6	1937
117.8	120.3	99.5	100.8	113.0	115.2	1938
122.2	123.6	108.4	110.4	118.7	120.2	1939
124.0	124.4	113.3	114.9	121.2	122.0	1940
134.6	131.3	130.8	131.7	133.6	131.3	1941
136.6	131.3	140.4	140.2	137.2	133.1	1942
141.5	134.1	150.7	150.4	143.4	137.3	1943
152.6	144.5	161.7	161.3	154.3	147.9	1944
159.0	150.9	160.9	160.7	159.3	152.9	1945
150.9	143.1	152.1	150.3	151.1	144.5	1946
151.5	142.3	151.3	146.7	151.3	143.1	1947
156.7	146.4	151.7	144.6	155.4	145.9	1948
162.7	152.8	145.2	137.9	158.5	149.3	1949
175.4	162.8	153.7	145.5	170.2	158.7	1950
179.4	164.8	155.1	146.0	173.6	160.4	1951
183.5	167.7	154.2	145.6	176.4	162.5	1952
190.9	173.1	156.6	145.3	182.3	166.4	1953
195.4	178.4	150.0	138.9	183.7	168.4	1954
204.8	186.8	158.5	146.8	193.0	176.8	1955
206.5	188.0	156.7	145.1	193.6	177.1	1956
211.7	192.6	153.7	142.4	196.2	179.4	1957

TABLE B

Summary Statistics for Individual Industrial Groups and Divisions  
Indexes for 1953 Relative to 1899

	Output	INPUT			OUTPUT PER UNIT OF			Real Hourly Earnings	Price of Product			
		Labor	Tangible Capital	Total	Labor	Tangible Capital	Total Input					
Farming, based on gross output	203	}	62	151	83	{	330	134	244	}	247	420
Farming, based on net output	153											
<b>Mining</b>												
Metals	279	71	121	88	391	231	317	239	220			
Anthracite coal	51	35	50	35	148	103	147	362	436			
Bituminous coal	237	95	267	103	248	89	230	378	725			
Oil and gas	2,434	401	855	486	607	285	501	409	613			
Nonmetals	671	143	239	172	470	280	390	158	210			
<b>Manufacturing</b>												
Foods	554	220	299	230	252	186	241	308	355			
Beverages	475	196	202	200	242	235	238	224	283			
Tobacco	661	46	700	106	1,442	94	620	276	257			
Textiles	382	108	177	118	354	216	325	378	308			
Apparel	552	205	550	224	269	100	246	313	283			
Lumber products	128	67	152	72	192	84	177	334	1,061			
Furniture	486	240	248	233 <sup>b</sup>	202	196	208 <sup>b</sup>	326	479			
Paper	1,406	342	765	391	411	184	359	405	345			
Printing, publishing	1,058	238	282	245	444	376	432	321	571			
Chemicals	2,335	400	942	537	583	248	435	377	178			
Petroleum, coal products	2,875	385	1,431	831	746	201	346	577	194			
Rubber products	4,953	507	1,399	564	978	354	878	371	58			
Leather products	185	90	115	94	206	161	198	306	432			

TABLE B, *concluded*

	<i>Output</i>	<i>INPUT</i>			<i>OUTPUT PER UNIT OF</i>			<i>Real Hourly Earnings</i>	<i>Price of Product</i>
		<i>Labor</i>	<i>Tangible Capital</i>	<i>Total</i>	<i>Labor</i>	<i>Tangible Capital</i>	<i>Total Input</i>		
<b>Manufacturing (cont.)</b>									
Stone, clay, glass	757	171	348	184	443	217	412	334	334
Primary metals	910	267	629	321	341	145	284	366	245
Fabricated metals	1,133	358	638	389	316	178	291	347	319
Machinery, nonelectric	1,046	384	581	418	272	180	251	333	339
Electrical machinery	6,264	1,693	2,742	1,854	370	228	338	332	276
Transportation equipment	4,059	615	1,026	669	661	396	608	398	415
Miscellaneous mfg.	1,038	331	556	355	313	187	292	223	314
<b>Transportation<sup>a</sup></b>									
Railroads	396	91	152	102	437	261	390	352	191
Local transit	296	84	50	80	351	595	372	296	270
<b>Communications, public   utilities</b>									
Telephone	4,048	1,391	1,704	1,318 <sup>b</sup>	291	238	307 <sup>b</sup>	308	230
Telegraph	310	130	76	118	239	409	263	306	286
Electric light and power	24,550	964	2,035	1,390	2,560	1,207	1,764	289	62
Manufactured gas	846	69	75	72	1,219	1,129	1,176	431	86
Natural gas	3,311	673	3,551	1,118	492	93	296	333	442

Source: Kendrick, "Productivity Trends in the United States" (in preparation). Slight inconsistencies are due to rounding of figures.

<sup>a</sup>The index in Chart 4 covers also waterways, motor transport, pipelines, airlines, and services allied to transportation.

<sup>b</sup>Inconsistency due to chaining indexes calculated on several weight-bases. See Kendrick's forthcoming report for a full explanation.

TABLE C

## Indexes of Real Hourly Earnings, 1889-1957

Year	Private Domestic Economy,		Year	Private Domestic Economy,	
	Manufacturing, Wage Earners <sup>a</sup>	All Workers <sup>b</sup>		Manufacturing, Wage Earners <sup>a</sup>	All Workers <sup>b</sup>
1889	47.3	47.0	1924	96.9	
1890	48.5		1925	94.4	
1891	48.5		1926	93.9	
1892	48.9		1927	96.0	
1893	51.3		1928	99.3	
1894	49.5		1929	100.0	100.0
1895	50.1		1930	100.1	
1896	52.1		1931	102.6	
1897	51.2		1932	98.9	
1898	50.2		1933	103.6	
1899	53.1	53.4	1934	120.5	
1900	54.4		1935	121.3	
1901	56.1		1936	121.4	
1902	58.1		1937	131.5	125.3
1903	58.3		1938	134.6	
1904	57.4		1939	138.0	
1905	59.0		1940	143.0	
1906	61.8		1941	150.1	
1907	61.3		1942	158.5	
1908	60.4		1943	168.1	
1909	61.8	62.3	1944	175.4	
1910	62.9		1945	172.3	
1911	64.2		1946	168.6	
1912	64.6		1947	167.8	
1913	67.4		1948	170.1	166.0
1914	66.5		1949	178.2	
1915	64.7		1950	184.6	
1916	70.3		1951	185.5	
1917	70.6		1952	190.6	
1918	74.6		1953	200.3	210.3
1919	83.5	77.5	1954	204.2	
1920	83.9		1955	212.7	
1921	87.3		1956	220.7	
1922	88.6		1957	223.0	237.6
1923	92.7				

<sup>a</sup>Source: Hourly earnings for 1919-57 are those of the Department of Labor; 1890-1914, Rees, "Real Wages in Manufacturing, 1890-1914" (typescript, 1958); 1914-19, interpolated by the index for payroll manufacturing industries given by Douglas, *Real Wages in the United States, 1890-1926* (Houghton-Mifflin, 1930); 1889, Rees's figure for 1890 extrapolated by data in Long, *Wages and Earnings in the United States: 1860-1890*, in press. The cost of living index for 1914-57 is that of the Department of Labor; 1890-1914, Rees; 1889-90, Long.

<sup>b</sup>Source: Kendrick, Chapter V. This index is derived by multiplying the index of real gross national product per unweighted manhour (in the private domestic economy) by an index of the estimated percentage of national income (also for the private domestic economy) received by wage earners, salaried workers and entrepreneurs. The deflator involved is the implicit index



of price of the national product at "factor cost." Alternative indexes of real hourly earnings, obtained by deflating by the implicit index of national product price at "market" (A, below) or by the BLS-Rees-Long index of the cost of living (B, below), are as follows:

	A	B
1889	52.1	54.0
1899	59.2	60.3
1909	64.9	74.3
1919	76.6	82.3
1929	100.0	100.0
1937	120.5	118.2
1948	171.8	176.7
1953	209.6	215.0
1957	236.8	249.0

Index A is given in the work by Kendrick cited. It should be noted that Kendrick's deflators, and the deflators in the sources he used, were calculated before the new indexes of Rees and Long were available.

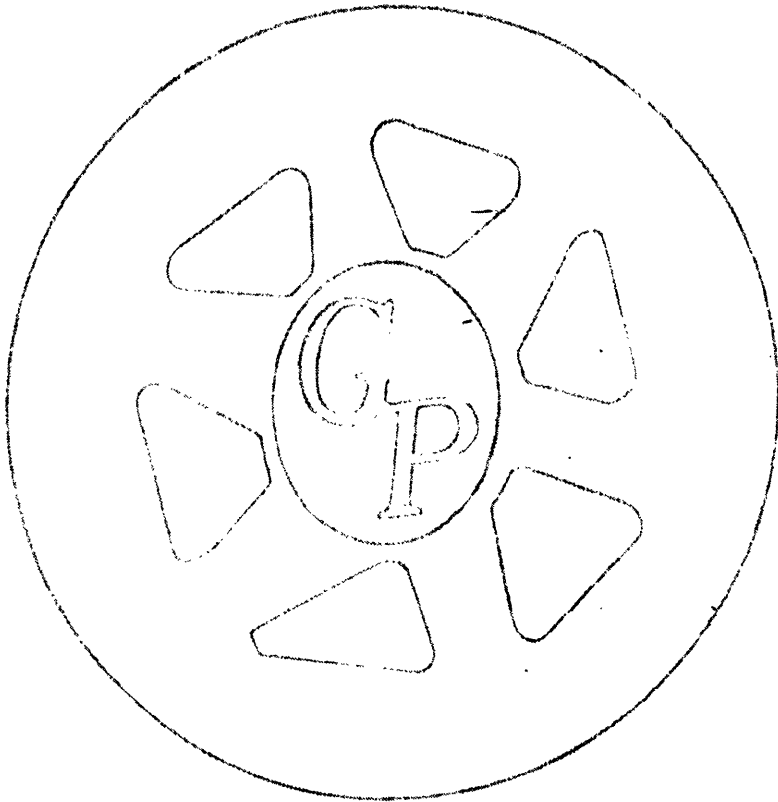
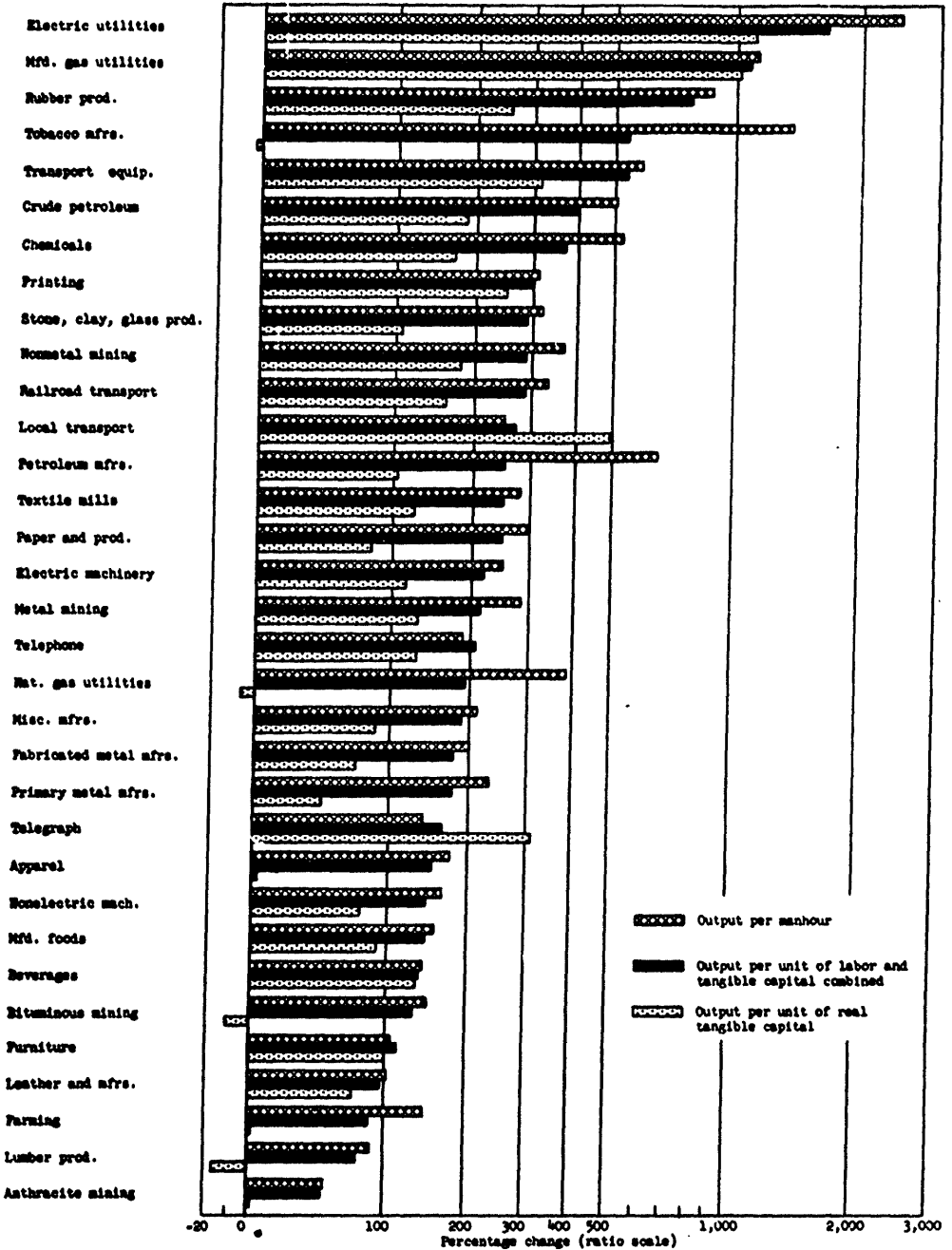


Chart A  
Productivity  
33 Industries of the United States

Percentage Change from 1899 to 1953

(Industries are ranked in order of percentage change in output per unit of labor and tangible capital combined.)



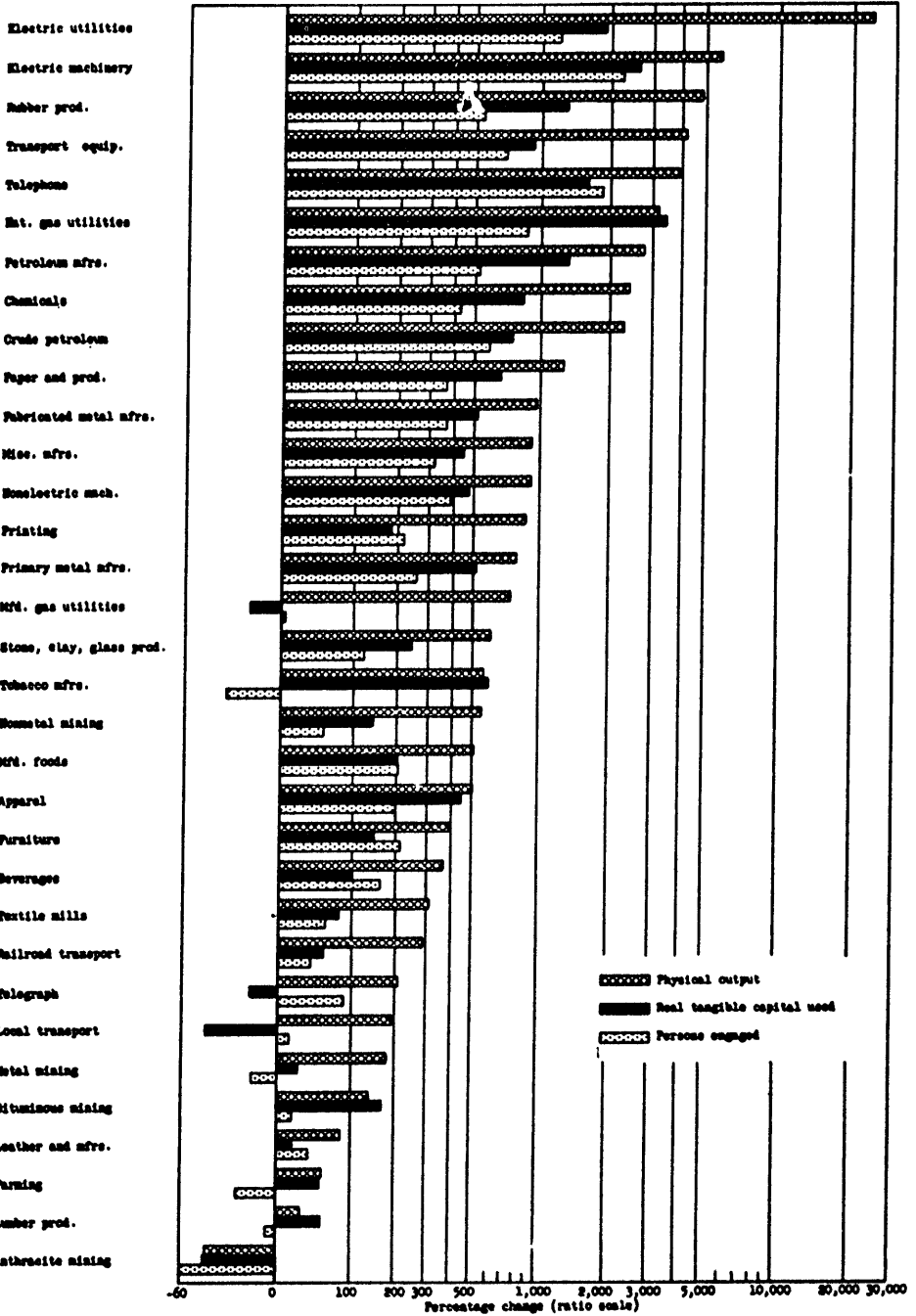
Source: National Bureau of Economic Research, Inc.

Chart B

Physical Output, Persons Engaged, and Real Tangible Capital Used  
 33 Industries of the United States

Percentage Change from 1899 to 1953

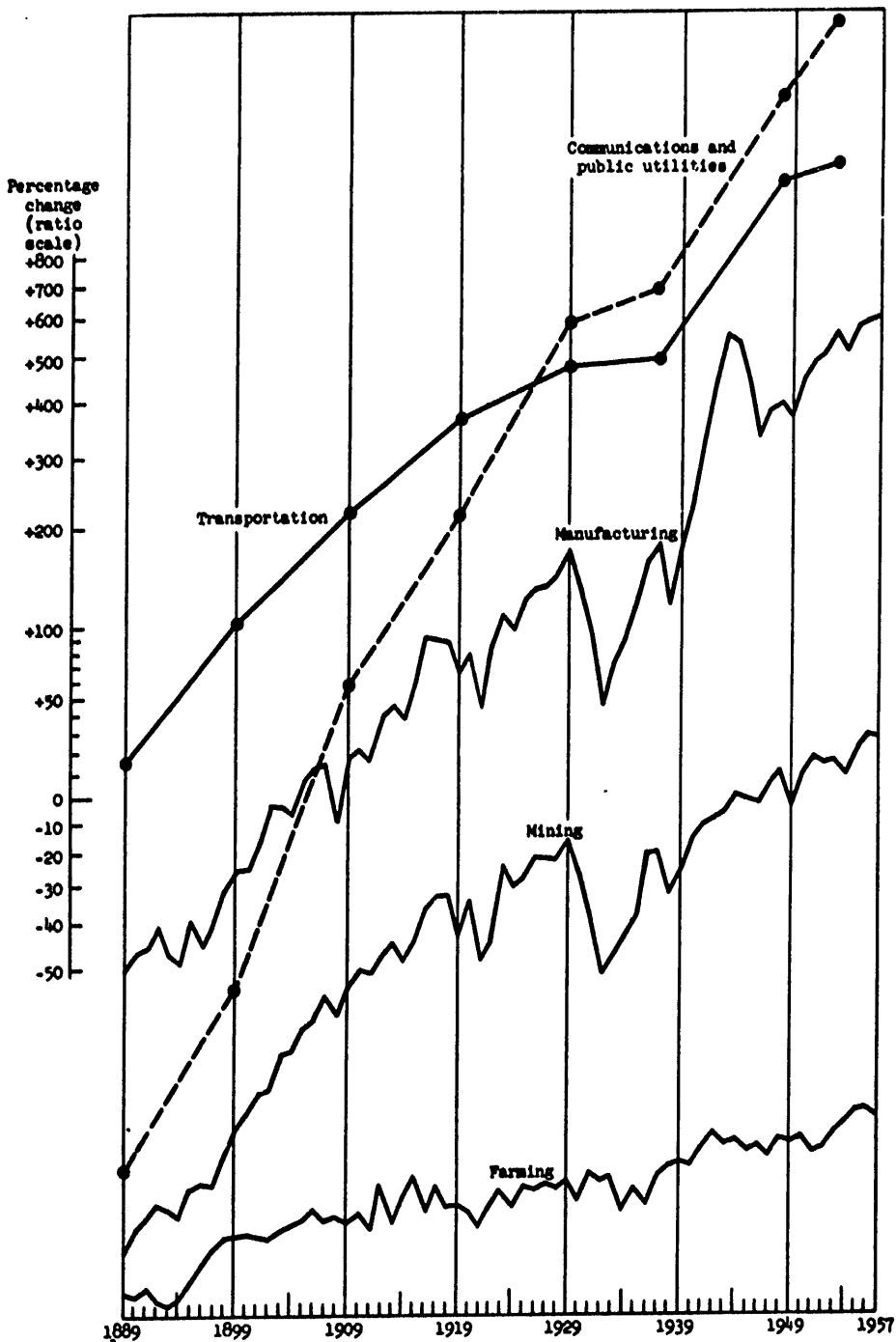
(Industries are ranked in order of percentage change in output.)



Source: National Bureau of Economic Research, Inc.

Chart C

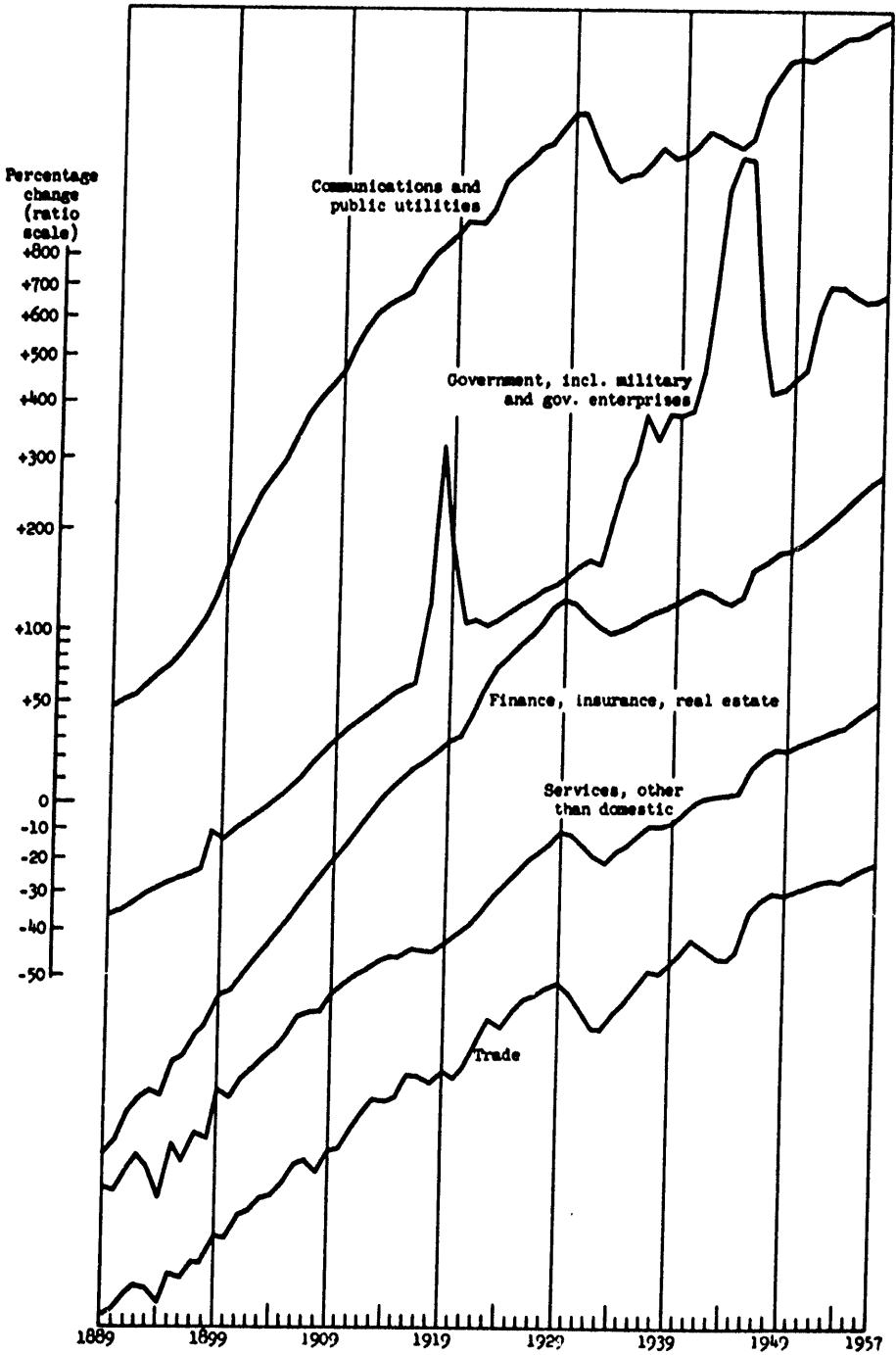
Physical Output  
Five Major Industrial Groups of the United States  
1889-1953 or 1957



Source: National Bureau of Economic Research, Inc.

Chart D: Section 1

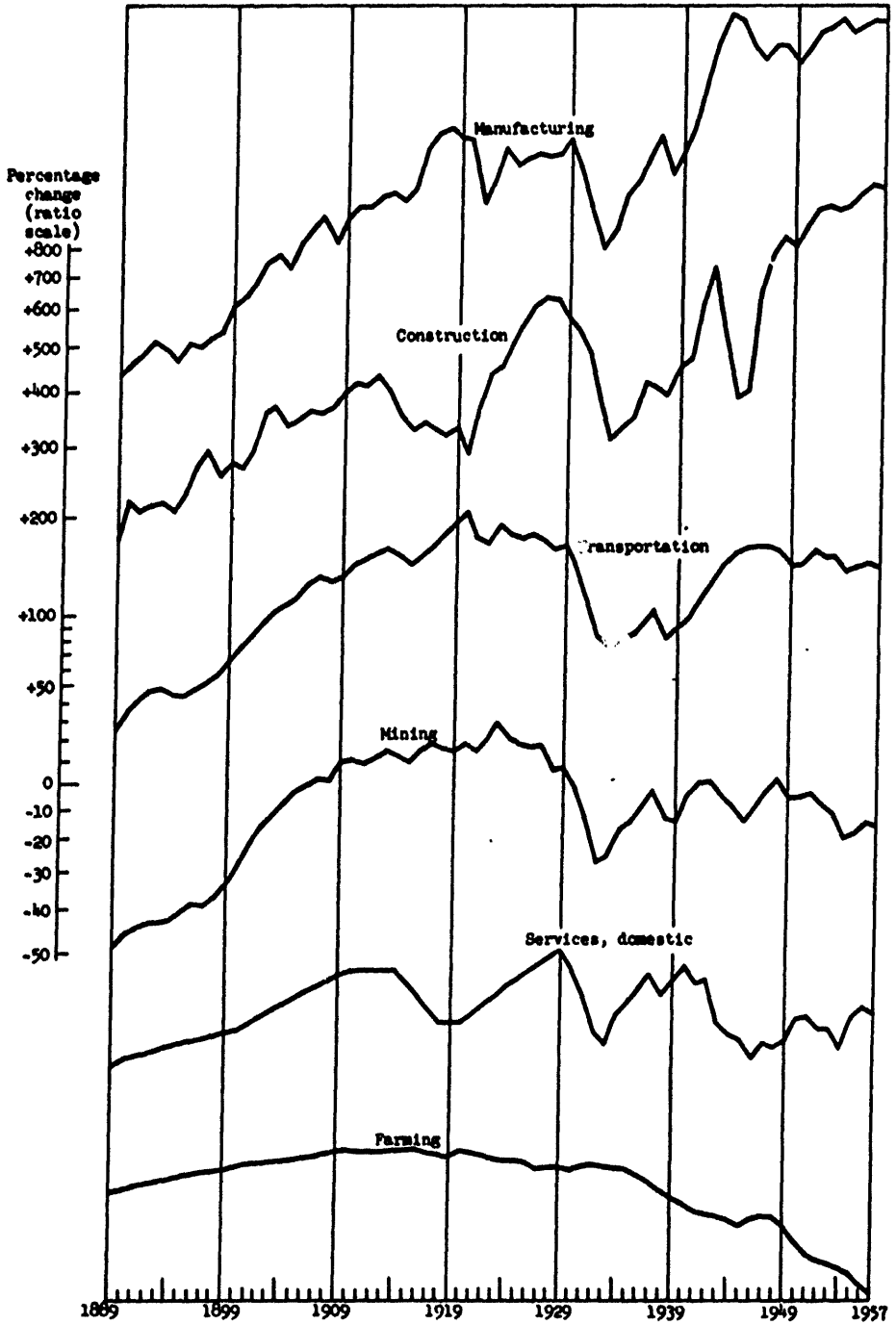
Persons Engaged  
Eleven Major Industrial Groups of the United States  
1889-1957



Source: National Bureau of Economic Research, Inc.

Chart D: Section 2

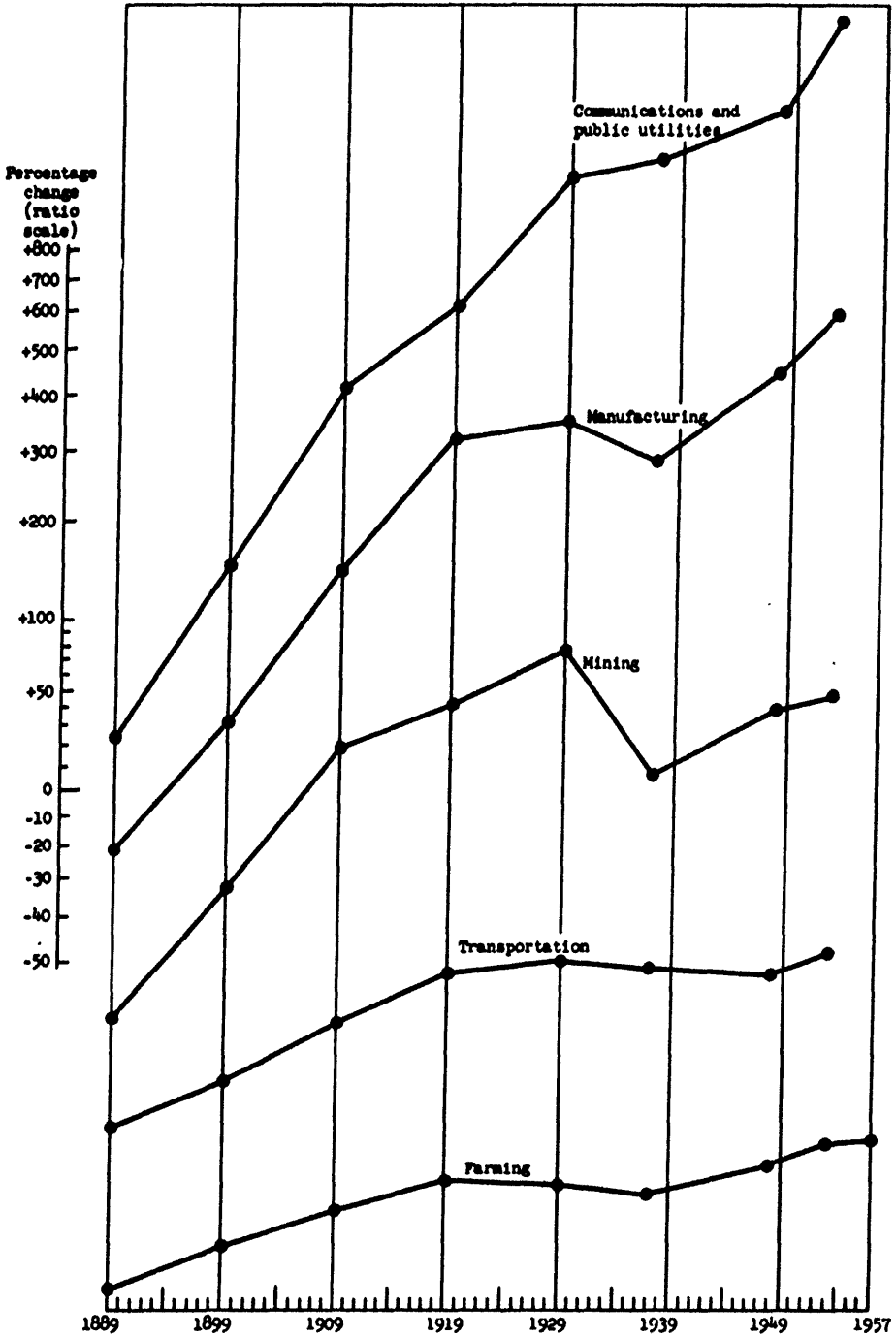
Persons Engaged  
 Eleven Major Industrial Groups of the United States  
 1889-1957



Source: National Bureau of Economic Research, Inc.

Chart E

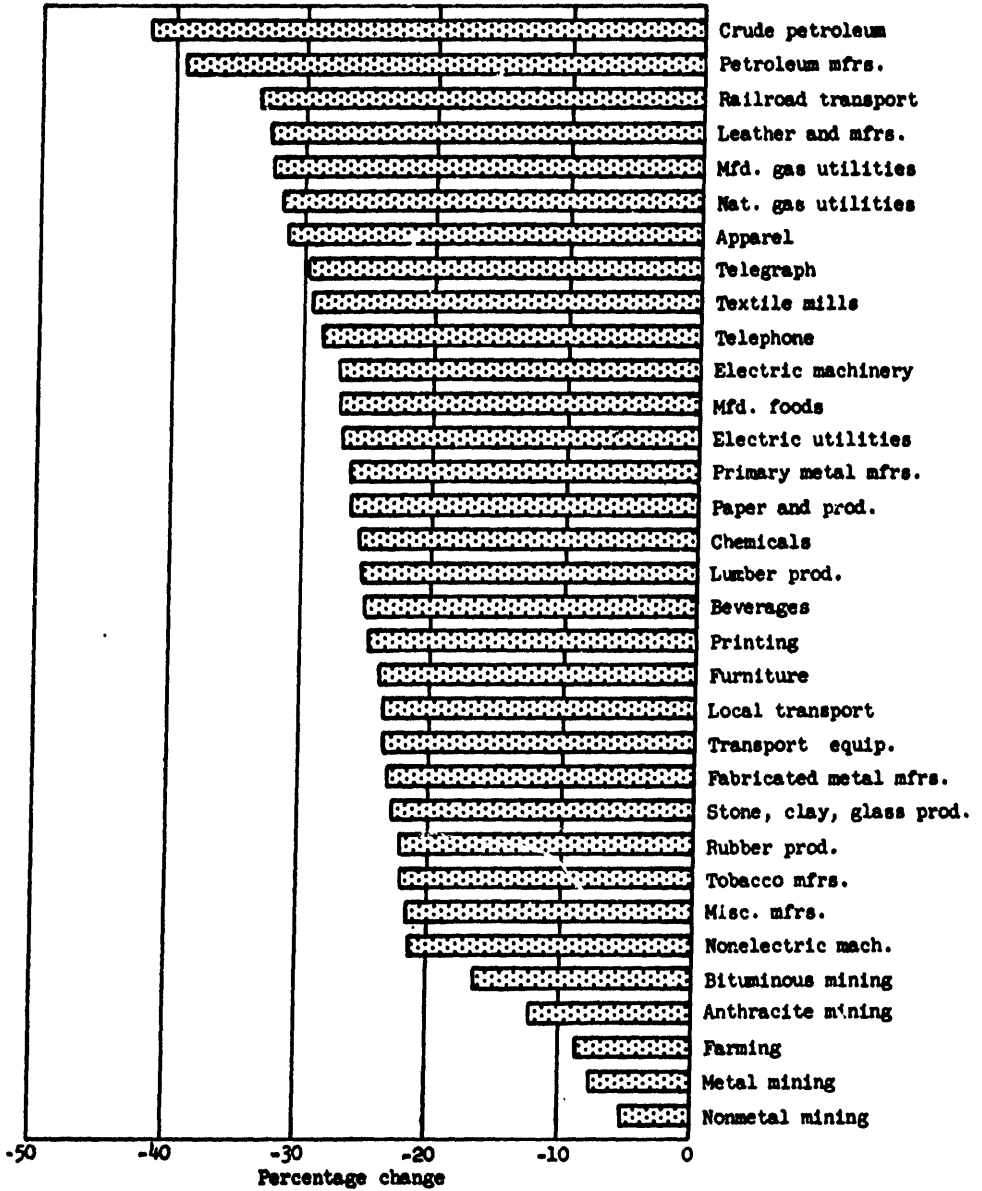
Real Tangible Capital Used  
Five Major Industrial Groups of the United States  
1889-1953



Source: National Bureau of Economic Research, Inc.

Chart F

Hours per Week per Worker  
 33 Industries of the United States  
 Percentage Change from 1899 to 1953  
 (Industries are ranked in order of percentage decline.)



Source: National Bureau of Economic Research, Inc.



Mr. FABRICANT. Let me start with what are the highlights of the important chapter of the economic history of the United States with which we are concerned this morning.

The essential facts on productivity and economic growth in the United States can be put most briefly and simply as follows:

1. During the past three generations, the Nation's real output per man-hour of work done has been rising at a substantial average rate, close to 25 percent per decade. This upward movement shows no signs of slowing down. On the contrary, the trend witnessed by this generation has been higher than the trend witnessed by earlier generations. Indeed, during the most recent period, that is, after World War II, national output per man-hour rose at a rate of 35 to 40 percent per decade. This means, in absolute terms, that a 10-year period has seen added to the output of each man-hour of American labor an amount well in excess of the total output obtained from an hour of work in most regions of the earth.

2. The increase in national output per man-hour is the outcome, first, of a heavy investment in business and farm plant and equipment, in public improvements, and in other tangible capital goods. The volume of tangible capital per head of the population has increased at an average rate of about 10 percent per decade. A contribution has come, second, from investment in education and on-the-job training, and expenditures on research and development and other forms of intangible capital. I can offer no figures here, but the contribution has, I believe, been significant. Third, and by no means least, has been greatly improved efficiency in the use of the country's labor and tangible and intangible capital resources.

3. A growing fraction of a higher and higher output per man-hour has been taken by our people in the form of greater leisure. Normal weekly hours of work per employed person, for example, have been cut by 20 to 30 percent, on the average, since the turn of the century; and the practice of paid vacations, and longer vacations, has become more widespread.

Another fraction of the rising output per man-hour has been used to finance investment in private and public capital. This fraction, however, has not had to rise to bring the great expansion in capital per head of the population to which I referred a moment ago. In fact, it may even have fallen a bit. Still another and growing fraction has been used to meet the increased needs of national security. Along with this a much smaller fraction has gone in technical and military assistance and aid to other countries.

The rest, the great bulk of the rise in output per man-hour, has been used by our people to get the goods and services for which they have worked and saved—a larger volume and better quality of old goods and services, and many new goods and services. National consumption per capita has grown at a rate somewhat lower than the rate of increase in output per man-hour largely because of the falling hours of work per person, but the rate has nevertheless been very substantial, something like 20 percent per decade on the average over the past three-quarters of a century.

4. The gains of productivity have been widely diffused among our people. Real hourly earnings, including fringe benefits of several sorts especially in recent decades, have grown as rapidly, on the

average, as has output per man-hour. Further, a roughly similar upward trend is visible in the real hourly earnings of each of the industries for which figures are available. The rate of return to capital has tended to remain roughly constant, on the average, but even this horizontal trend reflects a gain from productivity, in an important sense, since the great increase in capital per worker that I have mentioned would probably have reduced the rate of return on capital had not productivity risen.

5. Increased productivity inevitably involves the growth of new industries, and the relative or even absolute decline of old. So, too, for different occupations and regions, which also have grown at widely different rates. In some cases this has meant the painful and difficult adjustments that constitute one of the costs of economic progress. It is important to realize that economic growth, even when balanced in every significant sense, does not and cannot mean equal growth in all parts of the economy.

I would now like, if I may, to spell out some of these points, and present some of the significant details, by referring to the paper and the supplementary charts that I have offered for the record.

My first main topic is the long-term rate of increase in national productivity.

Over the 70-year period since 1889, that is, the period which has been examined most closely and for which presently available statistics are most adequate, the rate of increase in productivity has been as follows:

Physical output per man-hour in the private economy has grown at an average rate that appears to be about 25 percent per decade. This is identical with the annual rate of 2.3 percent mentioned in the paper, but for the present purpose I shall cite the rates in the rather more effective terms of per decade.

Comparing output with a measure of labor input in which a highly paid man-hour of work counts for proportionately more than a low-wage man-hour yields a measure of productivity for the private economy that grew at a significantly smaller rate, about 22 percent per decade.

A measure of productivity for the private economy that compares output not only with labor input, so determined, but also with tangible capital, each weighted by the market value of its services, grew still less rapidly, about 18 percent per decade.

All these indexes of productivity in the private economy rose somewhat more rapidly than the corresponding indexes for the economy as a whole, including government, when the usual measurements of government output and input are utilized. For the total including government, productivity rose about 16 percent per decade.

The CHAIRMAN (presiding). Mr. Fabricant, may I interrupt?

I did not have the chance to be here when Mr. Goldsmith testified. Have you read his testimony?

Mr. FABRICANT. Only a rough draft, very hastily, a few days ago, Senator Douglas.

The CHAIRMAN. As I understand it, he testified that the increase in average GNP per head was approximately  $1\frac{5}{8}$  percent per year; is that true? May I ask the staff if that is true?

Mr. FABRICANT. Over what period of time?

Representative BOLLING. For 100 years.

The CHAIRMAN. Over a period roughly of a century.

Senator BUSH. And a half, 150 years.

The CHAIRMAN. A century and a half.

Now a quick computation:  $15\frac{1}{8}$  percent is  $1.62\frac{1}{2}$ , and you come out with  $1.62\frac{1}{2}$ , you come out at 1.6, is that right?

Mr. FABRICANT. No, I come out with 2.3.

The CHAIRMAN. That is physical productivity.

Mr. FABRICANT. That is what I presume Dr. Goldsmith was referring to.

The CHAIRMAN. Now in your last paragraph you shifted from physical productivity to physical productivity plus services, in your fourth paragraph.

Mr. FABRICANT. In my fourth paragraph, the measure of output is total GNP.

The CHAIRMAN. That is roughly comparable with Goldsmith's—

Mr. FABRICANT. Yes.

The CHAIRMAN. It is an index; is it not?

Mr. FABRICANT. Yes. However, the denominator of the productivity ratio to which I am referring in the fourth paragraph is not the same as Mr. Goldsmith's. He used as the denominator of the productivity ratio simply man-hours and what I am referring to in the fourth paragraph is a weighted combination of man-hours and capital input. The appropriate figure for comparison with Mr. Goldsmith is the 2.3 percent per annum mentioned in the first paragraph of that little summary, 2.3. Now, that is much higher.

The CHAIRMAN. As compared to  $15\frac{1}{8}$ s?

Mr. FABRICANT. That is much higher than the figure he recited. The reason I refer to the 70-year period since 1889—

The CHAIRMAN. He finds the average would be relatively steady over the period and therefore greater growth does not change it appreciably.

Mr. FABRICANT. That is not my impression of it. I believe Mr. Goldsmith pointed out the rate of growth in productivity to judge from the available statistics was much slower before the 1870's than it was after the 1870's and that explains this difference.

Senator BUSH. Would the Senator permit me to make an observation because I was there and am very much interested in it?

The CHAIRMAN. Yes, indeed.

Senator BUSH. As I recall the Goldsmith story, while he came out of the period of 150 years with an average growth rate of  $15\frac{1}{8}$ s percent and he also came out with a similar growth rate within various other periods of 50 years or 40 years as from 1919 to 1959, still within those periods he had far from the steady increase—

The CHAIRMAN. I understand.

Senator BUSH. But a very erratic one and it just happened that over these big chunks of periods that he took that each one of them came out at about  $15\frac{1}{8}$ s percent.

The CHAIRMAN. I thought that 70 years was a sufficiently large flow of time, and that the same longtime influences which prevailed for 120 years would normally prevail within the 70 years.

Mr. FABRICANT. Yes; there cannot be any real difference between Dr. Goldsmith and me because we are using basically the same gross

national product figures, deflated in much the same way. The only difference between Dr. Goldsmith and me is, first, the denominator of the productive ratio, and, second, the period of time.

The CHAIRMAN. You use man-hours?

Mr. FABRICANT. In the fourth paragraph I used a weighted combination of man-hours and capital input. In the first paragraph—

The CHAIRMAN. You include capital?

Mr. FABRICANT. I do include capital.

The CHAIRMAN. In the denominator?

Mr. FABRICANT. In the denominator, as one of the types of input. For one of the resources used in the first paragraph of the summary I simply used man-hours.

The CHAIRMAN. The first paragraph is man-hours without any capital factors?

Mr. FABRICANT. Right.

The CHAIRMAN. And it is physical output but not gross national product?

Mr. FABRICANT. It is deflated gross national product which is equal to physical output essentially.

The CHAIRMAN. That is you treat services as physical output?

Mr. FABRICANT. So did Dr. Goldsmith yesterday.

The CHAIRMAN. Pardon?

Mr. FABRICANT. Dr. Goldsmith treated services in real terms as physical output.

The CHAIRMAN. I always thought it was desirable to maintain a difference between gross national product and physical output because of the fact that services are a very tricky item.

Mr. FABRICANT. I agree that there is good reason for measuring services very carefully. But when people usually these days talk about physical output they usually mean deflated gross national product which includes services. Times have changed, Senator Douglas.

The CHAIRMAN. This is a somewhat questionable proceeding. We know what we are doing.

Senator BUSH. Could I ask one question, Mr. Chairman, apropos of this?

The CHAIRMAN. Yes.

Senator BUSH. In this testimony of Dr. Goldsmith he speaks of the real GNP per head over a 150-year period and different other periods. That I presume means per head of population, whereas in your figures I am inclined to believe you mean people working.

Mr. FABRICANT. I mean not only people working but the number of man-hours they worked. Since hours per person has declined, this is another reason for a difference between his figures and mine. Mine must be larger because of the decline in hours.

The CHAIRMAN. So that the decline in the working week would mean that your denominator would be smaller, of course, than if you used the total number of workers or total population?

Mr. FABRICANT. That is right.

The CHAIRMAN. And hence your result would be higher?

Mr. FABRICANT. That is right.

The CHAIRMAN. Your quotient would be higher?

Mr. FABRICANT. That is right. There are several reasons why my result would be higher than his; otherwise they are based on the same figures.

The CHAIRMAN. And on per capita basis you would come out at about 1.6.

Mr. FABRICANT. 1.9, I would say. Roughly for the particular period that I am—

The CHAIRMAN. For the particular period.

Mr. FABRICANT. It would be a lot closer.

The CHAIRMAN. The results are approximately similar for the two series; is that right?

Mr. FABRICANT. Correct.

The CHAIRMAN. O.K.

Mr. FABRICANT. We have here the main broad measures of long-term productivity increase that John Kendrick has calculated in the National Bureau's study of the American economy. It is by no means complete. Kendrick has gone to some trouble to provide still other measures that differ in definition of output or input, in the degree to which they cover the economy, or in details of estimation. However, as the detailed figures in the paper indicate—this is table I on page 5 of that paper—these alternative calculations yield results similar to those just given and we may therefore concentrate on the above measures. They differ enough among themselves to raise a question about the meaning and measurement of productivity. Indeed we have already begun to have a discussion about the meaning and measurement of productivity.

Which measure of productivity is appropriate in any case depends, of course, on the question in mind. Change in output per man-hour, for example, shows the combined effect on the product obtained from an hour of labor of two groups of factors: First, those causing increases in efficiency; and, second, those causing changes in the volume of tangible and intangible capital available per man-hour. This measure answers an important question. But if what is wanted is a measure of increase in efficiency alone, the index of output per man-hour is deficient. A better measure, in that case, is one that compares output with the combined use of all resources. That is the reason why I used capital as well as labor in the denominator in that particular measure of productivity.

The CHAIRMAN. What was the weight you gave to capital as compared to that for labor?

Mr. FABRICANT. The weight of labor to capital is about 4 to 1 in the recent period. The weight would vary depending on the period. This is really a simplified version of your own production function, Senator.

The CHAIRMAN. I thought I recognized a distant relation.

Mr. FABRICANT. Yes; put in language that other people will understand.

Information on all resources is not available, however. Until rather recently, economists interested in measuring the rate of increase in national productivity had to make shift with labor input alone—first, in terms of number of workers, then in terms of number of man-hours. This is still true for most individual industries, narrowly

defined, even on an historical basis, and for both individual industries and the economy as a whole on a current basis.

For this reason, the most widely used index of productivity—the one I cited first—is simply physical output, or deflated gross national product, per man-hour. It is a useful index, if its limitations are recognized. Because in the economy at large and, as we shall see, in most—not all—individual industries, labor input is by far the most important type of input (measured by the fraction of income accruing to it), the index based on man-hours alone is not often in serious error. It is a fair approximation to a more comprehensive index of efficiency. But as such it is usually subject to an upward bias, as the figures cited indicate.

The bias in output per man-hour results not only from the omission of capital input. The usual index of output per man-hour fails also to take into account change in the composition or quality of labor. That is, man-hours worked by persons of different skills, levels of education, and lengths of experience are treated as if equivalent, thus ignoring important forms of human capital that aid in production and contribute to wage and salary differentials. The index of output per weighted man-hour—the second index cited—catches some of this intangible capital, for the labor in industries with high rates of pay is given a heavier weight than that in low-pay industries. However, a still better measure of efficiency is an index of productivity based on the comparisons of output with the input of both labor and tangible capital, each properly weighted.

Indeed, the best currently available approximation to a measure of efficiency is such an index. As we have seen (it is the third index that I cited), it shows a rate of growth of productivity that is significantly below the rate for output in relation to labor input alone. That it is lower will not be a surprise, since it is well known that tangible capital has increased substantially more than the labor force; tangible capital per weighted man-hour has risen at the average rate of 10 percent per decade. Because the services of labor have become more and more expensive relative to those of tangible capital, there has been a strong incentive for business firms and other producers to substitute capital for labor.

Surprising may be the fact that the difference between productivity measured in terms of labor and tangible capital combined and productivity measured in terms of labor alone is no more than we have found. The reason is the relatively high weight given labor in combining it with tangible capital. Obviously, man-hours cannot be combined with dollars of tangible capital without translating each of them into comparable units. The appropriate unit is a dollar's worth of services in a reference base period. If a man-hour of labor commands \$2 in the base period and a hundred dollars of capital equipment commands \$6 of net revenue per year (whether in rent, profits, or otherwise is immaterial), we count the hundred dollars of equipment as equivalent to 3 man-hours. Because, in production, use is made of many more man-hours than of even hundreds of dollars of capital, labor as a whole gets a much greater weight than does capital. The weights for the private economy are currently as 8 to 2, or 4 to 1.

I have called this weighted index the best available approximation to the measure of efficiency that we seek. It is approximate for more

reasons that those already given. One is the problem of measuring output, which involves combining into a meaningful aggregate a changing variety of old and new goods, and services as well as physical commodities. A special difficulty arises in putting a figure on the quantity of services produced by government to meet collective wants. This is a particularly troublesome type of service to measure in anything like real terms. This accounts for the greater confidence most statisticians have in the estimate of productivity for the private economy, exclusive of government.

A general deficiency of all the measures of output—and thus of productivity—is their failure to take adequate account of change in the quality of output, and I believe Dr. Goldsmith referred to that as well yesterday. This, it is likely, subjects them to a downward bias. And, to repeat, the indexes of output per unit of labor and tangible capital combined, though broader than any other indexes now available, fail to cover adequately the investment in education, science, technology, and social organization that serves to increase production—a point to which I shall have to return.

The technical questions raised above (which I have selected from a host), are, of course, matters primarily for the producer rather than the user of productivity statistics. But for the user it is important to be aware of the sharp differences made in the rate of growth of productivity by technical choices not always specified—and our little discussion a few minutes ago illustrates that—namely, whether output or input is defined in one way rather than another, or weights or components of output and input are determined by this rather than that method, or data are selected or estimated from one or another source.

Measured in any of the ways listed above, however, productivity in the United States has grown at a remarkable average rate over the past two-thirds of a century. The more comprehensive indexes, in which output is compared with both labor and capital input, indicate a doubling of efficiency every 40 years. The index of output per (unweighted) man-hour indicates a doubling even more frequently—every 30 years. Not many of the countries for which corresponding records might be constructed would show average rates as high or higher over so long a period. Over shorter periods, it is very likely our long-term rate has been exceeded in various countries. This has happened here, as well as elsewhere, as we shall see in a moment. But it is safe to say that the U.S. long-term rate is not low in relation to the experience of other countries over comparable periods. It may appear low only in comparison with aspirations—the long-term rates dreamt of by countries embarked on ambitious programs of economic development, or the rates some of our own citizens believe we need to reach and maintain if we are to meet some of the urgent problems that confront us.

My second main subject consists of fluctuations in the rate of productivity increase.

Productivity did not grow at an even rate. Its rate of growth was subject to a variety of changes, which may be characterized as follows:

A distinct change in trend appeared sometime after World War I. By each of our measures, productivity rose on the average more rapidly after World War I than before.

Over the whole period since 1889, productivity fluctuated with the state of business. Year-to-year rises in productivity were greater than the long-term rate when business was generally expanding, and less (or often falling) when business was generally contracting.

The slow rates of increase (or declines) in productivity appear to have been largely concentrated in the first stages of business contraction. Productivity rose most rapidly, as a rule, toward the end of contraction and during the early stages of expansion.

Year-to-year changes in productivity were appreciably influenced also by random factors.

The change in trend that came after World War I is one of the most interesting facts before us. There is little question about it. It is visible not only in the indexes that John Kendrick has compiled for the private domestic economy, to which chart 1 in the paper is confined.

You will find that chart in the paper. The scale I should mention is a ratio scale so that equal amounts of rise mean equal percentages. This change of trend around World War I can be found also in the figures for the whole economy, including government, as well as in the estimates for the group of industries for which individual productivity indexes are available. Some readers of chart 1, or any of the others I have referred to, might prefer to see in it not a sharp alteration of trend, but rather a gradual speeding up of the rate of growth over the period as a whole. The latter reading is not entirely out of the question, but it seems to fit the facts less well than the former. By either reading, it is clear, the rate of growth in productivity seen by the present generation has been substantially higher than the rate experienced in the quarter century before World War I.

As for cyclical fluctuations in productivity, a special study by Thor Hultgren of the national bureau's staff provides new evidence. This study, to be published by the national bureau later this year, points to a most striking fact, something that we miss in the annual figures. As was shown by Kendrick's annual data, interruption of the rise in output per man-hour came mainly during contraction. But the monthly data analyzed by Hultgren suggest, further, that most of the interruption may have usually been concentrated in the first half of contraction. After contraction had been underway for a while, and well before general business revival, output per man-hour as a rule resumed its upward march, and increased at a rate even greater than the rate of increase during the latter part of expansion. This can be seen in chart 2 of the paper I have inserted in the record. It appears on page 16 of the paper. I might add that events of recent years, not covered by this chart, confirm its general outline in some recent research undertaken by Hultgren.

Some of the irregular changes in chart 1 undoubtedly reflect inadequacies of the figures. Productivity change is measured by the ratio of two indexes, each subject to error, and even slight errors in these will sometimes combine to produce considerable error in the ratio, just as they will sometimes cancel one another. We cannot be sure whether or not the change between any particular pair of years is the result simply of statistical error. On the other hand, that the errors are on the whole not overwhelming is suggested by the fairly systematic business-cycle behavior that we have noticed. We know, also,



that some of the irregularities reflect not statistical error but the impact of weather, strikes, and the other real random factors to which life is subject.

The picture that emerges from the information gathered at the national bureau by Kendrick and Hultgren, and in the Federal Government by the Bureau of Labor Statistics and the National Income Division, is one of a persistent and powerful tendency toward improvement in efficiency. Sometimes the outcome was a fast, sometimes a slow, rate of growth in productivity. Sometimes the tendency was entirely offset for a while by cyclical and random factors. Only twice, however, was the interruption long enough to prevent productivity from reaching a new high within 5 years.

Because the rate of increase in productivity has been far from uniform, the user of productivity figures must know the period to which they relate. Rates of productivity increase derived from one period will differ, sometimes considerably, from those derived from a longer, or shorter, or altogether different period. The same caution may be noted with regard to extrapolations of past trends into the future. These, the record suggests, will always be rather risky.

My next main topic is productivity and the increase in national product.

The Nation's product or real income—the terms are interchangeable—may be said to have grown through increase in the volume of resources available for use in production, and through increase in productivity or the efficiency with which these resources are turned into product. Measurement of these two sources of increase in product suggests their relative importance over the past seven decades:

Each year's increase in productivity accounted, on the average, for about half of the year's increase in product. The other half reflected, of course, increase in resources; that is, labor and tangible capital. Productivity increase accounted for a larger fraction—about nine-tenths—of each year's increase in per capita product, with the rise in per capita resources contributing the other tenth.

Prior to World War I, both per capita resources and productivity grew significantly, and thus both contributed to the rise in per capita product. Since World War I, per capita resources have fallen slightly, but productivity has risen even more rapidly than before—rapidly enough, in fact, to keep per capita product growing at an average rate not far below the rate for the earlier period.

The full story for the private domestic economy is set forth in chart 3 of the paper, which appears on pages 20 and 21.

These results—and the results presented earlier, can be properly understood only if the qualifications contained in the paper are kept in mind.

Most important seems to be the definition of resources. We have measured these by weighted man-hours of work done and tangible capital available, and have thus largely excluded intangible capital. This results in some understatement of the contribution of resources, for it is likely that intangible capital has risen in relation to the resources we include. There is a corresponding overstatement of the rise of productivity after World War I, and the downward shift in the rate of growth in per capital tangible capital at about the same

time may reflect some substitution of investment in intangible capital for investment in tangible capital.

In an important sense, society's intangible capital includes all the improvements in basic science, technology, business administration, and education and training, that aid in production—whether these result from deliberate individual or collective investments for economic gain or are incidental byproducts of efforts to reach other goals. If intangible capital were so defined, it would probably follow that much—not all—of the increase in product would reflect increase in resources. But so wide a definition of intangible capital would get us no closer to determining the causes of increase in product.

With the statistics presently available we have been able to measure the direct effects, on output, of increase in labor time and increase in volume of tangible capital. The indirect effects of the increases in these resources, and the effects of all other causes, we have been forced to lump together under the heading of "productivity" and to measure as a whole. The residue includes the contributions of the several forms of intangible capital that I mentioned, education, and so on; the economies resulting from increased specialization within and between industries to which Adam Smith referred, economies made possible by growth in the Nation's resources and its scale of operations generally; the improvement (or falling off) of efficiency in the use of resources resulting from change in degree of competition, in volume, direction and character of governmental subsidies, in the nature of the tax system, and in other Government activities and regulations; and the greater (or smaller) benefits resulting from change in the volume, character, and freedom of commerce among nations.

The simple calculation that I have presented does no more than suggest the high relative importance of the factors grouped under productivity. But this is significant. It is, as Dr. Abramovitz has pointed out in another national bureau study, a "measure of our ignorance" concerning the causes of economic growth, and an "indication of where we need to concentrate our attention." It is well to know how far short we are of determining the sources of increase in national product.

I come now to productivity in individual industries.

The rate of growth in the entire economy's productivity is, of course, the prime fact with which we are concerned. The facts on productivity in individual industries are worth presenting, however, because they help us to understand the process by which national productivity has been raised. And here the main points may be put quite briefly.

Rise in productivity has been a general industrial phenomenon. Virtually every individual industry for which a reasonably adequate index can be calculated shows an upward trend in output per man-hour, and this was almost as universally true of output per unit of tangible capital and of output per unit of labor and capital combined.

Among individual industries, as for the economy as a whole, the rise in output per man-hour—the index most commonly available—nearly always exceeded the rise in productivity with capital as well as labor taken into account. For some industries the difference between the two measures was considerable.

Though virtually all industries showed rises in productivity, there was great variation among them in average rate of rise. The indus-

tries whose productivity advanced more rapidly than productivity in industries generally, were more often than not also those that expanded their output and employment of labor and capital more than industry at large. Industries in which productivity lagged, usually had a smaller growth in output and employment of labor and capital than industry at large—or even a decline.

The generality of rise in productivity is the outstanding fact that emerges when individual industries are studied. It is illustrated by the detailed figures for five major divisions given in chart 4 of the paper, which appears on page 24, and by the changes between 1899 and 1953 in 33 industries or divisions given in chart A of the supplementary exhibit.

There the industries are ranged, you will notice, in the order of percentage change in output per unit of labor and tangible output combined. The variation is perfectly enormous, ranging from electric utilities with well over 2,000 percent increase in output per man-hour, for example, to industries like lumber and anthracite mining, which show increases, but nowhere nearly as large.

The CHAIRMAN. Dr. Fabricant, do you measure productivity in physical terms or in value terms?

Mr. FABRICANT. Throughout my discussion I am talking of productivity in physical terms, not in value terms—physical terms, deflated values.

The CHAIRMAN. I am somewhat surprised at the fact that farming is the industry third from the bottom in terms of percentage increases of the 33 as shown in chart A. I had thought that at least in the last 15 years that the increase in physical productivity in farming had exceeded the average increase in manufacturing. Now this is not so, you say.

Mr. FABRICANT. There are several reasons why farming appears low down in this. First, I am referring to the full period 1899 to 1953 rather than just the past 15 years.

The CHAIRMAN. I understand.

Mr. FABRICANT. Second, the measure of output which I am using for farming here is a measure of physical output which takes account of the purchases that farmers make of gasoline and other supplies from nonfarming industries. Since a good deal of the increase in farm production has come by transferring the work from the farm to the factory and elsewhere, we made an allowance for that in the measure of output. The measure of output is what we call net physical output and that does not rise nearly as rapidly as does the usual measure to which I think you are referring, which is something we call gross physical output. Let me add finally, if I may, that farming does not stand out too badly in terms of output per man-hour, which I think you have in mind. You will notice that the first bar for farming sticks out quite far to the right. The reason why farming is third from the bottom is because the black bar, which is output per unit of labor and tangible capital combined is relatively low. One of the ways in which farm physical output per man-hour has been increased is by getting more capital equipment. That black bar takes that into account and therefore shows a rise in productivity which is rather less than you would get from the first bar in which you don't take account of the investment by farmers in tangible equipment, tractors, for example.

The CHAIRMAN. Even on the output per man-hour, it would look as though farming were in the lower quarter.

Mr. FABRICANT. Yes, sir.

The CHAIRMAN. Lower third.

Mr. FABRICANT. It is low. I grant that. It is low and it is low for the two main reasons, the period of time is 1899 to 1953 and most of this increase you are thinking about, which I certainly agree, occurred, has occurred in the last 15 to 20 years, and second, because we measure net output per man-hour rather than gross output per man-hour. I think the figures can be reconciled.

Representative WIDNALL. Would the chairman yield?

The CHAIRMAN. Yes, sir.

Representative WIDNALL. If that black bar was doubled in size in respect to farming then that would mean that employment had gone down materially on the farms, would it?

Mr. FABRICANT. The black bar refers to the ratio of output to the labor and capital resources available. It can be consistent with either a rise or fall in labor. If you are interested in the question about labor you will find that in another chart. This is chart B. The third set of bars from the bottom, chart B in this collection of charts, shows farming physical output, farming tangible capital use and farming persons engaged. You will notice that is the third bar and you notice also that it shows a decline. This is shown in somewhat more detail for other years as well on chart D, section 2, where you find farming at the bottom of that chart and you will notice that farming employment or persons engaged, including farmers themselves has been falling fairly steadily ever since 1909-10, thereabouts; there has been a considerable decline in the farm population.

Representative WIDNALL. The point I was making was as I understand it, the black bar indicated an increase in tangible goods.

Mr. FABRICANT. No. I am sorry. It showed the increase in output per unit of labor and tangible capital.

Representative WIDNALL. I understand. Thank you.

Mr. FABRICANT. The 33 industries which we show in chart A of the supplementary exhibit relate, of course, to a limited number of industries. The 33 industries for which individual productivity indexes are available make up less than half the entire economy, measured either by output or input. These industries, some narrowly and some broadly defined, are largely from the commodity-producing sectors of the economy, and observations are for the period beginning with 1899. Lack of data prevents giving similar information for earlier years and for other industries—the service industries, construction, trade, and government, and even some individual manufacturing, mining, and utility industries.

One reason why we have no data for the service industries, trade, and government, are precisely the reasons Senator Douglas had in mind before, when he referred to the difficulty of measuring the output of those industries.

However, it is very likely that productivity even in these industries has increased not only in the industries for which separate productivity indexes could be calculated, but also in the others, including the service industries. This is indicated by Kendrick's comparison of the productivity rise in the what he calls the "covered industries" with the rise in the economy as a whole. This is shown in the detailed table

I of the paper. The implied rate of increase of productivity in the industries not covered is of the same order of magnitude as the rate for the aggregate of those covered. Since this estimate is subject to considerable error, it cannot be conclusive in itself. But what we know of technological developments and the other immediate causes of productivity change in the service industries, for example, supports the impression of a rise. We know, too, that the factors that make for increasing efficiency in the use of resources are general in character, felt everywhere in the economy. Virtually all industries use mechanical power and have reaped some advantages from broadened national markets. More fundamentally, no industry has been free of the drives that improve efficiency.

There is good evidence that improved efficiency in the use of materials, fuel, and the like has been significant in certain industries—for example, electric powerplants—and for these, the usual indexes of productivity will understate the rise of efficiency.

On the other hand, industries have generally become more specialized, and many now purchase materials and services formerly produced on their own premises—power used in manufacturing is an example, and another example, of course, is agriculture, which also used to produce its own power but now buys it in large part. This works in the other direction.

Connections of these sorts between individual industries and other industries not only create difficulties of productivity measurement, but point also to the sources of productivity increase and diffusion. The connections provide channels along which new or improved or lower-cost materials, fuel, power, services, and equipment, as well as ideas, flow in to improve efficiency. What happens in an industry is influenced by the diligence, enterprise, and ability of its workers, its management, and its investors. It is influenced also by the quality and quantity of what the industry obtains from the rest of the world, domestic and foreign.

Increased efficiency in the use of supplies, materials, fuel, or equipment, and substitution of one input for another, also altered relations among industries and caused differences in rates of growth of output and input. These, and other developments characteristic of a progressive economy account for the great variation revealed in charts B through E. We looked at some of those a moment ago. It explains, for example, why agricultural employment fell and explains why employment in electric light and power rose.

Further, a better-than-average increase in an industry's productivity usually meant lower relative costs, lower relative prices (as we shall see later), and therefore, a better-than-average increase in its output. This is shown in the correlation revealed in chart 5, to return to the paper. This is a chart on page 28, which shows the correlation among the factors I just mentioned. Better-than-average increases in output were usually accompanied by better-than-average increases in employment of workers and tangible capital, despite the more rapid rise in productivity. Correspondingly, less-than-average increases in productivity were usually accompanied by less-than-average increases (or even decreases) in output and in the use of labor and capital resources.

No one concerned with the rise and fall of industries, or—to single out a currently discussed problem, one I think this committee has dis-

cussed—with the effects of automation on employment, may ignore these basic facts.

Productivity and the rise in real hourly earnings is the next main topic on which I would like to say a few words.

Productivity increase means more goods and services, more real income, available for distribution per unit of resources. Has the rise in productivity been reflected in the hourly real earnings of workers, as would be expected?

Real earnings per hour of work in the private domestic economy rose over the period since 1889 at an average annual rate about equal to the rate of increase in real product per man-hour, and greater than the rate of increase in product per weighted unit of labor and capital combined.

During recent decades, real hourly earnings have increased more rapidly, on the average, than during earlier decades. The change in the trend of real earnings, thus matches the change in the trend of productivity that we noticed earlier, though the data do not permit a confident conclusion on the relative timing of the two changes.

Long-term trends in hourly earnings in individual industries roughly paralleled the trend in the general average of hourly earnings. There was little systematic difference in rate of increase in hourly earnings between industries in which productivity rose very rapidly, and those in which productivity rose slowly; or between those industries with high or low, or relatively rising or falling, capital per man-hour.

Senator BUSH. Mr. Chairman, could I ask a question?

The CHAIRMAN. Yes, sir.

Senator BUSH. In the first of those three indented paragraphs it says:

Real earnings per hour of work in the private domestic economy rose over the period since 1889 at an average annual rate about equal to the rate of increase in real product per man hour.

Is that your 2.3 percent? Is that the same figure?

Mr. FABRICANT. Yes, that is right.

Mr. BUSH. Yes.

Mr. FABRICANT. These facts support the conclusion of generations of economists that over the long run the dominant factor in the general rise of real hourly earnings has been the increase in national productivity, and that the more rapid rise in earnings generally than in output per unit of labor and tangible capital combined has resulted largely from greater scarcity of labor relative to capital and from improved quality of labor. The trend in increasing scarcity and quality of labor is suggested in a very rough way by the rise of total input, that is, weighted man-hours and tangible capital per man-hour. This is given in chart 6 of the full paper. The chart appears on page 31.

The same facts lead also, it should be noted, to the conclusion that the rate of return on tangible property has fallen considerably in relation to the real hourly earnings of labor, but not absolutely. Productivity increase thus offset the effects of the rise in capital per worker, and prevented the appearance of the absolute long-term decline in the rate of return on capital that might otherwise have been expected, and which indeed the classical economist, since I did refer

to Adam Smith, I might mention this, felt it bound to happen. It hasn't happened because of the great increase in productivity and efficiency. I am referring, of course to long-term trends. We all know that during business cycles great fluctuations occur in the rates of return.

An important piece of information is provided by a new index of real hourly earnings in manufacturing, calculated by Albert Rees in a National Bureau study of wage trends between 1890 and 1914. This new index leads to a substantial revision of prevailing impressions concerning the historical relation between productivity and real wages prior to World War I.

Senator Douglas will be especially interested in this new index because of his own pioneering work in just this particular area and period.

It has long been thought, for example, that real hourly wages in manufacturing rose by only 8 percent between 1890 and 1914, despite much greater concurrent increases in productivity. Rees' index for 24-year period shows a much larger increase in real wages, a rise that is much more in line with the productivity increase of the time. Altogether, then, the present data, and I am now referring to the full period, the present data indicate that the real hourly earnings have normally, not always, moved up more rapidly than national productivity, that is, output per unit of labor and tangible capital, and that, as in the case of national productivity, the rate of increase in real hourly earnings was greater in recent decades than in earlier decades.

The CHAIRMAN. Dr. Fabricant, you are going very rapidly over a series of fundamental points. It is hard to keep all of these matters in one's mind.

But in view of the fact that the supply of capital has risen more rapidly than the supply of labor, other things being equal, you would expect that the marginal productivity of capital would fall and the rate of interest would fall, and so naturally you would expect the rate of increase in real earnings to be greater than the rate of return on the capital and since you have used the relative rates of return as weights, isn't this approximately what you would expect?

Mr. FABRICANT. You would expect that for the reasons that you have in mind, Senator Douglas, namely, that an increase in the relative proportion of capital to labor will depress the relative rate of return on capital to labor.

The CHAIRMAN. That is true.

Mr. FABRICANT. That has happened.

The CHAIRMAN. Yes.

Mr. FABRICANT. The interesting thing is that despite the decline in the relative rate of return on capital to the rate of return on labor, the absolute rate of return on capital has not declined.

The CHAIRMAN. That you account for by the increase in technical efficiency?

Mr. FABRICANT. That is right. To put it in the kind of technical terms you used to deal with, we moved along the production function and the production function itself has moved.

The CHAIRMAN. All right.

Mr. FABRICANT. This can all be put in those very fancy terms that you and Professor Cobb used some years ago. I have tried to spell it out in plain, simple English.

The CHAIRMAN. Let's restate that if we can.

That the increase in technical efficiency has been sufficient to offset the relative decline in marginal productivity which would otherwise have occurred, so that the rate of interest has remained approximately constant.

Mr. FABRICANT. Over the long run.

The CHAIRMAN. Over the long run. Is that correct?

Mr. FABRICANT. Yes, that is right, but to put it perhaps in more common terms, diminishing returns have been kept off by improvements in efficiency, technology.

The information we have on the economy as a whole provides strong evidence of the competition in the market for goods, labor, and capital that causes real hourly earnings to rise with national productivity and the other factors mentioned. Additional important evidence is provided by the developments in individual industries. This is given in chart 7 of the paper. Notice, for example, in the righthand part of the chart that the larger the increase in output per unit of total input indicated on the vertical axis, the smaller the rise in the price of the product of the industries or indeed an actual decline occurs. This reflects competition in the markets for goods. The industries that have increased their productivity relative to other industries have reduced their prices relative to other industries.

This is one of the ways that increases in productivity get out, of course, to our people. They buy things more cheaply, or certainly more cheaply relative to the prices they have to pay for other things.

The CHAIRMAN. Dr. Fabricant, I hope you will excuse me if we probe this subject a little further. Are you saying that in those industries where the increase in output per unit of input has been less than in other industries, there have been equilibrating forces either in the form of movements of labor or alterations in prices and hence in ultimate values so that the rate of increase in earnings has tended to be approximately equal in the different lines? Is that what you are saying?

Mr. FABRICANT. Yes, that is right. This is indicated in the left-hand part of the chart 7. There is a fair scattering, of course, among industries with respect to real hourly earnings. Those dots do not all fall on a single vertical line by any means but you notice how much closer they appear to be a vertical line than do the prices which are in the righthand part of the chart. This means that industries in which output per unit of total input has increased enormously, for example, the top dot, referring to a particular industry, you will notice that real hourly earnings rose there roughly about the same as in industries generally. Similarly, in industries in which output per unit of total input rose by very modest amount, the bottom few dots, you will notice that real hourly earnings rose about the same in those industries. What happens, of course, is that you have competition in the market for labor, labor will move from one industry to another, producers will compete for labor and there is this tendency for hourly earnings for given types of labor to become roughly equal. I think it is confirmed.



The CHAIRMAN. This is on an industry regrouping.

Mr. FABRICANT. I am sorry.

The CHAIRMAN. Your analysis is by industries. Has there not been a tendency, however, for the wages of unskilled labor to move up more rapidly than the wages of skilled labor so that differential within an industry has been narrowed?

Mr. FABRICANT. Yes. One of the reasons for that I refer to implicitly in my discussion, skilled and educated workers generally have become more plentiful in supply relative to unskilled workers and you have had exactly the same phenomena, decline in relative rate of return on education.

The CHAIRMAN. There was once a very famous professor of economics who proposed to close down all fellowships and have no more fellowships awarded to graduate students on the ground he did not wish to breed competitors.

Mr. FABRICANT. Yes. As we should expect to find in a competitive economy, the trends in productivity in individual industries and the trends in their hourly earnings are only weakly correlated. This is the point we made a moment ago. That is, hourly earnings in different industries moved up at fairly similar rates. The parallelism we noticed between the trend of real hourly earnings in manufacturing and in the economy at large is a fairly general phenomenon.

We find, also, as we should expect, that there is a stronger relation between an industry's trend in productivity and the trend in its product prices. Notice the second half of the chart. As a rule, in industries with high rates of productivity increase, product prices fell in relation to the prices of other goods, while in industries with low rates of productivity increase, relative prices of products usually increased.

To find closely parallel changes in the average rates of wages and salaries paid by different industries would be surprising. The American economy is one in which economic advance has brought not only greater efficiency but also other changes—in the type of labor used by different industries, in the relative scarcity of the skills they employ, in the values placed on the various noneconomic advantages and disadvantages of working in them, and in other determinants of demand and supply. So continuous has the flow of changes been that adjustment to them has never stopped. The exceptions to the rule are therefore many in chart 7, and they deserve study when the opportunity offers itself.

As for the general level of real wages—I have been speaking entirely of real hourly earnings—a fuller explanation of its historical changes must take account also of the behavior of money wages, retail prices, and productivity during the business cycles and periods of inflation and deflation that are found in the record of the past seven decades. And it is hardly necessary to add that it must take account of still other factors peculiar to particular periods, as well as of the more or less gradual changes in the markets for labor, goods, and capital that have taken place over the years.

But the chief determinants of the longer run trends in the general level of real wages and in the level of real wages in individual industries appear to be those with which we began our discussion, namely, the increase in national efficiency and the increase in capital tangible and intangible per worker.

I come now to my final topic, namely, recent productivity trends in perspective. Because these recent events are always of special interest, let us now take a closer look at productivity and a few related changes since World War II, viewing them in the perspective of the full record. Because of cyclical and other fluctuations, the average rates of change over the postwar period are best calculated by comparing the average level in 1945-48 with the average in 1953-57.

For the private domestic economy we find that:

Output per man-hour (and much the same may be said of output per weighted man-hour) rose between 1945 and 1957 at an average rate that was high, though not unprecedently so, for a 12-year period. The postwar rate was significantly higher than the average rate over the full period 1919-57, and still more so than the rate over 1889-1957.

Tangible capital was pushed up at an extraordinarily high rate—faster than in any preceding period of similar length. Since output rose at a rate only moderately better than average, output per unit of tangible capital fell.

Output per unit of labor and capital combined rose during 1945-57 at a rate slightly better than the longrun average and about the same as the average for 1919-58.

Real hourly earnings in manufacturing—not including certain types of supplementary employee remuneration—rose about as rapidly as over the full period 1919-57, and therefore less rapidly over the postwar period than output per man-hour and more rapidly than total productivity. The postwar difference between the annual rates for real hourly earnings in manufacturing and total productivity appears to have been about the same as the difference over the longer period 1919-57, and between 1889 and 1919.

Most of these facts have already been presented in the detailed charts to which reference has been made. It should be emphasized that we are focusing on output, input, and earnings expressed only in real terms (that is, adjusted for price change), and are thus passing over aspects of recent developments that are crucial for the problem of inflation.

According to the estimates of the Bureau of Labor Statistics, presented to this committee 2 months ago, changes between 1957 and 1958 were more or less in accord with expectations for a period of contraction. National output per man-hour (for the private economy) rose very slightly, if at all; and real hourly earnings (including overtime pay, which declined) rose by less than a half percent.

To return to the postwar trend, it may surprise those people who have heard of the "new" technological age that output per man-hour (and also output per weighted man-hour) rose at an average rate that, though high, was within the range of experience for earlier periods of similar length. Even if the average postwar rate is calculated for the period beginning with 1947, which was a very low point in the productivity ratio and ending with 1955, which is a relatively high point, it is not without an earlier parallel.

The rise in real hourly earnings relative to total productivity came mainly in the second half of the postwar period. In manufacturing, for example (which appears to have had a fairly typical experience), real hourly earnings rose between the average of 1948 to 1953 and the average of 1953-57 about 5 percent more than total productivity.

Over the full postwar period—comparing 1945–48 with 1953–57—real hourly earnings in manufacturing rose at a rate approximately half-way between the corresponding rates for output per man-hour and output per unit of labor and capital. Real hourly earnings in the economy as a whole seem to have risen somewhat more rapidly than in manufacturing, however, and therefore more rapidly than both output per man-hour and total productivity during the postwar period. Since the economywide index of earnings covers supplementary employee benefits, and the manufacturing index available does not, some difference in this direction is to be expected.

In any analysis of trends in the postwar period it is necessary to keep in mind not only that there have been considerable year-to-year variations in the rate of growth in real wages, in productivity, and in the relation between the two, but also that the figures are subject to a margin or error that is large in proportion to the annual changes. Although the data for recent years are, as a rule, more complete and of better quality than those for the earlier decades, they suffer in some degree from the usual statistical deficiencies.

Further, the recent period has seen a number of developments that serve to feed doubts about the precision of the estimates. These include a growing disparity between hours worked and hours paid for, a matter stressed first by the presentation of two alternative estimates of output per man-hour in the January 1958 Economic Report of the President and second by the recent initiation by the Bureau of Labor Statistics of a periodic survey to measure the difference between hours paid for and hours worked in manufacturing industries. I ought to mention that this new survey of the BLS and many of the other surveys that the BLS, and Department of Commerce as well, undertake are of absolutely first rate importance in getting up this kind of important figures. I could not have talked at all today about any of these trends if it weren't for the important work going on right here in the Federal Government in getting us the basic data.

Also of growing importance have been items of supplementary employee remuneration—so-called fringe benefits—that do not enter the usual calculations of hourly earnings. The rise in the real hourly earnings of factory workers in recent years has thus been understated.

Less clear in their mind on the postwar statistics are difficulties in the estimation of tangible capital. These have been caused by inflation, coupled with the prevalence of original cost depreciation accounting; and by a number of temporary and permanent revisions in the internal revenue code governing the calculation of depreciation changes.

Developments since the war have affected not only the statistics that one must use to describe the course of events. As is always the case, these developments have also generated new factors that played a part in recent events. Some are factors that will persist and influence the trends of the future. Others will turn out to be peculiar to the period. A detailed study of the period is essential if the nature and significance of these new factors are to be assessed. Essential also is a study of the longer record. For only in the light of the longer record can the new factors be recognized and weighed.

Even our brief survey of this record suggests, however, that the postwar period probably resembles past periods more than it departs

from them. In the recent, as in the early decades of the period since 1889, the main source of the rise in real wages is to be found not in special factors but in the persistent features of our economic development—the upward trend in productivity and the upward trend in tangible and other capital per worker.

The CHAIRMAN. Dr. Fabricant, I want to congratulate you and the national bureau for the very brilliant and fundamental paper——

Mr. FABRICANT. Thank you.

The CHAIRMAN. Which I think puts the whole study of productivity much further ahead than anything that has been done. I want to express my appreciation both to you and your organization.

In particular I must say, as one who worked in this subject some years ago, I am especially struck with the way in which you have equated capital and labor in terms of the relative payments made to each and have produced a combined unit of input which you use as a denominator by which you measure the output per unit of input. This I think is an extremely important contribution and one that could have occurred to me but didn't, and I am very glad that you have done it.

The second fundamental contribution is the way you are being able to isolate changes in technical efficiency from changes in the physical quantity of the factors of production. And this throws a whole series of fresh insights into the question.

Since I have taken up a good deal of time during the consideration of our paper, I am not going to ask any further questions except to make one comment, that as I listen to this and read it, it seems to me that the movement of production and movement of capital and movement of real earnings is like "Old Man River," that it keeps flowing along. Is that what you would say?

Mr. FABRICANT. It keeps flowing along because we have an economy, a system, which encourages people to improve themselves, to save their money, to educate themselves, to work hard, to be more efficient.

Mr. Bolling?

Representative BOLLING. Mr. Chairman, I am overwhelmed. I have no questions.

The CHAIRMAN. It is a very good paper.

Mr. Curtis?

Representative CURTIS. I am about in the same position as Congressman Bolling is. I do want to add my appreciation for the very splendid paper. It has raised so many questions in my mind and has given me such new courses of study that I do not know what to say at this time.

One thing, Mr. Chairman, I want to be sure, incidentally, is this "Basic Facts on Productivity Change" going to be in the record?

Representative BOLLING. I accepted it for the record.

Representative CURTIS. Yes. I want to be sure. There are many references to the charts. There is one thing that I would just like to ask you because it isn't in the paper. But I have seen some studies that attempt to use the increased use of power as a statistic or as a figure to relate to productivity, and I was wondering how valuable that is, I suppose it is per capita horsepower used per annum, whether that corresponds to the rate of increase that you have shown in pro-

ductivity. Do you know or would you comment on that area? I notice that is not an item you used in your studies.

Mr. FABRICANT. Yes. I think the work that has been done by several economists in comparing output with horsepower of power equipment is rather interesting. It certainly throws light on one of the types of technological changes which has brought this great increase in efficiency. Some economists, however, unfortunately feel they can use the horsepower of equipment as an index of tangible capital. I rather doubt that the horsepower gives a good enough index of tangible capital and for that reason anybody who assumes that output per horsepower does take account of capital is not really doing justice by the capital that we have in this country.

Representative CURTIS. I don't see how it could be used very much in individual industries. I wondered over a period of longtime trends whether it might be sort of a guideline.

Mr. FABRICANT. There is a fair degree of correspondence between the horsepower and the capital figures over a fairly long period of time. I would myself say that was really a matter of chance. There is no inherent reason why the two series should parallel one another. You would expect that they would both rise, but that one should rise identically with the other, I think, would be pure coincidence if it occurred. In fact, I don't think it has occurred. Therefore, I return to my original point. I think it is interesting to look at the horsepower figures just as it is to look at the fact that we use fewer horses and more electricity and things like that but not to use the horsepower figures as anything like an adequate measure of total capital.

Representative CURTIS. The reason I was glad to ask that. At this time we seem to be approaching an era of atomic energy and the possibility of a great deal more power being available to human beings. What might that indicate?

I remember reading somewhere someone propounded a theory and I don't know whether it is true or not but it is certainly intriguing, that the Renaissance came about largely because somebody invented the horsecollar because it almost doubled the horsepower available to people at that period of time.

Mr. FABRICANT. The horsecollar, did you say?

Representative CURTIS. The horsecollar, yes. Apparently horses had been hitched in a way that would cut their windpipe before then and by the invention of the horsecollar you got twice the efficiency out of the horse, thus creating more leisure time, and so forth, or at least having that much more power available to the society. And since then I have speculated in this area of horsepower, not horses themselves but the power and the effects of the switch from candlepower and steam. I have read these theories of why we are having this rapid suburbanization, largely a switch from steampower, which required concentration of people, to electrical power, and also the fact that there was more power available plus the advent of the automobile.

Knowing that that was an underlying factor or seemed to be, and having seen some studies in attempt to measure economic growth in relation to horsepower available; and the further comment that I made of the possible impact of atomic power on our society, the fact that that is going to give to us vast power that we haven't had avail-

able before to do a lot of things lead to me to ask your comments as to whether you thought power per capita was a possible source or possible guideline to indicate to what extent we have been advancing in productivity.

Mr. FABRICANT. I am glad you mentioned the horsecollar because the horsecollar is an interesting example of a technological development used in Western Europe which originated in Asia, and one of the points I made very hurriedly, I must admit, was that the efficiency growth in this country reflects not only the ideas and the energy of our own people but some of the ideas and energy of people elsewhere. The horsecollar is a wonderful example of that.

I agree thoroughly with you, sir, that atomic energy has enormous implications. There is no doubt in my mind that the industrial revolution, for example, in England and of course elsewhere, came about because of the enormous improvements in mechanical power and I would assume that atomic energy offers such very real possibilities. It will take a long time, however, before we really get all those fruits.

The CHAIRMAN. Senator Bush?

Senator BUSH. Yes.

Mr. Chairman, knowing that my colleagues have complimented the professor, I wish to add my compliment to this excellent paper.

I just have a couple questions, Professor.

In your statement you have: "The Nation's product or real income—the terms are interchangeable—" I have a little puzzlement about that.

We have in the economic indicator the gross national product and then the income. Those figures are not the same as you know better than I. What do you mean by saying that the national product or real income are interchangeable terms? I don't quite understand that.

Mr. FABRICANT. I don't blame you, because there are some differences of opinion among economists on that. First of all, by national product I meant this: Not the gross national product but the net national product. Second, I was assuming that net national product and national income are defined in such a way that they are in fact identical. As I said, there are differences of opinion. The Department of Commerce does not define them in such a way that they are identical. There are some differences between them. However, Prof. Simon Kuznets, who is the authority on the figures on national income and national product prior to the Department of Commerce period, did define national product and national income as identical.

I should have qualified that. It is really a technical point. They are interchangeable, in other words, if you define them as interchangeable, and I should have made that clear. The difference, however, is not too serious for most purposes.

Senator BUSH. You say:

Better than average increases in output were usually accompanied by better than average increases in employment of workers and tangible capital, despite the more rapid rise in productivity. Correspondingly, less-than-average increases in productivity were usually accompanied by less-than-average increases (or even decreases) in output and in the use of labor and capital resources.

No one concerned with the rise and fall of industries, or, to single out a currently discussed problem, with the effects of "automation" on employment, may ignore these basic facts.

I think that is a very important statement indeed, and it leads me to ask this question: Do you think that there is anything that we can do by legislation, tax reform, for instance, or other legislation to stimulate the growth in output so as to further acquire the benefits that you see, that you explain that we have received from them? In other words as we have increased output according to you this has been a good thing all around, it has been a good thing for workers, it has been a good thing for the management, too. Now, we are constantly seeking ways and in fact one of the purposes of this committee really is to stimulate job opportunities, help to create new job opportunities, and so on. Would you care to make any suggestions to the committee as to what kind of legislation we might consider that would improve this situation further?

This is really the basic purpose of the committee, to get all of this information; now, what are we going to do with it?

Mr. FABRICANT. I understand that. I addressed my remarks, of course, entirely to the basic facts and avoided, denied myself the opportunity of saying anything about policy. If I might?

Senator BUSH. I don't press you to do this if you don't care to.

Mr. FABRICANT. If you will permit, I will say this, which is not really a very specific answer to your question, but I have faith in the ability of Congress to improve our economy in such a way that we can get more output, widely diffused. I think, in other words, that we can improve, there is nothing in the record that indicates that we can't do better than this. However, it is a very difficult question on just what to do; there are many differences of opinion.

The particular point that I had in mind in connection with the page or so that you referred to a moment ago involves especially this, and I will put this in a rather negative way. It would not be to the good of the public welfare, the national welfare, in the long run, if the Congress took action to support output in any particular industry even though economic progress required in a certain important sense that that industry decline; for example, if the industry is making a product for which other substitute products are becoming available, better products, cheaper products, I think it would not be for the national benefit to try to maintain employment in that particular industry. A sensible thing to do, and this would be highly desirable to do, would be to make it easier to help the workers and the investors in that industry to move out and adjust to the new situation, brought by economic progress and by the development of substitutes. I think a good deal can be done by the Congress in easing that problem of adjustment rather than impeding it, you see. But I haven't been very specific.

Senator BUSH. That is an interesting observation. That is a little different from what I was expecting. Maybe I can point this up a little more sharply. One of the contentions of industry is that if they had wider leeway in connection with depreciation allowances, that they would expand more rapidly. Now, obviously, your thesis is that that is a good thing because——

The CHAIRMAN. I didn't infer that that necessarily followed.

Senator BUSH. Wait a minute.

The CHAIRMAN. I think the Senator is coaching the witness.

Senator BUSH. No; I am asking the witness and the witness is certainly able to take care of himself.

The CHAIRMAN. I understand he is a very good scientist but sometimes when a scientist gets in the hands of those of us who are politicians we twist them around a bit.

Senator BUSH. This is not a trial.

The CHAIRMAN. I ask my good friend not to coach the witness.

Senator BUSH. I ask my good friend to please be quiet and let me go ahead there. This is not a trial. The witness is not on trial. He is here to help us. He has been very helpful indeed.

Mr. FABRICANT. May I comment on that point?

Senator BUSH. Yes. I wanted to make sure that the question is clear.

Mr. FABRICANT. Sure.

Senator BUSH. What I am asking you to comment on is this thought that is frequently given us by industrialists, plant operators, and that sort of people that if they had wider leeway in the manner of depreciation charges it would result in more rapid expansion of plant and extension of plant and creation of job opportunities. That is what we are interested in. I would like you to comment.

Mr. FABRICANT. Well, commenting very generally on one of the implications of that, any change in legislation which gives entrepreneurs or workers or anyone, more freedom of choice is generally good. However, the Congress must always ask itself what are the costs of providing such freedom of choice and that becomes one of the serious questions.

I might add further and this is a little more pointed, with respect to the depreciation, I suspect, I haven't really investigated this thoroughly, but I suspect that we don't know as much as some people think as to how far businessmen would in fact go in choosing some of these alternative methods. One of the things that we would like to do at the national bureau is to make a study of the Federal tax system and its relation to economic growth. Quite obviously those tax provisions that affect entrepreneurs' freedom of choice, in choosing, let us say, depreciation methods is one of the topics that ought to be considered. It would be interesting to find out to what degree businessmen have taken advantage of such changes in the code in the recent past when such changes have been made. If few businessmen have in fact taken advantage of these changes I would rather suspect, this would not be conclusive, but I would suspect that further freedom in that direction might serve a few individual businessmen but isn't really terribly important in the large.

On the other hand, if many businessmen had taken advantage of such changes in the tax code, allowing of course for the usual lag in making adjustments to changes in taxes, but if many had taken advantage, then I would say that probably is something useful to businessmen and presumably would be—if the cost is not too great generally beneficial.

Senator BUSH. Excuse me, Mr. Chairman. You seem to be awfully interested in my questioning this far.

The CHAIRMAN. I am interested. I was going to remind the Senator he has exceeded his time. If he wishes to continue we will be very glad to have him do so. I do not wish to interfere.

Senator BUSH. I am overwhelmed by your gesture of fairness, Mr. Chairman, and I yield.

The CHAIRMAN. No, go ahead.



Senator BUSH. Excuse me 1 minute. I want to observe that it is contended by the same proponent of more freedom that this would not cost the Government any money because after all when you depreciate something you cannot charge it over any more. Over the longer term their contention is the cost would be nil. It would not perhaps be noticeable in the earlier years of such an operation. That is one of the avenues and the other is that I think you made an excellent suggestion that in this connection it would be wise to find out what has been done in the way of stimulating expansion when depreciation charges have been freer as under the 5-year plan, I think it expired already, a few years ago—that is what you had in mind?

Mr. FABRICANT. Exactly.

Senator BUSH. Yes.

Mr. FABRICANT. Exactly.

Senator BUSH. I thank you very much.

Representative CURTIS. Would the gentleman yield for one point?

Senator BUSH. If I may, with the courtesy of our distinguished chairman.

The CHAIRMAN. Surely.

Representative CURTIS. I think in there there is another element that has to be weighed. That is the impact of inflation on our depreciation allowances and that is one reason I think that most businessmen try to take advantage of a rapid writeoff. It is more to get their money back so that they will not be confronted with the inflated dollar.

Mr. FABRICANT. Yes, I referred to that, you recall, very briefly.

The CHAIRMAN. If my colleagues will permit me I would like to pick up an option which I temporarily discarded and use some of my 10 minutes now to ask questions.

Senator BUSH. Yes, I hoped you would go ahead.

The CHAIRMAN. Dr. Fabricant, you emphasized the fact that you believe business and labor should be given freedom of choice without any undue stimulus being given by government, for them to go into occupations with less than average productivity. In view of that statement, how do you feel about the protective tariff, for example?

Mr. FABRICANT. That is a very complicated question.

The CHAIRMAN. You found it possible to answer these other questions. Why is it more complicated when asked to answer this question?

Senator BUSH. My question was apropos of this.

The CHAIRMAN. You asked for guidance on policy and I am asking Dr. Fabricant for guidance on policy.

Mr. FABRICANT. I thought I was clearly avoiding answering that question. If you want me to make such an effort—but seriously, Senator, like most economists my personal feeling would be that the smaller a protective tariff we have—

The CHAIRMAN. Pardon?

Mr. FABRICANT. I say like most economists my personal position would be that the smaller the protective tariff we have the better, taking full count of the costs of lowering it.

The CHAIRMAN. Therefore, you would not favor a protective tariff on brass products, for example, Bridgeport brass products, nor would you favor quotas to restrict the importation of lead, zinc, and copper, is that true?

Senator BUSH. What do you know about brass products, Professor?

Mr. FABRICANT. I would be glad to come back in a year from now, Senator.

The CHAIRMAN. Simply as an illustration of a general principle.

Mr. FABRICANT. Let me complete my reply to your question, if I may.

The CHAIRMAN. Of course.

Mr. FABRICANT. Like other economists I believe in freedom of trade within the country and between the country and others. However, again, cost of freedom—

The CHAIRMAN. I want to compliment the witness on good sense.

Senator BUSH. Let him finish.

The CHAIRMAN. Surely.

Mr. FABRICANT. Cost of freedom must be taken into full account, exactly as in the case of changes in the Tax Code. Among those costs are the costs involved in our national security, for example, one of the costs involved is the problem of adjustment to change in tariffs and I would be loath to radically change anything in our economy overnight.

The CHAIRMAN. Therefore, you would be loath radically to change the distribution of the farm population as compared to the urban population?

Mr. FABRICANT. Radically, overnight, certainly.

The CHAIRMAN. Well, I regret that I have a 12 o'clock appointment to which I must go and we have a solid group of Republicans here and no Democrats. I must now put them on their honor.

Senator BUSH. We always are on our honor.

The CHAIRMAN. That they will not put into the record any unfair material which I am sure they being honorable gentlemen will not do. So I am going to turn the meeting over to Congressman Curtis.

Representative CURTIS. Senator Bush, because I have to leave, too.

The CHAIRMAN. And I am sure he will live up to his usual standards of gay gentility.

Senator BUSH (presiding). You are in a very good humor this morning.

Congressman Widnall. -

Representative WIDNALL. Mr. Chairman, Dr. Fabricant, I too would like to compliment you on an exceptionally fine exposition. It was a pleasure listening to you and I gained a lot of information.

Mr. FABRICANT. Thank you.

Representative WIDNALL. I was interested in what you said on page 7 of your statement that—

a special difficulty arises in putting a figure on the quantity of service produced by Government to meet the collective wants. This accounts for the greater confidence most statisticians have in the estimate of productivity for the private economy, exclusive of Government.

Are your figures as presented today exclusive of the Government or do they include Government.

Mr. FABRICANT. Virtually all excluded. There are a few items on an earlier page of the statement. The fourth indented paragraph on page 4 refers to a measure of productivity which roughly tries to take account of Government, but—

Representative WIDNALL. Have any studies been made of productivity of Government—

Mr. FABRICANT. Yes.

Representative WIDNALL. As such?

Mr. FABRICANT. Yes.

Representative WIDNALL. Are those available so they can be included in the record?

Mr. FABRICANT. Well, some of them are. The studies I recall off-hand are really rather ancient. The Bureau of Labor Statistics, to which I referred earlier, did important pioneering work in the 1920's and 1930's in measuring productivity. The particular study I thought of was productivity in the post office which Dr. Witt Bowden of the Bureau of Labor Statistics worked on and I think there have been similar studies not quite as elaborate made of other particular operations and branches of the Government. There has never been, as far as I know, a comprehensive attempt to measure productivity in the Government.

Representative WIDNALL. Is your Bureau of Economics into that?

Mr. FABRICANT. No, the most that can be said is that some general comments on that question appeared in the chapter of one of our books.

Representative WIDNALL. This next question is along the same line. In your testimony you said there is—

a growing disparity between hours worked and hours paid for, a matter stressed first by the presentation of two alternative estimates of output per man-hour in the January 1958 Economic Report of the President and second by the initiation by the Bureau of Labor Statistics of a periodic survey to measure the difference between hours paid for and hours worked in manufacturing industries. Also of growing importance have been items of supplementary employee remuneration—fringe benefits—that do not enter the usual calculations of hourly earnings. The rise in the real hourly earnings of factory workers in recent years has thus been understated.

Is there any study available that would bring us up to date with respect to what their real hourly earnings are, including fringe benefits?

Mr. FABRICANT. There are several pieces of evidence on this. The Bureau of Labor Statistics again in this connection undertook a special study a couple of years ago. The Department of Commerce currently prepares estimates which are relevant to this and they appear in their national accounts. Also, several private organizations have made occasional estimates of fringe benefits, particularly the Chamber of Commerce of the United States, for example, has done that. There have, I believe, also been some attempts to estimate the difference between hours worked and hours paid for. And the Bureau of Labor Statistics of course is currently undertaking an investigation in that.

In the detailed paper which I have asked to have put in the record I have referred to one or two items of information on that.

Representative WIDNALL. I think they are most important to have in the record at this time.

Mr. FABRICANT. They are very important, I agree.

Representative WIDNALL. Thank you very much.

Senator BUSH. Senator Javits.

Senator JAVITS. Dr. Fabricant, first, welcome as a fellow New Yorker—

Mr. FABRICANT. Thank you.

Senator JAVITS. Especially as a colleague of Arthur Burns who is a great friend of all of us—a great friend of this effort in which we are engaged.

I have just a very few questions.

I notice that you say in your statement that the real hourly earnings of workers have grown about as rapidly, on the average, as has output per man-hour. Then you say that the rate of return to capital has tended to remain roughly constant.

I ask you this question: Under those circumstances, you are really making a factual finding that the arguments on both sides of this question—both as to labor and capital—are probably not sound. In other words, on the one side organized labor has caused wages to far outstrip productivity and on the other side capital has caused its return to be much greater than would be called for by increased productivity; am I correct in that conclusion?

Mr. FABRICANT. Yes. I think both labor and capital, and indeed anybody who gets involved in the sort of negotiations that takes place around a bargaining table, tends to make statements that would from a purely scientific point of view be difficult to support.

I ought to mention, Senator Javits, that I am referring here to a rather long period of time, the long-run trend over a 70-year period. I am referring also to average earnings in industry at large. Perhaps at particular periods and in particular industries either or both sides might be right.

Senator JAVITS. Overall, both sides have pretty much held their traditional positions over periods of time?

Mr. FABRICANT. Well, we have at least one leading economic historian in the room sitting in back of me and I am sure he could answer that question.

Senator JAVITS. The other point I have is this: I notice all your observations about productivity do not relate to two critical points; one is the availability of raw materials to the American industrial machine to sustain productivity, and the other is the availability of markets either at home or abroad to sustain productivity.

Now, what do you see for the future in both of those respects, in terms of this very material increase of 30 to 40 percent per decade in the output per man-hour?

Mr. FABRICANT. On the raw materials there seems to be little question that we have to import a larger proportion than in the past, and in the case of domestic materials we have, so to speak, to dig deeper for them.

As far as the future is concerned, I expect that both those trends will continue. We will have to import a larger fraction and while we may be expanding the volume of materials we get from our own domestic resources, we will be able to get that increase in volume only by digging deeper. I expect that both will be possible. For example, in connection with the second, I have a great faith that our engineers and physicists and so on will be able to discover resources of which we are not now aware and extract resources that are not now possible and I think oil is a very interesting example of that and there, too, incidentally the Government has played a very interesting role.

Senator JAVITS. Now, in terms of markets which will absorb this production, how much greater do you consider the world market will be from this point on?

Mr. FABRICANT. I would hope that the share of the world market or rather the importance of the world market for American business-

men will increase. I say that because there are benefits to the American people as well as to American businessmen in finding more markets abroad and similarly buying more of our own things, the materials and other things from others. You get a much better division of labor among the peoples and areas of the globe that way. I would suppose, however, that the United States being as large as it is and growing as rapidly as it is, that in the foreseeable future the very largest part of the markets of American businessmen will continue to be domestic markets. And I have no fear that these markets will not be able to absorb an increasing volume of goods. I think our people will produce goods that they want in an important sense to consume and that they will get the income. That has been the record of the past. They will get the income and they will have the desire to buy those goods. There may be occasional problems associated with business cycles. There may be, of course, troubles in particular industries, when you have overproduction. But by and large I do not see in the long run any serious problem.

Senator JAVITS. Of absorption?

Mr. FABRICANT. Of absorption.

Senator JAVITS. Now, just follow me in this analogy now and I will be through, Mr. Chairman.

We have politically, what has been called by a gentleman whose name cannot be mentioned by a Republican Senator, a revolution in rising expectation—I am talking about Adlai Stevenson. Now, do we have the same kind of a revolution in terms of markets? Is there any scientific proof, based upon your studies and those of so many of your colleagues, that we are approaching a point in American economic life where there will be a shift to greater dependence upon foreign supplies and foreign sales for the two reasons that I have been discussing it with you: First, the need for raw materials, many of which are now almost unobtainable here; and, second, the need for a wider market to absorb the tremendous production potential of the United States? Do you see any dramatic period of that kind facing us the same way that we have facing us politically what is called the revolution of rising expectation?

Mr. FABRICANT. When anybody looks into the future he must use not only what scientific knowledge he has but also a good deal of guessing. When it comes to guessing about the future I feel no more competent than the gentleman you referred to or the gentlemen who hesitate to mention their names. I think we are all guessing when we look into the future.

So far as the historical record is concerned where we can speak with somewhat more confidence, I would say that these revolutions are rather infrequent. Things change as you look into the past. Things tend to change rather gradually. And there are a number of good reasons that one might expect why that would happen. In a sense the shift toward foreign sources of supply in the case of materials is not a revolutionary thing. It has been going on for decades in many different ways. In particular cases, of course, in the case of particular materials, you may get what amounts to revolutionary change; but when you are looking at materials generally, you don't get the impression of a revolutionary change. This does not mean, however, I should hasten to add, that even minor changes if they per-

sist will not within a few decades accumulate into a very substantial difference.

Senator JAVITS. I thank you, Mr. Chairman.

Senator BUSH. Professor Fabricant, would you turn in your blue-book, and table I there?

Mr. FABRICANT. (Complying.)

Senator BUSH. I wish you would explain in simple terms for me if you can just where the difference is where you say here in these headings for instance, you speak of the aggregate industries to which individual productivity indexes are available, the gross physical output, the weighted hour, the 2.3 average annual percentage rate of increase. That is your old 2.3 that we got originally. Then you say the entire private domestic economy likewise enjoys the same figure of 2.3. Then you say the entire economy including Government which seems to indicate lower figures as you go down the different columns. What is the significance of that, and when you include Government what are you including? You see? Let us answer that question first. When you include Government, add Government on to these others what does that mean, what are you adding, Government, is that military business, is that what it is?

Mr. FABRICANT. In large part.

Senator BUSH. Defense?

Mr. FABRICANT. In large part but not entirely. You see we are dealing there in the lefthand column, the stub of the table with a ratio of output to input. Now, as we move to the right what we do is add to the numerator of that ratio, to the output, and we add to the denominator of that ratio, to the input. As we move from the private economy to the entire economy, including Government we add to the numerator Government output. Now, Government output is very imperfectly measured as I mentioned earlier but if you measure it by what is available it would mean in effect the expenditures of Government on national security, on maintenance of roads, on things of that sort, education and what not. In the denominator you would add an estimate of the number of governmental workers, in the case of output per man-hour, and an estimate of governmental capital when you get down to that part of the table. Also, the larger part of governmental operation today happens to be national security, you see, which is why I make the distinction between the so-called national security version and the peacetime version. It is a technical difference as to how you treat national security.

Senator BUSH. Most of this security business, the defense contracts and that sort of thing are not done by the Government but by the private, domestic economy on Government contracts?

Mr. FABRICANT. Yes. It is that part of security which is done by the Government, that is, the military. You have the boys in the ships and they are there, they are doing something. That is a certain output and it is that part of it which in effect we are adding to the private product.

Senator BUSH. You are adding the soldiers and sailors?

Mr. FABRICANT. Services of the soldiers and sailors. The services of the postal clerks, the services of Jim Knowles, to get him into the record.

Senator BUSH. They are not productive, that is why they drag this?

Mr. FABRICANT. No, I won't say they are not productive. I think one of the troubles with the measures we have of Government productivity is that they don't reveal accurately how productive these people are. I think they are more productive than the usual figures show. That is certainly true of people in this room.

Senator BUSH. I want to thank you once more, Professor. If Congressman Widnall has no further questions we will adjourn this meeting.

Thank you very much.

Mr. FABRICANT. Thank you, sir.

Senator BUSH. And the meeting tomorrow, Thursday, at 10 o'clock will be in the House Caucus room, right here in this room, 362 Old House Building.

(Whereupon, at 12:13 p.m., Wednesday, April 8, 1959 the committee adjourned to reconvene at 10 a.m., Thursday, April 9, 1959.)





# EMPLOYMENT, GROWTH, AND PRICE LEVELS

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THURSDAY, APRIL 9, 1959

CONGRESS OF THE UNITED STATES,  
JOINT ECONOMIC COMMITTEE,  
*Washington, D.C.*

The committee met at 10 a.m., pursuant to recess, in the House caucus room, 362, Old House Office Building, Hon. Richard Bolling, presiding.

Present: Representative Bolling.

Representative BOLLING (presiding). The committee will be in order. Our subject is prices, wholesale and retail. Our first witness is to be Dr. George Rogers Taylor, professor of economics, Amherst College, and Chairman of the Council on Research in Economic History.

Dr. Taylor, you may proceed as you wish.

## STATEMENT OF GEORGE ROGERS TAYLOR, PROFESSOR OF ECONOMICS, AMHERST COLLEGE, AND CHAIRMAN, COUNCIL ON RESEARCH IN ECONOMIC HISTORY

MR. TAYLOR. I appreciate very much the honor of appearing before this distinguished committee. The concern which the members of this committee have shown in securing a broad historical background for their policy decisions is most encouraging to us who have a scholarly interest.

I shall proceed with my statement and shall shift these charts from time to time so that it will be convenient for you to observe them.

We have two continuous price indexes for the United States which have been prepared by Mrs. Ethel Hoover and myself.

The first is an annual index of wholesale prices. This covers prices in the United States from 1720 to 1958, giving a continuous index.

The second is an index of retail prices extending from 1800 to 1958.

Mrs. Hoover will comment on the wholesale index after 1861 and on the retail index.

I shall confine my remarks chiefly to the wholesale index for the 142 years ending in 1861.

The index numbers on which our report is based appear in table I attached to Mrs. Hoover's statement.

Let me say just a word or two about the construction of these indexes. The composite index—perhaps we should have that before us. This composite index which we are presenting is designed to picture the long-run trend of wholesale commodity prices in this country for nearly two and one-half centuries.

The other half of the chart will be displayed later.

It is not a cost of living index and because it is an annual index it is not well suited for studies of the business cycle. For this latter purpose monthly indexes and subindexes for shorter time periods and for particular markets within the country are available for considerable periods and provide rather more useful tool for the examination of relatively short-run movements.

We believe that this composite index which we have constructed provides the best available indicator of the long-run trend of wholesale commodity prices in this country. Like other indexes designed to measure changes in the price level over long time periods it provides a useful though imperfect device for this purpose. This is especially true because the items used to construct the index, as well as their respective weights, necessarily vary from period to period and the longer the time span the greater these variations become.

In addition, probably I should mention certain other limitations imposed by the price and index information which is available for the years down to 1861.

In the first place, this index, which is a composite index, is made up by combining, as far as they were available, indexes for five important market areas.

That is, this composite index is made up from from the individual indexes for the various markets for which prices were available.

Although prices in any wide trading area are always somewhat related, the closeness of their interrelationship depends largely upon the speed, reliability, and efficiency of transportation and communication among the national markets. Before the rapid spread of the telegraph in the 1850's and the unification of the railroad network following the Civil War, American markets were but loosely integrated and price movements in them were at times significantly divergent.

To get a composite picture of these various markets, indexes for the individual market areas, and these have already been erected by students, these were combined for those periods during which data were available and the weights for each market were assigned as I shall indicate. The weights are merely rough approximations based chiefly on (1) an estimate of the population and trade of each market area and (2) the representative character and adequacy of the indexes available.

The markets included and the weights assigned to each for the composite index of wholesale commodity prices, 1720-1861, were:

Time periods and markets:	Weights
1720-31: Philadelphia.....	10
1732-48:	
Philadelphia.....	7.5
Charleston.....	2.5
1749-99: Philadelphia.....	4
Charleston.....	2.5
New York.....	3.5
1800-15: Philadelphia.....	3
Charleston.....	2
New York.....	4
New Orleans.....	1
1816-61: Philadelphia.....	2
Charleston.....	1.5
New York.....	3.5
New Orleans.....	2
Cincinnati.....	1

In the second place, it should be noted that the methods used for erecting the indexes were not identical for all of the five markets included. That should not concern us here. It must suffice to note that the index for Philadelphia is an unweighted geometric mean except for the period of the American Revolution. For Philadelphia during the Revolution and throughout for the other four markets, a weighted arithmetic average of price relatives was used.

Finally, one other comment on the indexes, the number of items included in each of the component indexes was relatively small during the earlier years, much larger for later ones. Thus for Philadelphia, the city for which the largest number of continuous price quotations was available, the index for 1720-75 includes prices for 20 items; the number increases to 186 for the period 1784-1861. All of the component indexes were made up predominantly, though not exclusively, from the prices of agricultural products chiefly of domestic origin, with prices of some foreign imports such as rum, molasses, and salt also included.

I should perhaps comment further that the particular cities selected were chosen not only because these were important market areas but also because prices were available for them. It may seem surprising that Boston was not included because it was very important in the colonial period. But the newspapers and other sources of price data which were available for the markets shown do not exist for Boston.

Now, a few brief comments on the trends of prices. And here we should have before us both the composite index and that for the five markets. This will permit us to compare the two.

Representative BOLLING. There is probably a very simple explanation for this. Why does the composite index in the Revolutionary War period seem to be sharper in its "curve," than the other?

Mr. TAYLOR. I think it is merely a matter of scale. This is in a smaller scale. We couldn't get it on here. We have extended this up to a point here. In this index it is also extended here. I think it is about the same. It should be. It is merely because—

Representative BOLLING. What I meant really was that it seems the composite is sharper than Philadelphia, and Philadelphia seems to be the sharpest of the ones over there if you read that chart properly.

Mr. TAYLOR. Yes; this includes New York. The composite includes both New York and Philadelphia in part of this period and New York did not go up as rapidly as Philadelphia.

Representative BOLLING. I see.

Mr. TAYLOR. I think that is the answer.

Representative BOLLING. Thank you.

Mr. TAYLOR. For nearly 100 years, that is, from 1720 to 1814, the secular trend of prices in this country was upward. From a low of 53.4—the reading of the index in 1721—the index rose to 98.2 just before the Revolution. That is in 1772. Then if we ignore the paper money inflation during the Revolutionary War and the sharp deflation near its close, we find that the rising long-run trend reasserted itself a few years after the war and moved to a crest of 184.4 in 1814, an increase of 245 percent over 94 years. That is ignoring the Revolutionary period. A study of the individual indexes for Philadelphia, Charleston, and New York shows a substantially similar long-run trend as far back into the 18th century as data are available. Somewhat scattered information available for prices in Great Britain dur-

ing the pre-Revolution period suggests an upward movement at least roughly parallel to that in the American Colonies. Thus prices for two important staples in Great Britain, wheat and meat, were at a very low level in England in the early 1730's and in 1745 and then moved strongly upward until shortly before the Revolution more or less parallel to the colonial prices.

Our chart showing the indexes for the individual market and also a study that was made by Arthur Cole, shows monthly indexes for the same markets and indicate that in the pre-Revolutionary years the New York index and especially that for Charleston often fluctuated rather widely either above or below the Philadelphia index, but that the amplitude and duration of these divergencies decreased somewhat, as you will notice, after about 1747. In part the behavior of the indexes follows from differences in their composition and construction. In part the index for each port was influenced, at least in the short run, by special local conditions. Thus prices in Charleston were extremely low in 1745 and 1746 because demand for that port's major exports had fallen off in Europe and marine insurance rates at Charleston were unusually high on shipments abroad because of wartime interference with commerce at sea. Again the extremely high prices at Charleston in 1752 and 1753 arose from local conditions, a disastrous drought in the summer of 1752 followed by a hurricane in October of the same year.

Throughout the period before the Revolution the American Colonies were perennially short of the currency necessary to meet the ordinary needs of business. This condition they remedied as best they could, often despite British restrictions, by the issue of paper money and treasury bills. But for the period covered by our index such issues did not become excessive. So, although colonial paper often passed at a slight discount, the premium on sterling did not fluctuate sufficiently after 1720 appreciably to affect the price trend as shown by the index.

The hyperinflation of the Revolutionary War years provides, of course, a dramatic episode. The paper money prices for this period reflect war scarcities and the rapidly growing redundancy of continental currency as the hard-pressed Revolutionary Government attempted to finance its war effort. Prices advanced slowly at first. The increase was 21 percent in the year ending in April 1775 and 24 percent the following year. Then the rate of advance increased as prices rose 153 percent in the year ending in April 1777, 156 percent in 1778, 131 percent in 1779, 489 percent in 1780, and 559 percent in 1781. By April 1781, the wartime inflation had run its course, continental currency soon became practically worthless, and trading was resumed on a specie basis which was presently supplemented by limited issues of state paper. However, even on a specie basis, prices in May 1781 were nearly 70 percent above their level in May 1775.

Although the price index moved rapidly upward in the latter part of 1781 and during 1782, it fell thereafter to a low of 94 in 1789. Then followed a dramatic recovery, slow at first, but one which carried the index to 158 by 1796, an advance of 68 percent as the new country funded its debt and prices in Western Europe moved strongly upward.

From this high point (158) the index moved irregularly downward, reached a low point of 122 in the embargo year of 1808, and then turned upward aided first by a revival of European trade and

then by the State bank and Treasury note inflation which accompanied our participation in the European conflict beginning in 1812-15. The index of 184.4 in 1814 was not again reached until the Civil War inflation carried prices to an index of 220.9 in 1864.

Now, a word about the price trends from the War of 1812 down to the Civil War. Prices moved downward from 1814 to 1843 in a secondary secular movement which began with the price index at 184.4 and ended with the index at 75.1. This was followed by an upward swing culminating in the Civil War inflation which carried the index to its highest point in the 19th century.

When peace came in 1815 following the War of 1812, prices of imports began a persistent downward movement. Prices of American farm products, however, were buoyed up by a tremendous demand for exportation resulting from the disorganization and scarcities which characterized the immediate postwar period in Europe. But during 1818 European conditions returned more nearly to normal, crops improved, and the heavy demand for American food products rapidly disappeared not to return for nearly 30 years. As a result of the sudden cessation of European demand as well as a continuation of declining prices for imports, the wholesale price index fell from 168.6 in 1818 to 116.5 in 1820, a decline of 31 percent in 2 years. Next to the collapse of the continental currency during the American Revolutionary War and the sharp fall in prices after World War I, this appears to have been one of the most precipitous price declines in our history.

Prices continued their downward course during most of the 1820's with the index reading 90.6 in 1830. Then the decline was halted during the thirties as prices rose hesitantly at first, and then rapidly after 1834, to carry the monthly index to twin peaks in 1837 and 1839. The downward trend was then resumed and by 1843 the index was 75.1, the lowest level since 1758 and one not again equaled except in the depression year of 1896.

In the secondary secular price movement which began its upward course from 1843, prices rose slowly and irregularly, as you can see, at first, then rapidly in the midfifties to a sharp peak of 118.5 in the panic year of 1857. The index fell to 98.2 in 1858, then continued with only slight changes until, with the Civil War inflation, the secondary secular movement reached a narrow peak with the index at 220.9 in 1864.

It will be noted that the indexes for the individual markets which often showed considerable short-run divergences in the colonial and early national period moved more closely together after 1818 although differences continued to appear especially in years of rapid price change. In general, prices for New York and Philadelphia appear most clearly related, with those for Charleston, New Orleans, and Cincinnati following a similar but more exaggerated pattern. Of course this reflects the improved transportation and the appearance of a more completely integrated national market as we move into the middle of the 19th century.

Studies which have been made for subgroups of commodities for most of the markets indicate that prices for imported commodities declined more promptly after 1815 than did prices for domestic items and that they continued a more persistent downward course, were

only mildly influenced by the inflation of the 1830's, and persisted in their decline into the early fifties before this trend was reversed. The evidence for the movement of prices of manufactured goods is not conclusive, but prices for some fabricated goods do appear to have been falling somewhat more steadily from 1815 to the early 1850's than those for all commodities as measured by general index.

The secular movement of prices in the United States from 1790 to 1861 was, as in the colonial period, roughly parallel to that in Great Britain. Thus British wholesale prices like the American were generally rising from 1790 and reached a peak during the war of 1812. Despite considerable shortrun variations, the magnitude of this secular increase was almost the same for both countries. The downward swing of prices after the Napoleonic Wars continued to a low point in 1843 for the United States and was about the same for Great Britain although in Great Britain the low point came perhaps a few years later, perhaps in 1849 or 1850.

That gives a general view of prices in this early period and Mrs. Hoover will take it on from there.

Representative BOLLING. Thank you very much, Dr. Taylor.

Next, Ethel D. Hoover, Commodities and Services Branch, Bureau of Labor Statistics, U.S. Department of Labor.

Mrs. Hoover.

#### **STATEMENT OF ETHEL D. HOOVER, CHIEF OF THE COMMODITIES AND SERVICES BRANCH, BUREAU OF LABOR STATISTICS**

Mrs. HOOVER. I also want to thank the committee for the invitation to be here. I appreciate the privilege.

When Dr. Taylor and I were asked to provide a factual statement on wholesale and retail prices from the historical viewpoint, we were confronted with a contradictory situation in the kinds and amounts of data available. Primarily because of the efforts of the International Scientific Committee on Price History with which Dr. Taylor was associated, data were available for quite a number of years prior to the Civil War but after that the volume was less.

Also, there was a wealth of information for raw and semifinished materials but quite a dearth for finished commodities as such. Also, for retail prices, there is rather sparse information for most of the period of the 19th century.

This variation in kinds of information available is quite important from the point of view of what was happening in the country. The great variety of products and services available to producers and consumers that resulted from the technological changes in manufacturing, agriculture, and transportation during the past hundred years makes the task of providing measures of price changes for all commodities combined a rather difficult one. It was during this period that the transformation of the United States from a largely agricultural nation to an industrial nation took place, and the period that saw a rising standard of living through the ability of more individuals to obtain the basic necessities—like food, shelter, clothing—and to obtain and enjoy an increasing share of the luxuries. However, the evidence that is available from various sources is sufficient to give a reasonably good picture of what happened to prices since before the Civil War.

Dr. Taylor and I have prepared two indexes to show the history of price changes—one for wholesale prices from 1720 to 1958 and one for retail prices from 1800 to 1958. With my statement I have included a chart that shows the indexes for the 19th and the first half of the 20th century. It is a very rough chart but we thought it would be of some use.

Table 1 attached to the statement shows the wholesale prices for the full period covered by both Dr. Taylor and myself, and table 2 covers the consumer price indexes from 1800 to 1958.

Dr. Taylor has discussed the course of wholesale prices from colonial times to the Civil War. I would like to continue the review from the Civil War to the present, as well as comment on retail prices from 1800 to current times.

The two indexes on which the discussion is based were obtained by splicing together index series from a number of sources, which contain variations in the methods of computation, and differences in weights and item coverage, as Dr. Taylor has mentioned. Despite these differences, there is general consistency on the main facts—that is, the direction of price changes, the timing of price changes and, to a lesser extent, the magnitude of the price changes. Thus with some limitations on precision, we feel that the picture of price changes for these long periods are reasonably reliable.

I would like to say that in this statement I have made a number of references to economic developments other than price change. These references were not intended to imply that the developments were the cause of price changes, that is, that there was a cause and effect relationship. They were included to indicate what was happening in various other parts of the economy, which might have had some effect on the course of prices. In my work on prices in the Bureau of Labor Statistics over a number of years, we have found that it is practically impossible to isolate and enumerate all the different causes and say exactly what caused changes in price.

#### A. BRIEF SUMMARY

First, a very brief summary of where we are at the present time. Prices for commodities at wholesale and for goods and services at retail are about three times higher than just before the Civil War. The general trend of prices was downward from just before the Civil War until near the end of the 19th century and from that point to the present the general trend has been upward.

The year-to-year variations in prices over the 100-year period in both wholesale and retail markets are overshadowed by the marked upward and downward trends, with the major peaks either during or immediately after war years and the major low points sometime between the wars. This was a general picture until after World War II. Since 1946 periods of price increases have been dominant, but have alternated with periods of lesser declines in wholesale and retail prices for commodities. But costs for services and rents at retail, which are only in the Consumer Price Index and which rose very slowly during the war, have continued steadily upward since 1946.

## B. WHOLESALE PRICES, 1860 TO 1958

This chart provides the second half of the total picture on wholesale prices.

I would like to explain first about the dotted line in the 1860's. We had two indexes which we could put together to estimate prices during the Civil War. One of them was an index of prices in New York City compiled by G. F. Warren and F. A. Pearson. Warren and Pearson felt that the influence of cotton should be reduced in their index to more nearly approximate the volume of cotton that was available during the period of shortage. So for 10 years (from 1861-71), they reduced the importance of the price of cotton. I have used the Warren-Pearson index to make the continuous line for the Civil War. In the Philadelphia index, the price of cotton was kept at its prewar importance, so the wide variations in the price of cotton had a greater effect. This upper line (dotted line) is a combination of the New York and the Philadelphia indexes.

Price inflation during the Civil War, estimated as an average increase of 120 (or 165)<sup>1</sup> percent in 4 years, was followed by 7 years of sharply lower prices, a rise for 1 year from 1871 to 1872, then another 7 years of steep declines. In 1879, 15 years after the wartime peak, prices were again down to about the pre-Civil War level.

The indexes which were used to estimate price changes during the Civil War and immediately after, were based on prices in currency. If they had been expressed in terms of gold, the increase from 1860 to 1864 would have been very much smaller. The Government had issued a large volume of paper money (called greenbacks<sup>2</sup>) to finance the war. It remained in circulation during the postwar years and its value fluctuated according to prospects for its redemption, until specie payments were fully resumed in 1879. During the rest of the 19th century, there were a number of financial and monetary problems that continued to demand attention.

The 15 years from 1864 to 1879 were marked by contractions in business from time to time,<sup>3</sup> including the panic of 1873 and its protracted aftermath, but one of the outstanding characteristics of this period was the great expansion in many economic areas. The boom in railroad building just after the Civil War, particularly the completion of the transcontinental line in 1869, opened the western lands to settlement and cultivation. It also gave rise to much speculative activity in railroads and lands and what has modestly been called unsound railroad financing. The development and extensive use of many kinds of farm machinery added to the large agricultural production. Manufacturing industries were expanding with the opening of new markets and new sources of raw materials, and a change-over was gradually being made to mass production methods. A special report of the 10th Census<sup>4</sup> is an interesting one, by the way,

<sup>1</sup> The lower percentage is based on the inclusion of cotton at a reduced importance during the war while the higher percentage includes cotton near its prewar importance.

<sup>2</sup> See Wesley C. Mitchell's study "Gold, Prices and Wages under the Greenback Standard," University of California Publications in Economics, vol. 1, Mar. 27, 1908.

<sup>3</sup> The National Bureau of Economic Research (NBER) has identified three periods of contraction in its studies of business cycles: April 1865 to December 1867, June 1869 to December 1870, and October 1873 to March 1879 (see table 3).

<sup>4</sup> "Report on the Statistics of Wages in Manufacturing Industries," by Joseph D. Weeks, Census Office, Department of the Interior, Washington, 1886 (usually called the 'Weeks' Report').



in a study of this portion of the 19th century. It is full of references to the increased output per man that was possible with the introduction of new machinery and equipment. There were also a number of comments in this census report that indicate the resistance of some manufacturers to the use of the machinery and their evaluation of the poor quality of product that was produced. Others, of course, were very proud to indicate that the quality of their product had been materially increased.

In the 10-year period from 1869 to 1879, the increase in physical volume of total industrial production was almost 60 percent. But periods of optimistic business prospects alternated with dull trading and uncertainty.

The downward trend of prices that characterized the immediate post-Civil War period was interrupted occasionally, but the net effect for the 15 years was lower prices practically all across the board, with declines particularly sharp for some of the agricultural commodities and some metals and products of metals.

A temporary reversal of the downward price trend is apparent after 1879, and the index of wholesale prices increased about 18 percent from 1879 to 1882. A heavy export demand for American foodstuffs because of poor European harvests helped to restore activity in many lines and by 1881, manufacturers were fully employed, frequently with advance orders. There was a revived demand for iron and steel by the railroads. (I might interpolate here that I am sure the monetary economists would indicate that 1879 was also the resumption of specie payments. But as the export demand dwindled, reaction set in. The price decline that began after these 3 years did not really end until a few years before the close of the century. During these 15 years of a downward drift in prices, there were a few short periods of rising prices but each one of them averaged less than 5 percent increase. By 1896 and 1897, wholesale prices were about 25 percent below the pre-Civil War level (1850-59)—the same low point that was reached in the depression of the early 1840's. At no time during the 20th century have prices again reached this low point (so far as we can estimate from available data), despite the steep decline during the depression of the 1930's.

There were several periods of recovery of business and trade between the years 1882 and 1897 but they were relatively shortlived—usually a year and a half to 2 years.<sup>5</sup> Protective rates in tariff acts encouraged manufacturers in this country, but were a depressant to some European industries, particularly the woolen industries. There were land booms in the South and West before 1890 and real estate speculation was widespread. The protracted strain on currency and credit with the expansion of industry, agriculture, and commerce during this period has been advanced as one of the reasons for the panic of 1893,<sup>6</sup> which has been characterized as the worst business failure in our history.

But from that low point in 1897, the outlook was considerably brighter and the long pull out of the depression began. Good crops, large exports, stable money, and successes in the war with Spain re-

<sup>5</sup> NBER lists four periods business expansion: May 1885 to March 1887, April 1888 to July 1890, May 1891 to January 1893, and June 1894 to December 1895.

<sup>6</sup> See "History of Manufactures in the United States," by Victor S. Clark, McGraw-Hill Book Co., Inc., New York, 1929, vol. 2, p. 165.

stored confidence and stimulated business activity. The wholesale price trend was generally upward from the low point in 1896 and 1897 to 1914, the beginning of World War I. The only annual price decline of any magnitude during these 17 years was from 1910 to 1911, when livestock and some other farm products, particularly dairy products, registered a substantial drop and smaller declines occurred for most other commodity groups. The net increase for the 17 years from the bottom of the price curve up to 1914 was in the neighborhood of 45 percent, or about 2 $\frac{2}{3}$  percent per year.

During these years from 1897 to 1914, total industrial production doubled and per capita industrial production increased by almost 50 percent. However, the total duration of the five periods of business expansion<sup>7</sup> was only slightly greater than the total for the periods of contraction—109 months versus 101.

I would like to comment here very briefly on one of the deficiencies in the data on which these wholesale price measures are based. Finished goods were increasingly important after the Civil War, and became more so with greater use of electric power in the early 1900's. The indexes, however, are made up largely from prices of raw and semifinished goods, and have an insufficient representation of finished goods. The limited available price data for finished commodities—both producer and consumer—are not adequate to make even rough adjustments to the indexes for this 50- to 55-year period, but they do confirm the general direction of price changes. The actual degree of change, however, is somewhat uncertain. I have a feeling that if we could include for this period a better representation of prices of manufactured goods which typically show less price change than raw and semifinished goods, the index for the end of the 19th century might be slightly higher. However, the volume of goods produced was so great that I am really uncertain as to how much the index might be raised or whether it would in fact be raised at all. This deficiency in coverage is also present in the indexes through the 1920's, although to a diminishing extent.

The familiar pattern of price inflation and deflation again occurred as a consequence of World War I, but with a difference from the Civil War in that prices continued upward for about 2 years after actual fighting stopped. The total price increase from 1914 to 1920 amounted to 126 percent (that is contrasted with 120 percent during the Civil War) with about a quarter of this total increase from 1914 to 1916, about half during the 2 years the United States was an active participant, and about a quarter in the 2 years following the war.

The steep decline in wholesale prices (about 35 percent) in 1 year—from 1920 to 1921—was at a greater rate than at any time since the end of the Revolutionary War. The largest drop was for farm products and textiles—they dropped somewhere between 40 and 43 percent—although all major commodity groups were substantially lower in 1921. After a further small decline in 1922, prices fluctuated within a relatively narrow range for 7 years, with 1925 at the top of the narrow range and 1929 at the lower end.

<sup>7</sup> NBER identified the following periods of expansion: June 1897 to June 1899, December 1900 to September 1902, August 1904 to May 1907, June 1908 to January 1910, January 1912 to January 1913.

The 7 years from 1922 to 1929 saw further expansion in industrial production—an overall increase of more than 40 percent—though there were 2 years (1924 and 1927) when production fell off.

The 3-year precipitous drop from 1929 to the lowest point of the depression in 1932, brought wholesale prices down to about the 1911 level—from an index level of 154 in 1929 to 105 in 1932. Since then, the general trend of prices has been up. The two longest expansion periods in business cycle history (which is only available from 1854 to the present time), occurred since the depression of the early thirties (see table 3).

As the country pulled out of the depression, wholesale prices rose by about 33 percent in 5 years. The 50 months from March 1933 to May 1937 was next to the longest period of expansion in the 100-year period, so far as business cycles have been identified. From 1932 to 1937, the volume of industrial production jumped by more than 60 percent.

The recession in the latter part of the 1930's was accompanied by an 11 percent drop in wholesale prices over a 2-year period. When fighting again broke out in Europe in 1939, foreign war demands combined with a domestic national defense buildup marked the longest expansion period recorded—80 months—from June 1938 to February 1945. In the 2 years before Pearl Harbor, from 1939 to 1941, wholesale prices rose about 13 percent, another 13 percent during the first year of war, and then continued upward at a slower rate in the next 3 years when the stabilization program was in effect.

The steep postwar price rise was halted for 1 year—1949—then resumed for the 2 years in which there was fighting in Korea to a price level in 1951 more than double that of 1939 (130 percent increase). The dip from the high point in 1951 to 1953 was about 4 percent.

Prices then remained relatively stable for 2 years. In each year since 1955, the price level has averaged higher, rising at a rate of about 2.6 percent per year.

#### C. CONSUMER PRICES, 1800 TO 1958

I have reviewed the changes in wholesale prices in more detail than I would like to spend on consumer prices.

Generally, the estimates for consumer prices followed the ups and downs of the wholesale estimates—with some differences in the magnitude of the swings and in the timing of the turning points.

As a rule, retail prices of goods and services did not rise as much as wholesale prices of commodities nor did they fall as far. This is to be expected since commodities at retail usually fluctuate considerably less than at wholesale. Also indexes measuring changes in prices for the components of living costs typically include some of the "slow movers" not present in wholesale markets, like newspapers, medical fees, rents, and other elements not affected immediately by fluctuations in commodity prices at wholesale.

There are two marked exceptions to the generalization on price movements that are apparent on the chart. The first is the extent of the decline in retail prices after the War of 1812. The nature of the data we have used to estimate these early years may account in part for the different picture. But I am of the opinion that even

maximum allowances for inadequacies would not change the general relationship. Food is the most important element in living costs and there was a precipitous drop in food prices in the 2 years after 1814, due entirely to lower prices for imported foods. Domestic foods were increasing during these 2 years. (This is not the second exception, but I also would like to comment on the changes during the Civil War. We might find that the peak at retail should be somewhat higher if account could be taken of shortages and other wartime disruptions. But the data for this period were relatively good and it is doubtful whether improved price figures would raise the index at retail to any major extent.)

The second exception to the generalization is the period since World War II. Instead of prices falling after the immediate postwar flush of buying was over, both wholesale and retail prices have continued on a generally upward trend. The larger increase at retail than at wholesale has been due primarily to the increasingly important "services" component—that is, rents, medical care, haircuts, auto repairs, and the like. Such services, including rents, now account for about a third of family expenditures compared with about a fifth in 1875. Cost for rents and services, which lagged behind the increase for commodities during the war, went up 42 percent in the 10 years from 1948 to 1958, while commodities including food have shown a net increase of only 13 percent over the 10-year period.

I have included in the paper a number of figures showing the percent changes in retail prices and in wholesale prices for some of the long swings that I will not read here.

(The information follows:)

Percent changes for—

Period	Retail prices	Wholesale prices	Period	Retail prices	Wholesale prices
1800-03.....	-11	-9	1897-1920.....	+141	+231
1803-14.....	+39	+44	1920-33.....	-35	-57
1814-51.....	-61	-53	1933-48.....	+86	+144
1851-64.....	+91	+155	1948-58.....	+20	+14
1864-97.....	-47	-66			

Suffice to say from 1897 to 1958, that is from the low point to where we are at the present, wholesale prices went up a total of 93 percent and the consumer price index or retail prices went up 247 percent.

Although it would be of interest to indicate what effect changes in consumer prices had on the purchasing power of earnings, I did not have time to trace the history of wage changes for this long period of time. A few summary figures might be useful, however, to indicate the general status of the wage earner in this respect. In a study by the Twentieth Century Fund in 1953,<sup>8</sup> "real" hourly earnings were estimated to have increased about 55 percent from 1860 to 1890. In his notable work on real wages, Senator Douglas, the chairman of this committee, estimated a slight decline for real weekly earnings (full time) in manufacturing from 1890 to 1914, but an increase of more than 7 percent in building trade.<sup>9</sup> (Yesterday, Dr. Fabricant quoted

<sup>8</sup> "Employment and Wages in the United States," by W. S. Woytinsky and associates, Twentieth Century Fund, New York, 1953, p. 47 and 51.

<sup>9</sup> "Real Wages in the United States, 1890 to 1926," by Paul H. Douglas, Houghton Mifflin Co., Boston and New York, 1930, p. 180 and 187.

some figures from a study of real wages using data that was not available to Senator Douglas at the time he made his study. Dr. Fabricant indicated there was an increase of 8 percent in real hourly wages. I do not know what the figure would be for weekly earnings because the number of hours would have to be taken into account.)

An overall estimated increase of 100 percent in real weekly earnings in manufacturing between 1890 and 1947 is included in the 20th Century Fund study, although there were some periods of significant declines. Since 1947, the BLS has estimated a net increase of about 30 percent in real weekly earnings in manufacturing.

#### D. SOURCE MATERIALS

I would like to make some comments with regard to the source materials.

The wholesale price index from 1860 to 1958 was estimated by splicing several separate indexes. For 1860 to 1890, we combined two indexes, one for New York and one for Philadelphia. For 1890 to 1958, we tied to that combination the wholesale price index of the Bureau of Labor Statistics.

The Consumer Price Index is also made up by splicing a series of indexes for shorter periods. Prior to this time, most estimates of cost of living or retail prices before 1860 have been made from changes in wholesale prices. This is the first index which utilizes the study made by Dr. Adams of the Vermont Agricultural Experiment Station. His Vermont index, which we used to estimate 1800 to 1851, is an index of prices paid by Vermont farmers for goods and services purchased for family living. It is the only index that I know of for this period that has included some of the services, like repairs of shoes and making of shoes, and medical care costs. I am convinced that despite its geographical limitations, it is a pretty good indicator of what happened to retail prices in this period.

From 1851 to 1890, we used a Consumer Price Index that I compiled for the Conference on Research in Income and Wealth (conducted by the National Bureau of Economic Research in 1957). From 1890 to 1913, we used the cost of living index compiled by Albert Rees. The figures that were available to me were preliminary figures included in an annual report of the National Bureau. This is subject to some minor corrections when Mr. Rees' study is published in final form. From 1913 to 1958, I used the Bureau of Labor Statistics Consumer Price Index.

I have not included at this time a description of each of these separate indexes and the derivations of the two long-time series. I will include these in technical appendixes which I will submit. I would like, however, to make a few general comments on the measurements.

The one characteristic that all of the indexes have in common—both the wholesale and consumer price (or cost of living) indexes—is that they were designed to measure only price changes, insofar as it was possible to do so from the available data. That is, they were all calculated with fixed weights and a constant list of items so that only price changes would influence the movement of the indexes.

But there was considerable variation in the methods used to measure the price changes, that is, before the separate items we put together to make an index. In the New York wholesale price index, when

the description of a commodity was materially changed or when new commodities were introduced, the new item was linked into the index, so that the difference in price level between the old and new commodity was not reflected as a price change. In the Philadelphia wholesale price index, adjustments for changes in description were not made, so far as I could determine. The BLS indexes for the earlier years employed the linking procedure, that is, not allowing the change in description to influence the price change. But since 1945, we have introduced some refinements in measurement that have attempted to separate the value of quality differences from the amount of price change so that we can divide the total differential into that portion which is a quality valuation and that portion which is the actual price change.

Similar differences in the measurement of individual price changes were also present in the retail indexes. For Vermont, the sparsity of of description did not allow for any attempts to compare prices for the same quality, and for the index which I estimated the quality descriptions were very general. Although I discarded some data that were obviously not comparable, for the most part, there was no control on the quality comparisons. I am under the impression from conversations with Mr. Rees, that he used the linking procedure for clothing and housefurnishings. In other components of his index, it is probable that strict quality comparisons were not possible. The BLS index from 1913 to 1934 was based on prices for the volume seller within a general description. Linking was used when the description changed. In 1935, we introduced more elaborate specifications so that we had a greater knowledge of the quality of the goods on which prices were reported, but we did not have the facilities or the know-how, perhaps, for handling these changes. The linking procedure was generally used until around 1942 when the same refinements as I mentioned for wholesale were introduced into the consumer price index.

I have detailed the price comparison procedure for the different indexes because of the effect on the overall price measurement. The linking procedure has a tendency to dampen the measurement of price changes. It is very usual for manufacturers and retailers to change prices at the same time they introduce a new quality, and the price change is not reflected when linking is used because the assumption is made that the full difference in price is due to the quality difference.

On the other hand, the lack of control of quality in making price comparisons can result in a price change in an index when, in fact, the price difference may be due entirely to quality difference. Also, price change can be exaggerated, as during wartime shortages of low-end goods. When prices are declining, quality is frequently improved, so that lack of control on quality can mean that the indexes understate the extent of the decline.

In all the indexes, the coverage of items is fairly good with the exception of inadequate representation of finished goods in earlier years which I mentioned before. The sampling of commodities, of course, for the non-BLS indexes and for the early BLS figures, depend to a large extent on the availability of prices, since they were all derived from research in records that had survived. Agricultural products are always well represented at wholesale. Other raw ma-

terials and semi-processed goods are also well covered. In the consumer price indexes, the coverage is considerably sparser, but except for the period from 1880 to 1890, the research that was done permitted fair representation in most categories of living costs.

I have included for the record the number of commodities in each of these separate index segments.

(The information follows:)

#### WHOLESALE PRICE INDEX

New York: 135 in 1860 to 146 in later years.

Philadelphia: 251 (416 commodities or grades).

BLS: 251 in 1890, about 950 in 1952 to approximately 1,800 at present.

#### CONSUMER PRICE INDEXES

Vermont farmers: 25 commodities and services in 1800 to 33 in later years.

Hoover index: 1851 to 1880, 66 commodities and services. Indexes from 1880 to 1890 are rough estimates.

Rees index: Details not published.

BLS: Approximately 150 commodities and services in 1913 to about 300 in 1958.

There are other differences that impose limitations on these indexes. Among the more obvious ones are, the uncertainty as to the similarity of price changes for Vermont farmers and the rest of the Nation, splicing consumer price indexes that represent very different ways of living, making comparisons in wholesale prices over periods when the United States ranged from an agricultural economy to an industrial one, and other limitations that are inherent in long-term comparisons.

But the two historical indexes allow for approximations of price changes for longer periods of time than are possible from any one of the separate indexes. It would be easy to pick flaws in them from a technical point of view, but an enumeration of their shortcomings would, I think, give the wrong impression of their validity. The timing and the direction of price trends, and to a lesser extent the amount of price change, were generally consistent among the indexes used for estimation (when more than one index was available) and also were in substantial agreement with nonstatistical accounts of the times.

(The material referred to by Mr. Taylor and Mrs. Hoover follows:)

TABLE 1.—Indexes of wholesale prices estimated for the United States, 1720–1958, and for 5 important markets, 1720–1890—Preliminary

[1850–59=100]

Year	United States <sup>1</sup>	New York <sup>2</sup>	Philadel- phia	Cincin- nati	Charles- ton, S. C.	New Orleans
1720	58.6		54.4			
1721	53.4		49.6			
1722	55.5		51.5			
1723	57.3		53.2			
1724	60.4		56.1			
1725	65.7		61.0			
1726	68.7		63.8			
1727	66.3		61.6			
1728	63.1		58.6			
1729	62.9		58.4			
1730	66.6		61.9			
1731	59.2		55.0			
1732	58.0		53.8		68.9	
1733	59.7		56.0		68.9	
1734	67.0		57.6		93.4	
1735	66.3		57.6		91.2	
1736	62.6		55.1		83.4	
1737	69.3		57.7		102.3	
1738	69.4		57.6		102.9	
1739	59.6		54.8		72.3	
1740	59.6		56.7		66.7	
1741	73.6		69.4		84.5	
1742	69.7		67.8		78.4	
1743	59.7		59.0		60.0	
1744	57.1		57.1		55.6	
1745	63.7		57.8		40.0	
1746	55.0		59.8		38.9	
1747	65.6		66.9		60.0	
1748	74.3		78.2		75.6	
1749	76.1	69.8	73.0		83.4	
1750	73.9	61.6	72.7		86.7	
1751	72.0	66.7	72.6		72.3	
1752	75.6	67.7	72.8		84.5	
1753	78.2	66.7	71.8		97.8	
1754	71.4	66.7	69.8		74.5	
1755	71.2	67.7	68.3		74.5	
1756	69.5	67.7	69.0		66.7	
1757	69.6	66.7	69.5		67.8	
1758	73.9	71.8	71.4		74.5	
1759	85.8	81.1	78.4		96.7	
1760	81.5	81.1	78.4		80.0	
1761	77.5	79.0	77.3		68.9	
1762	83.4	89.8	84.2		66.7	
1763	83.5	81.1	83.2		80.0	
1764	77.2	75.9	75.8		74.5	
1765	76.7	73.9	75.7		75.6	
1766	81.7	74.9	80.2		86.7	
1767	81.7	79.0	79.3		82.3	
1768	80.7	75.9	75.4		88.9	
1769	81.2	79.0	73.2		90.0	
1770	80.0	79.0	76.5		80.0	
1771	84.9	81.1	78.4		93.4	
1772	98.2	91.3	85.9		118.9	
1773	90.9	86.2	83.7		101.2	
1774	84.3	78.0	81.7		90.0	
1775	78.0	76.9	75.8			
1776	108.0	88.2	105.1			
1777	329.6	126.2	320.1			
1778	598.1	143.6	590.6			
1779	2,969.1	231.9	2,878.9			
1780	10,544.1	230.8	10,221.5			
1781	5,085.8	221.6	4,931.0			
1782	139.6		136.9			
1783	119.1		117.2			
1784	112.7	100.5	111.3		122.3	
1785	105.0	94.4	104.6		111.2	
1786	105.1	92.3	101.2		120.1	
1787	103.9	92.3	98.3		120.1	
1788	97.4	89.3	92.6		107.8	
1789	94.0	88.2	91.6		97.8	
1790	99.9	92.3	96.2		107.8	
1791	98.1	87.2	99.7		102.3	
1792	101.3	92.3	101.7		104.4	
1793	109.3	104.6	107.1		110.0	
1794	121.7	110.8	121.9		128.9	

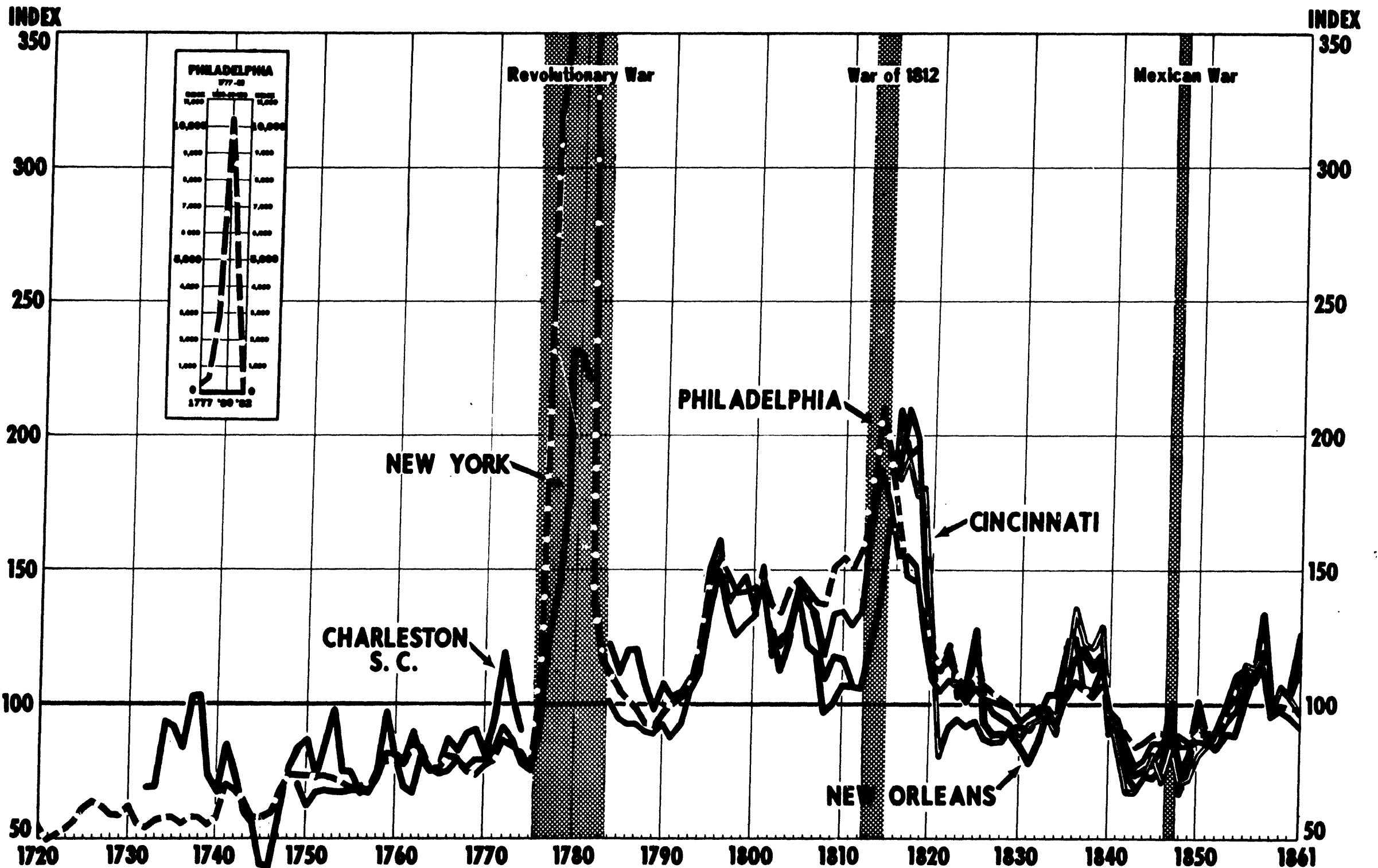
See footnotes at end of table, p. 397.



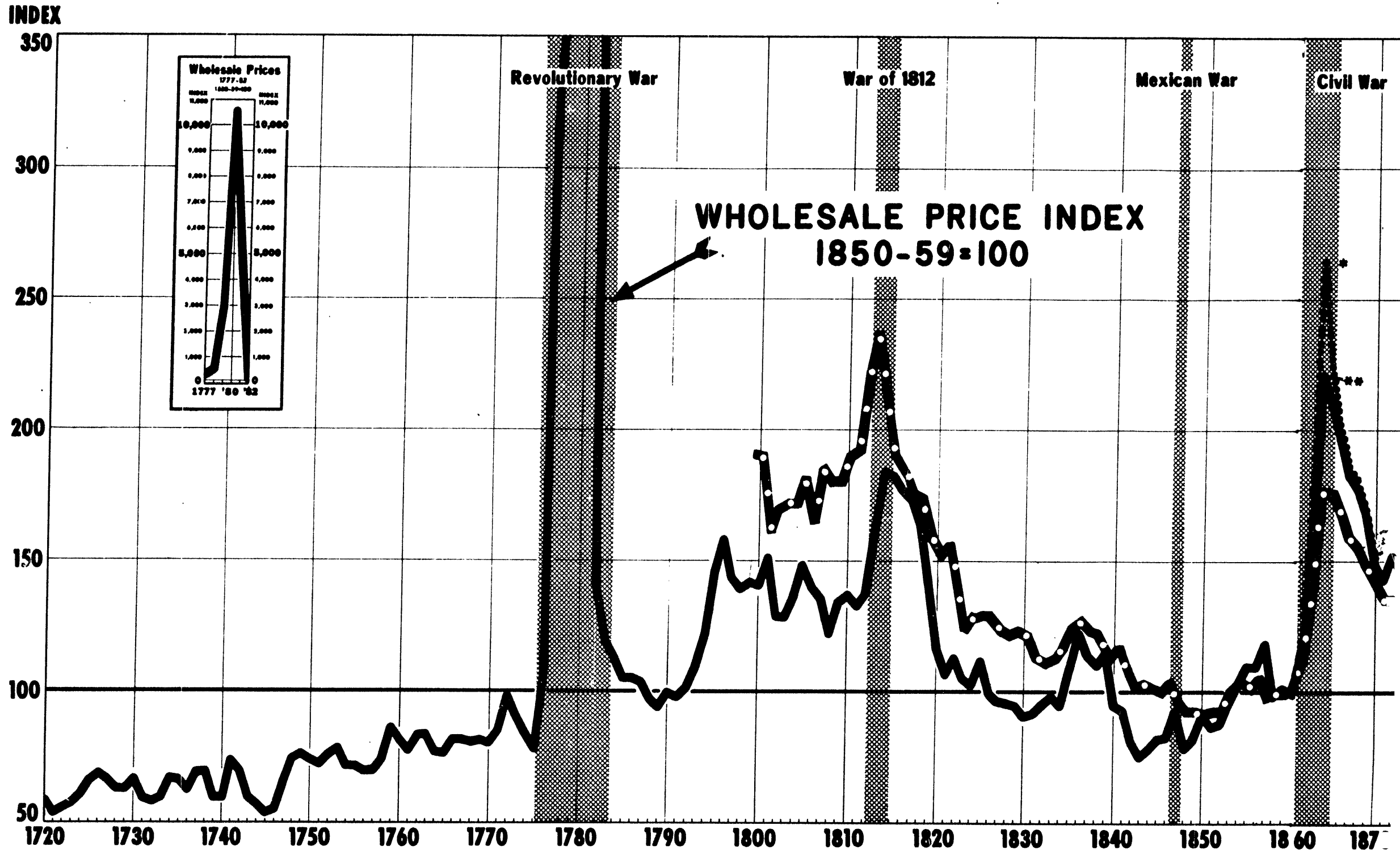


# WHOLESALE PRICES IN 5 U.S. MARKETS, 1720-1861

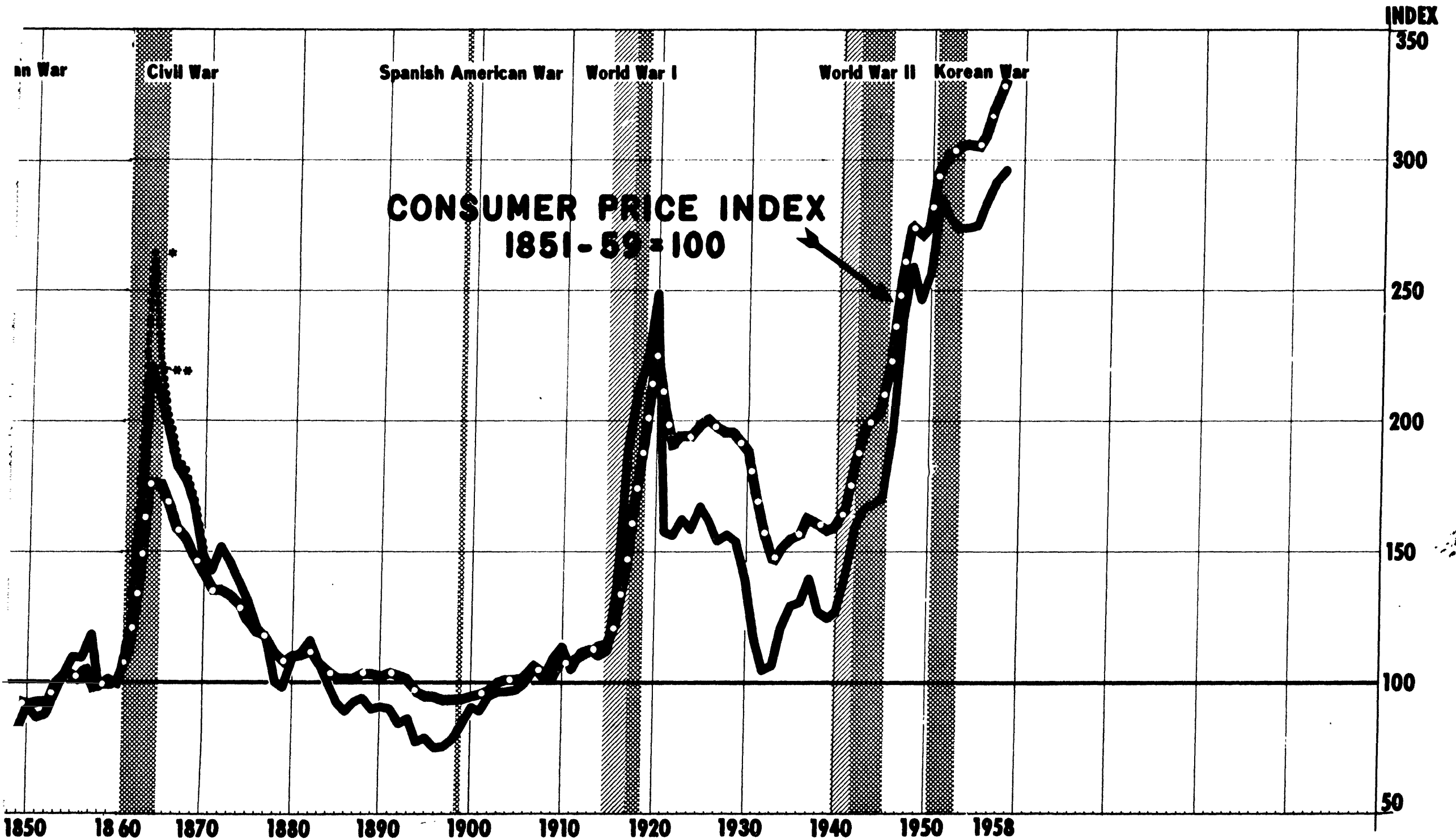
1850-59=100



# WHOLESALE PRICE INDEX, 1720-1958 AND



# 8 AND CONSUMER PRICE INDEX, 1800-1958



\* Higher index Cotton at prewar importance.  
 \*\* Lower index Cotton reduced in importance.



TABLE 1.—Indexes of wholesale prices estimated for the United States, 1720-1958, and for 5 important markets, 1720-1890—Preliminary—Continued

[1850-59=100]

Year	United States <sup>1</sup>	New York <sup>1</sup>	Philadel- phia	Cincin- nati	Charles- ton, S.O.	New Orleans
1795	146.2	134.4	145.8		151.3	
1796	158.0	149.8	154.7		161.2	
1797	143.4	134.4	148.4		155.6	
1798	139.2	125.2	141.8		143.4	
1799	141.9	129.3	141.5		147.8	
1800	140.6	132.8	142.7		136.7	135.1
1801	151.1	145.7	152.4		151.2	142.9
1802	128.8	120.0	136.2		117.8	137.3
1803	128.3	121.1	135.6		124.5	112.6
1804	136.0	129.3	142.4		126.7	123.3
1805	148.4	144.7	146.2		140.1	143.9
1806	139.8	137.5	142.4		121.2	139.0
1807	135.3	133.4	137.5		118.9	130.2
1808	122.0	118.0	136.9		96.7	109.6
1809	134.2	133.4	130.8		100.0	117.5
1810	136.9	134.4	154.2		106.7	116.5
1811	132.7	129.3	150.4		106.7	107.7
1812	136.9	134.4	158.2		105.6	106.7
1813	161.3	166.2	179.0		121.2	122.4
1814	184.4	186.7	210.9		136.7	138.0
1815	182.5	174.4	192.5		165.6	166.4
1816	176.9	154.9	168.9	183.1	191.2	209.5
1917	172.9	154.9	147.4	191.5	210.1	192.8
1818	168.6	150.8	145.2	177.5	199.0	195.8
1819	141.2	128.2	132.8	180.3	147.8	147.8
1820	116.5	108.8	118.5	130.8	122.3	116.5
1821	106.7	104.6	118.4	80.3	112.3	112.6
1822	112.7	108.8	115.9	91.5	120.1	121.4
1823	105.2	105.7	109.6	94.3	108.9	102.8
1824	102.4	100.5	104.8	91.5	103.4	107.7
1825	111.9	105.7	109.5	93.4	121.2	127.3
1826	99.5	101.6	106.6	86.9	102.3	93.0
1827	96.5	100.5	103.4	85.0	96.7	88.1
1828	95.6	99.5	101.2	85.9	94.5	89.1
1829	94.7	98.5	96.7	91.5	91.2	88.1
1830	90.6	93.4	93.4	86.9	91.2	84.2
1831	91.7	96.4	97.5	92.5	90.0	78.3
1832	95.0	97.5	99.3	94.3	95.6	86.1
1833	98.1	97.5	98.0	95.3	103.4	96.9
1834	94.6	92.3	95.4	88.7	103.4	94.0
1835	109.1	102.6	100.8	109.3	120.1	120.4
1836	122.2	117.0	108.5	135.4	134.5	129.2
1837	113.9	118.0	106.0	122.3	120.1	105.7
1839	110.1	112.9	102.2	120.5	114.5	104.7
1839	115.0	114.9	106.6	128.9	118.9	113.5
1840	94.9	97.5	97.2	97.1	92.3	89.1
1841	92.7	94.4	94.7	83.1	94.5	91.0
1842	80.8	84.1	87.9	67.2	82.3	73.4
1843	75.1	76.9	83.8	67.2	73.4	68.6
1844	78.0	79.0	85.5	71.9	75.6	73.4
1845	81.8	85.2	88.6	81.3	77.8	72.4
1846	82.5	85.2	89.1	71.0	83.4	76.4
1847	92.5	92.3	92.8	84.1	100.0	91.0
1848	78.4	84.1	87.3	70.0	74.5	66.6
1849	81.5	84.1	85.1	71.9	81.1	78.3
1850	90.6	86.2	88.8	80.3	96.7	100.8
1851	88.5	85.2	89.3	84.1	86.7	87.1
1852	87.6	90.3	89.4	86.9	85.6	83.2
1853	95.9	99.5	97.5	97.1	93.4	89.1
1854	102.7	110.8	106.5	102.7	97.8	88.1
1855	109.6	112.9	110.4	114.9	108.9	100.8
1856	109.5	107.7	110.2	113.0	107.8	111.6
1857	118.5	113.9	112.2	119.5	117.8	133.1
1858	98.2	95.4	99.7	95.3	100.0	101.8
1859	101.3	97.5	99.4	106.5	104.5	104.7
1860	99.6	95.4	98.7	102.7	104.5	102.8
1861	102.9	91.3	96.1	96.2	125.6	114.6
1862	119.5	108.7	131.9			
1863	152.3	136.5	190.6			
1864	220.9	198.0	288.4			
1865	210.9	189.8	228.0			
1866	197.4	178.5	198.2			
1867	182.7	166.2	176.0	186.1		
1868	177.3	162.1	170.4			
1869	168.4	154.9	156.1			
1870	149.1	138.5	134.7			
1871	142.5	133.4	128.8			
1872	151.6	139.5	139.8			

See footnotes at end of table, p. 897.

TABLE 1.—Indexes of wholesale prices estimated for the United States, 1720-1958, and for 5 important markets, 1720-1890—Preliminary—Continued

[1850-59=100]

Year	United States <sup>1</sup>	New York <sup>2</sup>	Philadel- phia	Cincin- nati	Charles- ton, S.C.	New Orleans
1873.....	145.8	136.5	131.7			
1874.....	138.0	129.3	124.5			
1875.....	130.6	121.1	119.1	* 132.8		
1876.....	120.3	112.9	108.5			
1877.....	117.2	108.8	106.9			
1878.....	100.0	93.4	90.6			
1879.....	98.3	92.3	88.5			
1880.....	109.6	102.0	99.1	* 109.8		
1881.....	111.6	105.7	99.4			
1882.....	116.3	110.8	103.1			
1883.....	107.6	103.6	94.3			
1884.....	99.9	95.4	88.5			
1885.....	92.2	87.2	82.4	* 95.2		
1886.....	88.8	84.1	79.3			
1887.....	92.4	87.2	82.7			
1888.....	94.2	88.2	85.1			
1889.....	89.9	83.1	82.4			
1890.....	90.8	84.1	82.8	* 94.3		
1891.....	90.1					
1892.....	84.3					
1893.....	86.2					
1894.....	77.4					
1895.....	78.8					
1896.....	75.1					
1897.....	75.3					
1898.....	78.3					
1899.....	84.3					
1900.....	90.6					
1901.....	89.3					
1902.....	95.1					
1903.....	96.2					
1904.....	96.4					
1905.....	97.1					
1906.....	99.8					
1907.....	105.3					
1908.....	101.6					
1909.....	109.2					
1910.....	113.7					
1911.....	104.8					
1912.....	111.6					
1913.....	112.7					
1914.....	110.0					
1915.....	112.2					
1916.....	138.1					
1917.....	139.8					
1918.....	212.0					
1919.....	223.8					
1920.....	249.3					
1921.....	157.6					
1922.....	156.2					
1923.....	162.5					
1924.....	158.4					
1925.....	167.1					
1926.....	161.5					
1927.....	154.1					
1928.....	156.2					
1929.....	153.9					
1930.....	139.5					
1931.....	117.9					
1932.....	104.6					
1933.....	106.4					
1934.....	121.0					
1935.....	129.2					
1936.....	130.5					
1937.....	139.4					
1938.....	126.9					
1939.....	124.5					
1940.....	126.9					
1941.....	141.0					
1942.....	159.6					
1943.....	166.5					
1944.....	167.9					
1945.....	170.9					
1946.....	195.6					
1947.....	239.5					
1948.....	259.4					
1949.....	246.5					
1950.....	256.2					

See footnotes at end of table, p. 397.

TABLE 1.—Indexes of wholesale prices estimated for the United States, 1720-1958, and for 5 important markets, 1720-1890—Preliminary—Continued

[1850-59=100]

Year	United States <sup>1</sup>	New York <sup>2</sup>	Philadel- phia	Cincin- nati	Charles- ton, S.O.	New Orleans
1951.....	285.3					
1952.....	277.3					
1953.....	273.6					
1954.....	274.1					
1955.....	275.1					
1956.....	284.0					
1957.....	292.2					
1958.....	296.2					

<sup>1</sup> Estimated from individual city wholesale price indexes from 1720 to 1890 and from BLS data from 1890 to 1958. For complete description see discussion in appendix A.

<sup>2</sup> Includes some quotations in other markets after 1860.

<sup>3</sup> Includes estimates for July to December derived by straight line interpolation.

<sup>4</sup> Estimated from Philadelphia.

<sup>5</sup> 8 months average (May-December).

<sup>6</sup> Estimated from Charleston.

<sup>7</sup> Estimated from changes in New York (adjusted for small difference in 1871). The New York indexes were calculated with a reduced weight for cotton during this period of extremely short supply. The Philadelphia indexes were calculated with the full weight for cotton. If the United States were estimated from a combination of New York and Philadelphia, the figures would be as follows:

Year:	Index	Year:	Index
1862.....	129.7	1867.....	183.0
1863.....	177.7	1868.....	180.7
1864.....	261.4	1869.....	169.0
1865.....	224.4	1870.....	148.6
1866.....	202.0		

<sup>8</sup> Estimated using percentage changes from 1861 as shown by Cincinnati wholesale price index in wholesale prices at Cincinnati and New York, by Henry E. White, Cornell University Agricultural Experiment Station, Ithaca, N.Y., October 1935, Memoir 182, pp. 14-22.

TABLE 2.—CONSUMER PRICE INDEX, 1800-1958—Preliminary

[1851-59=100]

Year:	Index	Year:	Index	Year:	Index
1800.....	101	1830.....	124	1860.....	101
1801.....	190	1831.....	122	1861.....	102
1802.....	162	1832.....	115	1862.....	114
1803.....	170	1833.....	113	1863.....	141
1804.....	172	1834.....	114	1864.....	178
1805.....	172	1835.....	118	1865.....	177
1806.....	181	1836.....	125	1866.....	169
1807.....	106	1837.....	128	1867.....	159
1808.....	184	1838.....	124	1868.....	156
1809.....	180	1839.....	123	1869.....	149
1810.....	180	1840.....	115	1870.....	143
1811.....	190	1841.....	118	1871.....	137
1812.....	193	1842.....	112	1872.....	137
1813.....	222	1843.....	103	1873.....	135
1814.....	237	1844.....	104	1874.....	131
1815.....	122	1845.....	103	1875.....	125
1816.....	191	1846.....	102	1876.....	120
1817.....	184	1847.....	105	1877.....	119
1818.....	176	1848.....	98	1878.....	112
1819.....	174	1849.....	94	1879.....	109
1820.....	160	1850.....	94	1880.....	111
1821.....	153	1851.....	93	1881.....	112
1822.....	156	1852.....	94	1882.....	113
1823.....	139	1853.....	94	1883.....	108
1824.....	126	1854.....	102	1884.....	105
1825.....	129	1855.....	105	1885.....	103
1826.....	130	1856.....	103	1886.....	103
1827.....	130	1857.....	106	1887.....	103
1828.....	125	1858.....	100	1888.....	105
1829.....	123	1859.....	101	1889.....	105



TABLE 2.—CONSUMER PRICE INDEX, 1800-1958—Preliminary—Continued

(1861-59=100)

Year:	Index	Year:	Index	Year:	Index
1890	104	1918	118	1936	158
1891	105	1914	115	1937	164
1892	104	1915	116	1938	161
1893	103	1916	124	1939	159
1894	98	1917	146	1940	160
1895	96	1918	172	1941	168
1896	96	1919	198	1942	186
1897	95	1920	229	1943	198
1898	95	1921	204	1944	201
1899	95	1922	191	1945	205
1900	96	1923	195	1946	223
1901	97	1924	195	1947	255
1902	98	1925	200	1948	275
1903	101	1926	202	1949	272
1904	102	1927	198	1950	275
1905	102	1928	196	1951	297
1906	103	1929	196	1952	303
1907	107	1930	191	1953	306
1908	105	1931	174	1954	307
1909	104	1932	156	1955	306
1910	109	1933	148	1956	310
1911	109	1934	153	1957	321
1912	111	1935	157	1958	330

Source: Estimated by splicing the following series: "1800-1851—Index of Prices Paid by Vermont Farmers for Family Living"; "1951 to 1890—Consumer Price Index," by Ethel D. Hoover; "1890 to 1913—Cost of Living Index," by Albert Rees; "1913 to 1958—BLS Consumer Price Index." For derivation, see app. B.

TABLE 3.—Tentative reference dates of business cycles in the United States

BY MONTHS

Initial trough	Peak	Terminal trough	Expansion (months)	Contraction (months)	Total (months)
December 1854	June 1857	December 1858	30	18	48
December 1858	October 1860	June 1861	22	8	30
June 1861	April 1865	December 1867	46	32	78
December 1867	June 1869	December 1870	18	18	36
December 1870	October 1873	March 1879	34	65	99
March 1879	March 1882	May 1885	36	38	74
May 1885	March 1887	April 1888	22	13	35
April 1888	July 1890	May 1891	27	10	37
May 1891	January 1893	June 1894	20	17	37
June 1894	December 1895	June 1897	18	18	36
June 1897	June 1899	December 1900	24	18	42
December 1900	September 1902	August 1904	21	23	44
August 1904	May 1907	June 1908	33	13	46
June 1908	January 1910	January 1912	19	24	43
January 1912	January 1913	December 1914	12	23	35
December 1914	August 1918	March 1919	44	7	51
March 1919	January 1920	July 1921	10	18	28
July 1921	May 1923	July 1924	22	14	36
July 1924	October 1926	November 1927	27	13	40
November 1927	August 1929	March 1933	21	43	64
March 1933	May 1937	June 1938	50	13	63
June 1938	February 1945	October 1945	80	8	88
October 1945	November 1948	October 1949	37	11	48
October 1949	July 1953	August 1954	45	13	58
August 1954	July 1957	April 1958	35	9	44
April 1958					

## BY CALENDAR YEARS

Initial trough:	Peak:	Terminal trough:
1855	1856	1858
1858	1860	1861
1861	1864	1867
1867	1869	1870
1870	1873	1878
1878	1882	1885
1885	1887	1888
1888	1890	1891
1891	1892	1894
1894	1896	1896
1896	1899	1900
1900	1903	1904
1904	1907	1908
1908	1910	1911
1911	1913	1914
1914	1918	1919
1919	1920	1921
1921	1923	1924
1924	1926	1927
1927	1929	1932
1932	1937	1938
1938	1944	1946
1946	1948	1949
1949	1953	1954
1954	1957	1958

Sources 1854-1918 Wesley C. Mitchell, "What Happens During Business Cycles," National Bureau of Economics Research, Studies in Business Cycles, No. 5, 1951, p. 12.

1919-57 Geoffrey H. Moore, "Measuring Recessions," National Bureau of Economic Research, 1958, pp. 260, 261.

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#### APPENDIX A. DERIVATION OF WHOLESALE PRICE INDEX FOR THE UNITED STATES, 1720 TO 1958

The wholesale price index for the United States from 1720 to 1958 prepared for the Joint Economic Committee was obtained by combining and splicing index numbers constructed by various investigators for different markets to approximate a continuous series. The annual indexes were calculated by working forward and backward from the selected base period, 1850-59. No adjustments were made to the original series for differences in coverage or in methods of calculation. However, when wholesale prices in two or more markets were combined, the necessary conversions to a common base period were made, and occasional estimates as noted in table 1 were used.

From 1861 back to 1720, weighted combinations were made of the available index series for five major markets, except for the years before 1732 and the Revolutionary War years. For these periods, the estimates were based on Philadelphia prices only. The weights used to combine markets were rough approximations, based chiefly on estimates of the population and trade for each area and on the representative character and adequacy of the available indexes. From 1861 to 1890, wholesale price indexes for two markets, New York and Philadelphia, were combined with equal weights. Changes in prices as shown by the BLS wholesale price index were used to bring the estimates forward from 1890 to 1958.

The list of index series and sources for each market, with a brief description for each, follows:

##### A. Philadelphia

1720-31. Unweighted arithmetic averages of relatives of prices for 12 commodities, from Wholesale Prices in Philadelphia 1784-1861 by Anne Bezanson, Robert D. Gray, and Miriam Hussey (University of Pennsylvania Press, Philadelphia, 1936, p. 396).

1731-74. Unweighted geometric averages of relative of prices for 20 commodities, from same source as above, page 396.

1774-84. Weighted arithmetic averages of price relatives for 15 commodities from Prices and Inflation During the American Revolution, Pennsylvania, 1770-90 by Anne Bezanson and associates (University of Pennsylvania Press, Philadelphia, 1951, p. 344). The weights were developed on the basis of exports, Army ration standard, and Army supplies.

1784-1861. Unweighted geometric averages of price relatives for 140 commodities, from same source as 1720-31, page 302.

1861-90. Weighted arithmetic averages of price relatives for 251 commodities, from Wholesale Price Indexes for Philadelphia, 1852-90: Annual Summary and Group Totals (BLS, August 1958).

#### *B. New York*

1740-74 and 1784-1800. Weighted arithmetic averages of price relatives for 15-19 commodities (mostly farm products and foods) from 1740 to 1787, 71 commodities from 1787 to 1800 and for 110-140 commodities from 1800 to 1800. Weighting factors were developed from censuses, imports, and exports and other official figures and were varied over the years.

The indexes were taken from Wholesale Prices for 213 years, 1720 to 1932, by G. F. Warren and F. A. Pearson (Cornell University Experiment Station, Memoir 142, November 1932, pp. 7-9).

#### *C. Charleston, S.C.*

1732-74 and 1784-1861. Weighted arithmetic averages of price relatives for varying number of commodities from 6 in the early years to 32 in later years. Indexes were constructed by George R. Taylor for eight separate time periods with weights for each period representing approximate importance of commodities in South Carolina commerce. An all commodities index for the full period was obtained by splicing indexes for the eight separate periods.

The indexes were taken from Wholesale Commodity Prices in the United States 1700-1861 by Arthur H. Cole (Harvard University Press, 1938, p. 155-157).

#### *D. New Orleans*

1800-61. Weighted arithmetic averages of price relatives for varying number of commodities from 8 in early years to 49 in later years. Indexes were constructed by George R. Taylor for four separate time periods with weights for each period represent the importance of commodities in New Orleans trade. Indexes for the four time periods were spliced to obtain a continuous series.

The source of the figures is the same as for Charleston, pages 178-179.

#### *E. Cincinnati*

1816-61. Weighted arithmetic averages of price relatives for commodities varying in number from 18 in 1816 to 50 in later years. The indexes were constructed by Thomas S. Berry for three separate time periods, which were spliced to obtain a continuous series. Weighting factors were based on receipts at New Orleans before 1825 and on receipts at Cincinnati thereafter.

The source is the same as for Charleston, page 185.

#### *F. BLS Wholesale Price Index*

1890-1958. Descriptions of the BLS wholesale price index may be found in various BLS publications, including Bulletin 1168, "Techniques of Preparing Major BLS Statistical Series," chapter 10, and Bulletin 493, "Wholesale Prices 1913 to 1928," pages 2-6 and 237.

### APPENDIX B. DERIVATION OF CONSUMER PRICE INDEX ESTIMATES, 1800 TO 1958

The Consumer Price Index for 1800 to 1958 prepared for the Joint Economic Committee to show changes in retail prices of goods and services purchased by families, was obtained by splicing together index series from several sources. The list of series, with a brief description for each, follows:

#### *A. 1800 to 1851*

(Index numbers of the retail prices of commodities and services purchased by Vermont farmers for family living, from the study "Prices Paid by Vermont Farmers for Goods and Services and Received by Them for Farm Products, 1790-1940; Wages of Vermont Farm Labor, 1780-1940", by T. M. Adams. (Bull. 507, Vermont Agricultural Experiment Station, Burlington, Vt., February 1944).)

These Vermont indexes are unique for this period in that they are the only indexes available that are based on retail prices. Other estimates of cost of living changes prior to the Civil War were derived almost wholly from wholesale prices. The timing and amplitude of price changes in Vermont may differ to some extent from a more comprehensive (but unavailable) index for the more heavily populated areas along the eastern seaboard and the geographical limitation is thus a disadvantage. Although price changes in Vermont could be expected to conform more closely with those in other parts of the country after

1850 because of improved transportation and communications, the similarity of the Vermont index with other estimates for later years was so striking that it was felt the Vermont data could be used as a reasonable estimate of changes in consumer prices for this early period.

The commodity coverage embraced most categories of family spending. In addition to the important food and clothing groups, housing costs were represented by prices for building materials, and costs of services such as physician's fees and shoe repairs, were also included. The number of commodities and services included in the indexes varied from 25 in 1805 to 33 in 1845. Prices were obtained from sales records of stores, from farm account books and diaries furnished by more than 800 Vermont residents, as well as from other records. All averages were composites of the various grades and qualities bought in a particular year, so that changes over the years are a mixture of price change and quality change.

The index was completed as a weighted average of relatives using weighting factors representing the importance of groups and items in farm family living as estimated from the value of sales of general stores and other records for services.

### B. 1851 to 1890

(Consumer Price Index, 1851 to 1890, compiled by Ethel D. Hoover for the 1957 conference on research in income and wealth. This index will be included in "Trends in the American Economy in the 19th Century, Studies in Income and Wealth," vol. 24, to be published by Princeton University Press for the National Bureau of Economic Research.)

The indexes from 1851 to 1880 were based on retail prices for 58 commodities published in a special report of the 1880 census<sup>1</sup> supplemented by data for 8 additional commodities and services from other sources. The distribution of items included in the index for these years were: food 40; clothing 12 (primarily yard goods, boots, and shoe repairs); rent 2; fuel and light 5; and "other" 7 (medical care, newspapers, soap, and starch). The index was computed as a weighted average of price relatives, using as weights the distribution of major groups of family expenditures in 1875 (as estimated from Massachusetts studies), and the distribution of items within groups from the 1890-91 studies made for the Senate Committee on Finance (published in "Retail Prices and Wages," July 19, 1892, 52d Cong., 1st sess., Rept. 806).

The figures used for the 10 years from 1180 to 1890 are less reliable than those for the preceding 30 years since there was very little information on retail prices for these years. Segments of three different indexes were combined with weights based on the 1890-91 expenditure study. An index of retail prices for 10 foods compiled by W. Randolph Burgess for his study of "Trends of School Costs"<sup>2</sup> was used to represent the food component. Clothing price changes were estimated from the index of wholesale prices weighted by family expenditure derived by Roland P. Falkner for the Senate Committee on Finance, and rents were estimated from an index included in "Business Cycles and Business Measurements," by Carl Snyder.<sup>3</sup>

### C. 1890-1918

("Cost of Living Index 1890-1914," constructed by Albert Rees. Preliminary figures were obtained from the 38th Annual Report of the National Bureau of Economic Research, Inc. (p. 59).)

These index numbers were based on the food, liquor, and tobacco components derived by Paul H. Douglas,<sup>4</sup> supplemented with retail prices for the following: Clothing and furniture prices from mail-order catalogs; rents from newspaper advertisements in six cities; kerosene prices from the New Jersey State cost-of-living index and illuminating gas prices from utility companies.

The indexes were computed as weighted averages of prices relatives, using weights for major components from the BLS consumer expenditure study of 1901-02 and for items from the 1918 expenditure study.

<sup>1</sup> "Report on the Statistics of Wages in Manufacturing Industries: With Supplementary Reports on the Average Retail Prices of Necessaries of Life, and on Trade Societies, and Strikes and Lockouts," by Joseph S. Weeks, Washington, 1886. (Usually referred to as the "Weeks report." Retail prices are included for cities and towns located in 16 States.

<sup>2</sup> Russell Sage Foundation, New York City, 1920.

<sup>3</sup> Russell Sage Foundation, New York City, 1927.

<sup>4</sup> "Real Wages in the United States, 1890 to 1926," Houghton Mifflin Co., Boston and New York, 1930.

## D. 1913-58

For this period, the BLS Consumer Price Index was used. A complete description of the index is included in the joint committee print, "The Consumer Price Index" (Report of the Joint Committee on the Economic Report on the Consumer Price Index of the Bureau of Labor Statistics, 80th Cong., 2d sess., Washington, 1949).

Detailed descriptions may also be found in various BLS publications, particularly chapter 9 of BLS Bulletin 1168, "Techniques of Preparing Major BLS Statistical Series."

## APPENDIX C. PRICE CHANGES FROM YEAR TO YEAR

The percentage change from each year to the next is shown in table C-1 for the Wholesale Price Index from 1720 to 1958 and in table C-2 for the Consumer Price Index from 1800 to 1958.

TABLE C-1.—Year-to-year percent changes in the wholesale price index for the United States, 1720-1958

Year:	Percent change from preceding year	Year:	Percent change from preceding year	Year:	Percent change from preceding year
1721	-8.9	1764	-7.5	1806	-5.8
1722	+3.9	1765	-.6	1807	-3.2
1723	+3.2	1766	+6.5	1808	-9.8
1724	+5.4	1767	0	1809	+10.0
1725	+8.8	1768	-1.2	1810	+2.0
1726	+4.6	1769	+6	1811	-3.1
1727	-3.5	1770	-1.5	1812	+3.2
1728	-4.8	1771	+6.1	1813	+17.8
1729	-.3	1772	+15.7	1814	+14.3
1730	+5.9	1773	-7.4	1815	-1.0
1731	-11.1	1774	-7.3	1816	-3.1
1732	-2.0	1775	-7.5	1817	-2.3
1733	+2.9	1776	+38.5	1818	-2.5
1734	+12.2	1777	+205.2	1819	-16.3
1735	-1.0	1778	+81.5	1820	-17.5
1736	-5.6	1779	+396.4	1821	-8.4
1937	+10.7	1780	+255.1	1822	+5.6
1738	+1	1781	-51.8	1823	-6.7
1739	-14.1	1782	-97.3	1824	-2.7
1740	0	1783	-14.7	1825	+9.3
1741	+23.5	1784	-5.4	1826	-11.1
1742	-5.3	1785	-6.8	1827	-3.0
1743	-14.3	1786	+1	1828	-.9
1744	-4.4	1786	-.1	1829	-.9
1745	-6.0	1787	-1.1	1830	-4.3
1746	+2.4	1788	-6.3	1831	+1.2
1747	+19.3	1789	-3.5	1832	+3.6
1748	+13.3	1790	+6.3	1833	+3.3
1749	+2.4	1791	-1.8	1834	-3.6
1750	-2.9	1792	+3.3	1835	+15.3
1751	-2.6	1793	+7.9	1836	+12.0
1752	+5.0	1794	+11.3	1837	-6.8
1753	+3.4	1795	+20.1	1838	-3.3
1754	-8.7	1796	+8.1	1839	+4.5
1755	-.3	1797	-9.2	1840	-17.5
1756	-2.4	1798	-2.9	1841	-2.3
1757	+1	1799	+1.9	1842	-12.8
1758	+0.2	1800	-.9	1843	-7.1
1759	+16.1	1801	+7.5	1844	+3.9
1760	-5.0	1802	-14.8	1845	+4.9
1761	-4.9	1803	-.4	1846	+1.9
1762	+7.6	1804	+6.0	1847	+12.1
1763	+1	1805	+9.1	1848	-15.2

TABLE C-1.—Year-to-year percent changes in the wholesale price index for the United States, 1720-1958—Continued

Year:	Percent change from preceding year	Year:	Percent change from preceding year	Year:	Percent change from preceding year
1849	+4.0	1886	-8.7	1923	+4.0
1850	+11.2	1887	+4.1	1924	-2.5
1851	-4.5	1888	+1.9	1925	+5.5
1852	+1.8	1889	-4.6	1926	-3.4
1853	+9.5	1890	+1.0	1927	-4.6
1854	+7.1	1891	-0.8	1928	+1.4
1855	+6.7	1892	-6.4	1929	-1.5
1856	-.1	1893	+2.3	1930	-9.4
1857	+8.2	1894	-10.2	1931	-15.5
1858	-17.1	1895	+1.8	1932	-11.3
1859	+3.2	1896	-4.7	1933	+1.7
1860	-1.7	1897	+3	1934	+13.7
1861	+3.3	1898	+4.0	1935	+6.8
1862	+16.1	1899	+7.7	1936	+1.0
1863	+27.4	1900	+7.5	1937	+6.8
1864	+45.0	1901	-1.4	1938	-9.0
1865	-4.5	1902	+6.5	1939	-1.9
1866	-6.4	1903	+1.2	1940	+1.9
1867	-7.4	1904	+.2	1941	+11.1
1868	-3.0	1905	+.7	1942	+13.2
1869	-5.0	1906	+2.8	1943	+4.3
1870	-11.5	1907	+5.5	1944	+.8
1871	-4.4	1908	-3.5	1945	+1.8
1872	+6.4	1909	+7.5	1946	+14.5
1873	-3.8	1910	+4.1	1947	+22.4
1874	-5.3	1911	-7.8	1948	+8.3
1875	-5.4	1912	+6.5	1949	-5.0
1876	-7.9	1913	+1.0	1950	+3.9
1877	-2.6	1914	-2.4	1951	+11.4
1878	-14.7	1915	+2.0	1952	-2.8
1879	-1.7	1916	+23.1	1953	-1.8
1880	+11.5	1917	+37.4	1954	+.2
1881	+1.7	1918	+11.7	1955	+.4
1882	+4.3	1919	+5.6	1956	+3.2
1883	-7.5	1920	+11.4	1957	+2.9
1884	-7.2	1921	-36.8	1958	+1.4
1885	-7.7	1922	-9		

TABLE C-2.—Year-to-year percent changes in the consumer price index from 1800 to 1958

[1851-59=100]

Year:	Percent change from preceding year	Year:	Percent change from preceding year	Year:	Percent change from preceding year
1801	-0.5	1815	-10.5	1820	-1.6
1802	-14.7	1816	-9.9	1830	+.8
1803	+4.9	1817	-3.7	1831	-1.6
1804	+1.2	1818	-4.3	1832	-5.7
1805	0	1819	-1.1	1833	-1.7
1806	+5.2	1820	-8.0	1834	+.9
1807	-8.3	1821	-4.4	1835	+3.5
1808	+10.8	1822	+2.0	1836	+5.9
1809	-2.2	1823	-10.9	1837	+2.4
1810	0	1824	-9.4	1838	-3.1
1811	+5.6	1825	+2.4	1839	-.8
1812	+1.6	1826	+.8	1840	-6.5
1813	+15.0	1827	0	1841	+2.6
1814	+6.8	1828	-3.8	1842	-5.1

TABLE C-2.—Year-to-year percent changes in the consumer price index from 1800 to 1958—Continued

[1851-50=100]

Year:	Percent change from preceding year	Year:	Percent change from preceding year	Year:	Percent change from preceding year
1843	-8.0	1882	+0.0	1921	-10.9
1844	+1.0	1883	-4.4	1922	-6.4
1845	-1.0	1884	-2.8	1923	+2.1
1846	-1.0	1885	-1.0	1924	0
1847	+2.0	1886	0	1925	+2.6
1848	-0.7	1887	0	1926	+1.0
1849	-4.1	1888	+1.9	1927	-2.0
1850	0	1889	0	1928	-1.0
1851	-1.1	1890	-1.0	1929	0
1852	+1.1	1891	+1.0	1930	-2.6
1853	0	1892	-1.0	1931	-8.9
1854	+8.5	1893	-1.0	1932	-10.3
1855	+2.9	1894	-4.9	1933	-5.1
1856	-1.9	1895	-2.0	1934	+3.4
1857	+2.9	1896	0	1935	+2.6
1858	-5.7	1897	-1.0	1936	+0.6
1859	+1.0	1898	0	1937	+3.8
1860	0	1899	0	1938	-1.8
1861	+1.0	1900	+1.1	1939	-1.2
1862	+11.8	1901	+1.0	1940	+0.6
1863	+23.7	1902	+1.0	1941	+5.0
1864	+26.2	1903	+3.1	1942	+10.7
1865	-0.6	1904	+1.0	1943	+6.5
1866	-4.5	1905	0	1944	+1.5
1867	-5.9	1906	+1.0	1945	+2.0
1868	-1.9	1907	+3.9	1946	+8.8
1869	-4.5	1908	-1.9	1947	+14.3
1870	-4.0	1909	-1.0	1948	+7.8
1871	-4.2	1910	+4.8	1949	-1.1
1872	0	1911	0	1950	+1.1
1873	-1.5	1912	+1.8	1951	+8.0
1874	-3.0	1913	+1.8	1952	+2.0
1875	-4.6	1914	+1.8	1953	+1.0
1876	-4.0	1915	+0.9	1954	+0.2
1877	-0.8	1916	+6.9	1955	-0.3
1878	-5.9	1917	+17.7	1956	+1.3
1879	-2.7	1918	+17.8	1957	+3.5
1880	+1.8	1919	+15.1	1958	+2.8
1881	+0.9	1920	+15.7		

Representative BOLLING. First I want to thank you both for presenting an absorbing picture. I had no idea that one could get a picture of such remarkable stability up to the 1900's except for wars. It seems to me that from roughly 1770 to about 1897, you have a line of lows that go through almost exactly the same point. I don't know whether this has any enormous significance. It is certainly very interesting that for a period of 120 years the lows turned out to be almost exactly the same at three points.

Mrs. HOOVER. Yes; these two lows—1843 and 1896—come out exactly the same point, at an index of 75.1.

Representative BOLLING. That is quite interesting. I am not sure I can see the chart properly from here, but apparently in two world wars in which the rest of the world was already involved before we were involved the fact seems to be that the wholesale line does not change when we become involved. Do I make myself clear?

In the period from 1914 to our involvement in World War II, the wholesale price rise is as sharp or sharper before we were involved in the war than it was afterward, isn't it? Is that right?

Mrs. Hoover. I think it is partly an illusion because there are so many years that had to be compressed on this chart.

Of this total rise from 1914 to 1920, only a fourth of it occurred in the 2 years before we got in, but half of it during the 2 years we were in.

Representative BOLLING. I see.

Mrs. Hoover. The other fourth in the years after the war was over.

Representative BOLLING. The stabilization program of World War I was very different from the stabilization program of World War II, was it not?

Mrs. Hoover. Quite different.

Representative BOLLING. What is the picture in World War II? What, in fact, happened in the period from 1939 to 1941, what percentage of the increase occurred then?

Mrs. Hoover. There was 13 percent increase in 2 years from 1939 to 1941. Then in the first year that we were in the war another 13 percent.

Representative BOLLING. I see.

Mrs. Hoover. So that it is twice as fast in the first year we were in the war as the 2 years before we were in.

Representative BOLLING. Then the stabilization program had an effect and slowed it down to what?

Mrs. Hoover. I haven't computed those figures. Actually it is—

Representative BOLLING. It doesn't matter. It obviously slowed it down.

Mrs. Hoover. Yes; it slowed it down considerably.

Representative BOLLING. When does that sharp rise start again? Does that have a direct relationship to the elimination of OPA?

Mrs. Hoover. This sharp rise is partly due to the discontinuance of many of the controls that had been put on.

As you know, there was a sort of gradual decontrol of many prices, and in many cases rent control continued on for quite a number of years. However, there was also high incomes and a very great flush of buying during that period of time, particularly of some of the durable goods that were not available in the war years. Automobiles were not available during the war and this—

Representative BOLLING. This is the result of pent-up demand?

Mrs. Hoover. Normally termed pent-up demand. This increase in the immediate postwar years is partly due to flush of postwar buying.

Representative BOLLING. What is the detailed picture of the Korean war period? Again I cannot see. I cannot tell where the line actually begins.

Mrs. Hoover. It is a little difficult.

Representative BOLLING. There is a sharp increase in the first year, a decline in the second and third year.

Mrs. Hoover. I think maybe the size of the indexes would indicate this. These figures are on a pre-Civil War base. We put it on the base in the middle of the 18th century so both Dr. Taylor and I could work on it.



In 1949, before we were in the war, the wholesale price index was 246, in 1950, it was 256, in 1951 it was 285, and by 1952 it was down to 277.

Representative BOLLING. Yes. There is no relationship in this movement to the stabilization program of the Korean war, if my memory is correct, is there?

Mrs. HOOVER. There were some controls during this period.

Representative BOLLING. I know there were some controls. I was around then and I remember the fights. I do not remember the dates when the control program collapsed.

Mr. KNOWLES. If I can remark, Mr. Chairman.

Representative BOLLING. Yes, do.

Mr. KNOWLES. As I remember, being on the staff at the time, the principal movement of that index occurred after about June 1950, so that the 1950 rise was mainly started already in the spring and most of it was in the second half of the year and the peak of the index was in February, I believe, January or February, one or the other, 1951. There was a break, if I remember right, in February 1951, about the time when the control went on. The control went on, the ceilings went on to the extent that they were placed on in February 1951, if I remember correctly. I can check that. I think it was February 1951 that the actual controls went in.

Representative BOLLING. What I am curious about is that in the period of actual involvement we did have some comedown as the chart would indicate. In the Korean war we went up a peak and came down during the period of the war.

Mrs. HOOVER. There were one or two special conditions during this period. I think there was a sharp drop in food prices in one or two of those months—

Representative BOLLING. It is not very important.

Mr. KNOWLES. If I may enlarge, from my experience with the committee at the time, which got a little bit involved in this, this movement you will find in any wholesale price index I have seen in other countries as well. This was fairly widespread—

Representative BOLLING. Yes.

Mr. KNOWLES. And part of the earliest of the peak and then the cutback occurred because of the raw material component of this. The raw materials, rather, I think on the technical price chart the analyst would call it an overshooting of the movement. They went far in excess. If I remember my prices right, wool went something like twice the movement with respect and then fell back. This sometimes happens in a speculative market.

Mr. TAYLOR. Scare buying at the time.

Mr. KNOWLES. It is a scare-buying operation, and this occurred quite generally, we thought. Last November, when some of us were in Europe, we found other countries had the same experience and had trouble importing raw material at the time, and it affected the domestic price level.

Representative BOLLING. This I am sure has no meaning, but if the wars were taken out of this, there would be remarkable stability until the 1930's.

Mrs. HOOVER. There is a sort of a general trend downward in the early part of the 19th century, and straight across from the low of 1843

to 1897 but there has been a general trend upward since 1897. We tried to spread out these annual figures on the chart so that something other than war peaks could be seen. I think monthly figures would make it much clearer.

Representative BOLLING. But in terms of long-run stability if the wars had never happened you would have had apparently a very considerable amount of stability compared to what you have. That is all I wanted to observe.

This is the first time in our history that we have not had a substantial deflation following a substantial inflation.

Mrs. HOOVER. That is right.

Representative BOLLING. Of course, that depends, it could be said to depend on what one's definition of what wartime and peacetime are. Do you have any questions, anybody on the staff?

Mr. KNOWLES. I have two or three that I would like.

Representative BOLLING. All right.

Mr. KNOWLES. I gather the impression, Mrs. Hoover, and Mr. Taylor, both, that over this long sweep of time that you compared these prices that there is really no consistent relation between the longer, I suppose you would call them secular movement in prices and secular growth trends even though you find a lot of short periods correspond in wars or cycles, that you find as far as I could listen to your running descriptions, it seems to me you were running periods when the prices were secularly downward, but you had economic growth and then in a sense, a fairly substantial amount.

You had other periods when prices seemed to have been secularly going upward rather than persistently over long periods and you had rapid economic growth. I do not get any impression that these two have been closely linked. Is this the impression it is supposed to convey?

Mr. TAYLOR. One of the interesting points here is this decline, the rate of economic growth was about as great during that period as it has been since; that is, there is not a very marked difference in economic growth in the long period of decline after the Civil War than there has been since that time.

Mr. KNOWLES. Then secondarily to that I gained the impression also, Mr. Bolling referred to, that all of the large movements, the really big sweeps in prices have been associated somehow rather immediately or sort of an aftermath to very large currency and credit inflation or deflations. They correspond to very large movements in the supply of currency, such as the wartime paper money episodes, the greenback episode and the like. That you do not find a really large and persistent movement. Now, if you exclude the period since about 1950, but all the other big movements were periods that you had correspondingly very large increases in supply of money.

Mr. TAYLOR. The only exception is this period in the early 1790's, but that was near the beginning of the Napoleonic wars in Europe, which affected prices throughout the country, throughout the world, and was a period of great credit expansion in the United States with the funding of the debt and the Hamiltonian measures that were taken at that time.

There was a good deal of credit expansion in the financing of the War of 1812, too, largely through the issue of State banknotes and Treasury notes. Specie payments were suspended during the war.

Mr. KNOWLES. So then if you look back in the historical record prior to World II you would not find the sort of phenomenon that has become to be referred to in recent times as a cost push or anything that could have resembled it in which the argument is made that prices move independently of movements in the supply of currency relative to trade?

Mr. TAYLOR. This is not a large increase at this point. If you take World War II and the Korean war into account this is a small increase, between 2 and 3 percent a year, I believe, and over the last year very little increase.

Mr. KNOWLES. Now, a technical question. I think, Mrs. Hoover, it will be a little more in your province.

For the periods since 1947, does not the BLS wholesale price index not merely include a lot more items than it did before in the sample but have a considerably better representation of finished goods, especially in the area of machinery?

Mrs. Hoover. Yes, it does. With some additional appropriation made available to us by the Congress we have been concentrating on methods of pricing finished goods, particularly in the heavy goods area and have been working very actively with a number of advisory committees in the various industries in order to get a better measurement of these goods in the index.

Mr. KNOWLES. Before that time these machinery items and durable goods frequently were represented how? By raw materials such as steel or something of this sort?

Mrs. Hoover. It varied to some extent. In some cases they were represented either by the raw materials or by various components or they were represented by what you might call the standard noncomplex machines.

Mr. KNOWLES. The reason I asked this, one reason, what effect this would have on the character of the fluctuation that you would get out of such an index after 1947 and before under substantially similar conditions—I am not talking about the actual price movement, just the character of the index. If you better represent by direct price measures these substantially finished durable goods would not that have the effect of introducing a very considerable degree of stability to the index, that is a greater degree of stability, particularly in the business cycle than it would have had before?

Mrs. Hoover. Well, the usual pattern has been for finished goods to fluctuate less than the raw materials because their prices have in them a greater proportion of finishing costs or costs that do not fluctuate as widely as the materials cost.

From the statistical point of view, it is a better representation, perhaps.

I do want to interpolate a comment. We have not succeeded by any manner of means in making perfect measures of prices for these goods, but I think that is stability is introduced into these measures through the introduction of these goods that this is a good technical step to have taken.

Mr. KNOWLES. The reason I asked was there is a tendency at times for people to compare the movements of prices, including wholesale prices in postwar periods, particularly in periods of both expansion

and contraction such as last year with preceding contractions before you made these improvements in the index.

Mrs. HOOVER. Yes.

Mr. KNOWLES. What I am sort of feeling for here is whether or not in making that you have to worry about whether or not you just automatically ought to expect that the index now would show less of a decline or no decline whereas previously it would have shown—turned that just around. If we had had the present kind of an index which was just as good as it is now for the period of, let us say, the twenties and thirties, the movements in 1929 to 1933 and from 1937 to 1938 would be considerably less than is shown in the existing index or appreciably less?

Mrs. HOOVER. No; I don't think that it introduces appreciable stability. After all, a large portion of the wholesale index is made up of farm products and processed foods. And the finished goods that have been introduced are relatively minor in importance, but these two groups are major in importance in the overall wholesale price index.

I think that comparisons of the indexes after finished goods have been introduced with the period in which some of these finished goods were not included, lack something in precision, but I don't think the lack of precision is to a major extent so that it would mean such comparisons were worthless.

Mr. KNOWLES I am not getting to that. I am trying to think we have to make some allowances. Suppose we excluded the food and agricultural materials from this and just compared the nonindustrial or nonagricultural product part of this that you compute.

Mrs. HOOVER. Yes.

Mr. KNOWLES. This would mean we are taking a highly volatile agricultural product out. This would mean that even prior to 1947 the remaining component index other than farm products index that is now published was more stable and all I am asking would that component be still more stable if you had been doing then what you are doing now?

Mrs. HOOVER. It might have been slightly more stable, yes, but if I may be excused for using a work chart, I would like to show you a work chart of all commodities other than farm and food. This is on a monthly basis you can see that the index for all commodities other than farm products and foods was very stable up until 1946.

Mr. KNOWLES. Yes.

Mrs. HOOVER. I had this chart primarily for comparisons with pre-war to show where farm products were as well as other groups.

Representative BOLLING. This is an absolutely fascinating thing to me. I have learned a great deal today.

What is generally considered to be the time when this country began to industrialize in terms of so-called industrial revolution?

Mr. TAYLOR. It began to become industrialized very rapidly after about 1839. There were some beginnings before. The fifties was a decade of very rapid industrialization but many say the real industrial revolution in this country came after the Civil War.

Representative BOLLING. I wanted to pursue a little bit, the point that you made a little earlier about the growth in relations to price level.

Did we have relatively a substantial rate of growth in the period from 1830 something to 1860?

Mr. TAYLOR. We think so, although, of course, our data for this early period are not very perfect.

Representative BOLLING. No; I should not think they would be.

Mr. TAYLOR. But we do have estimates from 1839 on.

Representative BOLLING. That would include a period of considerable ups and downs?

Mr. TAYLOR. Yes.

Representative BOLLING. And I wondered if there was any very substantial difference in growth rate during the down period as opposed to the up periods or vice versa?

Mr. TAYLOR. We cannot be too sure about this but as I remember the figures on this the rate of growth was rather more rapid in the forties than it was in the fifties. Seemingly, the short-run rate of growth is likely to be rather rapid after a low point.

Representative BOLLING. Yes.

Mr. TAYLOR. But Goldsmith's figures on that, which are in the record, I believe, for the earlier hearing are much more accurate than my recollection.

Representative BOLLING. While I had it in my mind I wanted to raise the question. I remember Mr. Goldsmith's testimony.

Do either of you have any further comments you would like to make?

Mr. TAYLOR. I think not.

Representative BOLLING. Again I would like to thank you very much for the very real contribution to certainly my thinking, and I am sure the committee as a whole.

Mr. TAYLOR. Thank you.

Representative BOLLING. Tomorrow we will meet in the old Supreme Court Chamber, room P-63 in the Senate wing of the Capitol.

The subject will be long swings in U.S. growth. The witness will be Moses Abramowitz, professor of economics, Stanford University.

We stand adjourned.

(Whereupon, at 11:24 a.m., Thursday, April 9, 1959, the hearing was adjourned to reconvene at 10 a.m., Friday, April 10, 1959.)

# EMPLOYMENT, GROWTH, AND PRICE LEVELS

FRIDAY, APRIL 10, 1959

CONGRESS OF THE UNITED STATES,  
JOINT ECONOMIC COMMITTEE,  
Washington, D.C.

The committee met at 10 a.m., pursuant to recess, in room P-68, the old Supreme Court Chamber, the Capitol, Hon. Paul H. Douglas, presiding.

Present: Senators Douglas, Sparkman, and Bush; Representatives Bolling, Reuss, and Coffin.

Also present: Roderick H. Riley, executive director; John W. Lehman, clerk; James W. Knowles and William H. Moore, economists. The CHAIRMAN. The committee will come to order.

This is the fourth and final day in the current second set of hearings.

I want to say we are gratified with the high quality of the papers which have been presented thus far both on production and prices. We have drawn very heavily upon the work which has been conducted for many years under the auspices of the National Bureau of Economic Research and are very happy to have an associate of the National Bureau, Dr. Abramovitz, who is also professor of economics at Stanford, with us this morning to discuss long swings in U.S. growth.

It is my understanding that this is the first public, full-scale presentation of your original research in this field, am I correct in that?

Mr. ABRAMOVITZ. Yes, that is right, Mr. Chairman.

The CHAIRMAN. I am very grateful to you for coming.

Before I formally call upon you I would like to announce that the next hearings of the committee will be concerned with unemployment and will take place late this month. We will issue a statement in the next few days giving the names of witnesses, the subjects, and other matters.

We are very happy indeed to have you testify, Dr. Abramovitz, and want to thank you for coming from so far and taking the time to prepare this paper.

Will you proceed in your own way?

## STATEMENT OF MOSES ABRAMOVITZ, NATIONAL BUREAU OF ECONOMIC RESEARCH, AND PROFESSOR OF ECONOMICS, STANFORD UNIVERSITY

Mr. ABRAMOVITZ. Thank you, Mr. Chairman.

I think you will appreciate it when I say as an old professor I have looked forward for a long time for a chance to lecture to a really small class.

I am very glad to have this chance, Mr. Chairman, to present to you some of the results of the work that I have been doing for the last 2 years.

Summary: 1. The economic growth of the United States has taken place in a series of surges during which growth was especially rapid followed by relapses when growth proceeded much more slowly. In periods of rapid growth, output has increased at rates two, and often three, times as fast as in period of slow growth.

2. These waves of acceleration and retardation stand out clearly in records of output when the influence of the relatively short business cycles has been eliminated as far as possible. Clear evidence of such waves can be found in economic records going back at least as far as the third decade of the 19th century. The duration of the waves has usually been between 10 and 20 years. Since this period is two to five times the duration of ordinary business cycles, we refer to the waves in growth as long swings.

3. The long swings in the growth of output were but one aspect of a more general wave characterizing our economic development. Long swings similar to those in output and occurring at about the same time can be found in the records of population growth, immigration, transport development, geographical settlement, internal migration, the growth of cities, price change, the growth of the money supply, the foundation of new corporations, residential buildings, and in still other branches of economic life and in some aspects of noneconomic activity.

4. The long waves in the rate of growth of output reflect similar waves in the rates of growth of resources, both labor and capital; in the rates of growth of productivity; and in the intensity with which resources were employed. These waves in the factors underlying output occurred in a particular sequence which recurred in approximately the same manner during each successive long swing.

5. In the past, the culminating event of each period of retarded growth has been a business depression of unusual severity and almost always of unusually long duration. These severe and protracted depressions began when the long swings in the volume of investment in durable capital passed their peaks. Sustained recovery from depression began at about the same time as the volume of investment in durable capital entered the rising phase of a new long swing.

6. Although many features of the long swings in economic development can now be described, the cause of these fluctuations is still to be determined. It is not yet known whether they are the result of some stable mechanism inherent in the structure of the U.S. economy, or whether they are set in motion by the episodic occurrence of wars, financial panics, or other unsystematic disturbances. Their pronounced uniformities, however, make it likely that continued study of long swings will shed light on the process of economic growth and on the origins of serious depressions.

#### I. GENERAL CHARACTER OF LONG SWINGS IN GROWTH

The most important and the most striking feature of U.S. economic growth is the great upward sweep of total output and of output per capita which started in the first half of the last century, or perhaps earlier still, and which is still visibly going on today. Manifestly,

however, this sweep of growth has not been steady. Seasonal influences apart, it has been subject to frequent minor interruptions and sometimes to drastic upward and downward movements of an episodic character, the most important of which were connected with wars. In addition, we have suffered the more or less regular interruptions in growth associated with business cycles, a type of disturbance which in this country has involved waves in output which have generally required 3 to 5 years to run their course.

These fluctuations represent familiar and well-established types of disturbances. They are not, however, the only important sources of unsteadiness in growth. Evidence has accumulated that economic development in this country, and in at least some other industrialized countries, has taken place in a series of great surges, followed by periods of much slower growth. These waves of acceleration and retardation in the rate of growth of output stand out clearly after output indexes have been corrected, so far as possible, to eliminate business-cycle fluctuations. The duration of these larger and longer swings in output growth has generally been between 10 and 20 years, although there have been shorter and longer movements of apparently similar character. Because the fluctuations in output which emerge after correction for business cycles are fluctuations in the rate of growth of output rather than in the level of total production, and because the waves are of relatively long duration, they have sometimes been called secondary secular movements or trend cycles. But I shall refer to them simply as long swings. This somewhat neutral title is intended to avoid any premature commitment to the theory that these fluctuations are self-generating cyclical movements whose internal mechanism produces their own recurrence. There are, nevertheless, certain pieces of evidence which point in that direction, and, in any event, the long swings have been marked by a common set of occurrences which repeat themselves from occasion to occasion and which give them a definite character.

The long swings of acceleration and retardation in economic growth are sharply distinguished from business cycles not only by their longer duration but also by other characteristics which make them dramatic elements in our economic history and in the process of economic growth. In particular, the long swings are marked by very large fluctuations in the rate of resource development. Each of the long swings has included a great wave in the level of immigration and in the total number of people added to the population. Each long swing has also involved a wave in the total number of persons added to the labor force. The long swings also manifest themselves in large fluctuations in the net volume of fixed capital formation, and most particularly in towering waves of residential building and of railroad and public utilities construction. Before World War I, each of the long swings in the rate of growth of output involved a renewed surge in the progress of territorial settlement as evidenced by Federal land sales and by the number of miles of canals and railroads opened for traffic. The upward phases of the long swings are also times when the pace of internal migration of people within the country speeds up and when urban growth, more recently suburban growth, proceeds at an unusually rapid pace, only to slow down again after a time.



One common attribute of all these processes of resource development involving the movement of people from country to country and place to place, the formation of households and the birth of children, the foundations of business, and the investment of capital in highly durable forms is that they involve long-term decisions and commitments. Hence they pick up speed and come to fruition slowly and when they slow down, they are not easily or quickly set in motion again. They give rise, therefore, to long waves of resource development and output growth. These processes involving long-term decisions, on the other hand, respond only sluggishly to the impact of the ordinary short and mild business contractions. By contrast, the most prominent feature of short business cycles is a fluctuation in shorter term investment, particularly inventory investment.

While the long swings of acceleration and retardation in growth differ from business cycles in duration and many other features, they are distinctly not free from fluctuations in the volume of unemployment or, more generally, from fluctuations in the intensity with which resources are used. Indeed, each long swing of which we have a definite record has ended in a depression of unusual severity and, with one possible exception, of unusual duration. In one sense, therefore—unless we are to suppose that severe depressions are merely accidental occurrences—we may regard the long swings as the sequence of events which lead up to these catastrophes. An understanding of the long swings may, therefore, help us not only to understand why our rate of long-term growth is subject to acceleration and retardation, they may also be a path by which we can gain firmer knowledge about the severe depressions which are still, perhaps, the most serious disease with which capitalist economies are threatened.

In successive sections of this statement, I propose to describe some of the more prominent features of the long swings in the U.S. economic growth. Section II tells how we make our measures. Section III deals with acceleration and retardation in the growth of output and of economic activity generally. The succeeding sections take up briefly the various processes which combine to form the long swings in the rate of growth of output. Section IV deals with additions to the population and to the labor force, section V with additions to the stock of capital equipment, that is, with capital formation, section VI with the rate of growth of productivity, and section VII with the intensity with which resources are used. Section VIII presents a general conspectus of the various changes in their relation to the long swings in the rate of growth of output and leads up to some suggestions about possible lines of explanation. Now I propose to go into some of these matters in a little more detail.

## II. MEASUREMENT OF LONG SWINGS

Just as one must eliminate seasonal fluctuations from time series in order to reveal business-cycle movements clearly, so one must remove the effects of business cycle as well as one can in order to reveal the long swings. Unfortunately, because business-cycle fluctuations are much less regular than seasonal movements, it is not possible to correct time series for the former as well as one can for the latter. The kinds of adjustments that can be made all involve some sort of smoothing process in which averages are computed from the original

data over periods believed to be of the same duration as a business cycle. Moving averages of the original data are a common method of smoothing out business cycles.

Those who believe that the normal duration of business cycles is in the neighborhood of 3 to 5 years are inclined to use 5-year moving averages. This corresponds with, although it is not the same as, the average duration of business cycles as revealed by the widely accepted standard business cycle chronology of the National Bureau of Economic Research. Those who believe that, in addition to the relatively short business cycles identified by the National Bureau, there is also a so-called major business cycle, marked by the occurrence of relatively deep depressions which occur at intervals of 8 to 11 years, have often used 9-year moving averages. Still other methods of smoothing out business cycles by calculating moving averages with other periods and with more complicated weighting schemes have been used.

The method employed in my own work is somewhat different. It is a variant of a method long employed by the National Bureau of Economic Research to make measures of secular movements, defined as changes in economic or other magnitudes which do not reverse themselves in the course of a business cycle. This method starts from the fact that business cycles, though they have been on the average some 4 years long, actually vary a great deal in duration. Indeed, the duration of the individual business cycles identified by the National Bureau of Economic Research has ranged between  $2\frac{1}{2}$  and  $8\frac{1}{4}$  years. To smooth out the business cycles of experience, therefore, it seems better to strike averages, not over some uniform period of years, as in the normal moving average, but rather over the actual years included in each successive business cycle.

To carry through this procedure, we make use of the standard and widely accepted chronology of business-cycle peaks and troughs established by Wesley C. Mitchell and Arthur F. Burns (6). To obtain values for a series which are, as nearly as possible, free of the influence of business cycles, we compute the average value of the series for all years between one business-cycle trough and the next. We compute such averages for all business-cycle periods running from trough-to-trough and then for all business-cycle periods running from peak-to-peak. We then intermix the average standings for trough-to-trough cycles with those for peak-to-peak cycles chronologically to obtain a continuous series of averages for overlapping business-cycle periods. Following the National Bureau's usage we refer to these averages as average reference-cycle standings. They are the successive values of a series after the effects of business cycles have been smoothed away as well possible.

In many types of economic processes, for example, in railroad construction or in immigration, the average reference-cycle standings themselves fluctuate in long waves, and these waves in the average level of a series, when they appear, are often themselves of great interest. In some kinds of economic processes, however, our interest centers in the long swings which may appear, not in the level of the process but in its rate of growth. In such cases, we compute rates of growth per annum between the average reference-cycle standings. We first compute rates of growth between the reference-cycle standings for trough-to-trough cycles, then between the reference-cycle

standings for peak-to-peak cycles. Again we intermix the two sets of rates of growth chronologically to obtain a continuous series of rates of growth between overlapping pairs of business-cycle periods.

Now I think I am ready to ask you to look at some of the charts and tables, and as I said to the chairman before I started I think it might be most convenient if you simply ripped away from the back of your statement the set of tables and the set of charts and put them down before you, and then I think you will be able to follow them more easily as I refer to them.

The CHAIRMAN. You suggested separating the charts from the tables.

Mr. ARAMOVITZ. And separating the charts from the tables. The tables come first and the charts are all at the back.

### III. LONG SWINGS IN THE RATE OF GROWTH OF OUTPUT AND OTHER INDICATORS OF ECONOMIC ACTIVITY

I ask you to look first of all at charts 1-A and 1-B which give us our first view of the long swings in economic growth. Chart 1-A shows the annual figures for GNP as estimated by Simon Kuznets—that is the dotted line on that chart—together with the average reference-cycle standings computed from these figures which represent gross national product after the business cycles have been smoothed away. The graph of average reference-cycle standings supports the observation that when business cycles have been smoothed away, the total physical volume of production in this country has, at least since 1870 when these figures begin, risen without significant interruption, apart from the decline associated with the great depression of the 1930's. In short, there have been no long swings in the volume of output.

At the same time, it is apparent that, business cycles apart, total output has sometimes risen along a steeper trend than it has at other times. It is these alternations between acceleration and retardation which are the long swings in growth of output. They stand out much more clearly if we look, not at the average reference-cycle standings of output, but, as in Chart 7-B, at the rate of change per annum between average reference-cycle standings. Chart 1-B displays the large range over which the rate of growth of total output has swung during the last 80 years. It also suggests that the rate of growth does not fluctuate erratically, but rather rises and falls in wide movements usually last for considerable periods.

Such fluctuations in the rate of growth are a characteristic not only of total output but of all the major branches of industry with the sole exception of agriculture. Arthur F. Burns' famous study of "Production Trends" made as long ago as 1934, showed that each long swing in the rate of growth of total output was accompanied by similar long swings occurring at approximately the same time in most individual sectors of nonagricultural production.

In chart 2 I have been able to put together some figures that carry this story somewhat further.

Senator BUSH. Could I ask a question on chart 1-B before you leave it there?

Mr. ARAMOVITZ. Please do.

Senator BUSH. Gross national product in 1929 prices. I note that for instance in the period of the twenties there you have the sharpest of drops on that chart. Why is that?

Mr. ABRAMOVITZ. That is because during the great depression we had a protracted period of years when total output was not only growing more slowly, which is the usual reason why this graph falls, but actually declining so that the rate of growth fell to negative figures, sir. I was going—

Senator BUSH. The line that I refer to begins in about 1923 and ends in 1930, all of which was a period I thought of very substantial growth.

Mr. ABRAMOVITZ. Yes, but the rate of growth from about 1923 began to proceed more slowly. During the latter years of the 1920's year by year our rate of growth was slowing up. That is shown on this chart by a drop in the line. Then after 1929 we began to have an actual decline in output and that, of course, is a negative rate of growth and that is the first time we had that for such a protracted period in this country.

The CHAIRMAN. That is a very interesting point, and your figures seem to indicate that the rate of growth was falling very rapidly in the period when the financial wizards were saying we were in a new economic era and going forward more rapidly than we had ever gone before.

Mr. ABRAMOVITZ. I expect some more of that to come out later. It is characteristic of these long swings that we reach our most rapid rate of growth early in what you might call the expansion phase of the long swing, that the rate of growth thereupon tends to fall, and after some years of growth at a falling rate we suffer or, at least in the past we have suffered, a serious depression when, of course, the rate of growth has fallen to extremely low levels.

The CHAIRMAN. Apparently the rate of growth was negative prior to 1929.

Mr. ABRAMOVITZ. That arises from the fact that this rate of growth is not measured year by year, Mr. Chairman, but measured between average reference-cycles standings and those average standings for business cycles were centered at the middle of business cycle periods. The rate of growth per annum between these average standings was then centered at the midpoint between the business cycle midpoints and that apparently suggests that the rate of growth reached negative figures before 1929. It reached it, so to speak, corrected for business cycles.

It is not true, of course, that literally the rate of growth measured year by year uncorrected for business cycles would have reached negative figures before 1929.

Senator BUSH. Then what is the value of this information?

Mr. ABRAMOVITZ. Sir, we are trying to take a look at the behavior of economic time series corrected for business cycles in order to center our attention on longer movements. Just as we find that by correcting monthly figures for seasonal movements we have a useful way of looking at data even though it does not tell us literally how output or prices moved from month to month, so I think we are going to find that looking at longer movements in data, corrected for business

cycles, is going to be a useful way of arranging and assembling figures for comparative purposes.

Senator BUSH. Thank you.

Mr. ABRAMOVITZ. Now I refer you to chart 2 in which I would like to try to point out to you how widely diffused these long swings in economic growth are, how many different aspects of economic life they seem to be found in. Chart 2 has 4 pages of graphs. It suggests that the long swings in the rate of growth of GNP and of industrial production since the Civil War were diffused, not only throughout the component sectors of GNP, but that they are matched by similar swings in the rates of growth of a wide range of indicators of economic activity such as wholesale prices, money supply, capital imports, new incorporations, the prices of common stocks, railroad bond yields, and immigration. The list could easily be extended. The main point here is simply to gain an impression of the fact that the behavior of these various elements in economic life are moving along in roughly the same fashion. Indeed the impression of rough similarity I think would have been stronger had there not been some mistakes in the charting. Two of the series in which the original computations were made on a monthly basis were charted on the wrong scale and consequently hardly seem to move at all.

Representative BOLLING. Mr. Chairman, these are all adjusted for the business cycle?

Mr. ABRAMOVITZ. These are all adjusted for the business cycle.

The CHAIRMAN. When you read the chart it becomes more and more hectic as you turn from sheet to sheet, is that right?

Mr. ABRAMOVITZ. I think that is true because in the latter sheets we are seeing some of the series which represent long-term decisions and which represent, I think, the core of the long swing, the kind of process out of which it develops.

Table 1, if you will turn to that, brings out an important feature of the behavior of the series whose rates of growth are shown in chart 2. The table presents, for each series a chronology of the years in which the rates of growth reached their peak and trough levels in successive long swings. Apparently, the long swings in the rates of growth of this wide variety of indicators of economic activity not only conform generally to the swings in GNP and industrial production, but their turning points cluster in narrow bands of years which center upon the turning dates in the rate of growth of total output. There are very few cases, if you glance down the columns, in which a date in one column occurs as early as those in the preceding column or as late as those in the succeeding column.

Chart 2 and table 1 I think carry the strong suggestion that in the absence of actual estimates of aggregate output, we might have detected the existence of long waves in the rate of growth of aggregate output from the behavior of a considerable variety of series taken together and we might use the concensus of their turning points to establish a rough chronology of the peaks and troughs in the rate of growth of aggregate economic activity.

This is the *raison d'être* of table 2, which we use to indicate the existence of long waves in the rate of growth of economic activity before the Civil War. For this early period, there are very few series of production statistics. But one can find series representing the construction of buildings, canals, railroads, and ships, the imports and

exports of goods, the import of capital, the transport of goods by canals, wholesale prices, interest rates, stock prices, money supply, and immigration. Not all these activities can be studied in all years, but even in the second decade of the century, there were some important indicators of the growth of activity. Charts of the rate of growth of these series, which I have not reproduced, reveal the existence of long swings similar to those we observed in the post-Civil War period. Again, as table 2 indicates, the turning points cluster in relatively narrow bands of years. This suggests that the waves were general in character and it encourages one to try to fix upon a single set of turning points, which may be said to represent in a crude way the turning points in the rate of growth of aggregate economic activity, by depending upon the consensus of the turning points in the individual series.

This we have done in table 3 which presents an attempt at a rough chronology of the peaks and troughs in the rate of growth of total output since the beginning of the 19th century. Before the Civil War, as stated, it depends on the consensus of the behavior of a wide variety of series. From 1864 to 1881, we depend on Frickey's Index of Industrial and Commercial Production, and from 1886 forward, we use the turning points in the rate of growth of GNP. The chronology permits us to say that in the 124 years between 1814 and 1938, there were nine long swings with an average duration of approximately 14 years. The individual swings varied widely in duration, from about 6 to 21 years, but while that is a wide range it is no wider proportionately than the range of duration over which business cycles vary because they have ranged in duration between  $2\frac{1}{2}$  to 8 years. That is a wider range proportionately than the 6 to 21 years within which the durations of the long swings have fallen. The suggestion offered by the table that the average duration of the long swings was shorter after the Civil War than it was before is due almost entirely to the inclusion in our list of two short movements whose admissibility to a chronology of long swings may be thought to be in doubt. One is the short period of retardation which our measures suggest interrupted the spurt of the 1880's. The other is the short retardation association with World War I and its aftermath. Had we considered these movements too small or too short to be admitted to our list, the duration of the long swings would have appeared to be longer on the average and less variable. Closer study may suggest that this is, indeed, the better practice.

For the time being, however, the present method of organizing the investigation seems best. The average duration of the long swings would also appear somewhat longer if we were to take into account the record of recent years. A variety of causes have combined to produce an unbroken period of retardation in growth which has now lasted for some 20 years and whose end cannot yet be determined.

Senator BUSH. Are you going into the discussion of those causes?

Mr. ABRAMOVITZ. If you will give me an opportunity later, Senator, I would be glad to.

I turn now to some comments about the height and depth of the long swings in the rate of growth of output. Table 4 presents measures of the amplitude of the long wave in the rate of growth of GNP and its major components. Column (1) shows the average difference in percentage points between the rates of growth at the peaks of the

long swings, when growth was most rapid, and that at succeeding troughs when growth was slowest. Column (2) records the results of the same calculations made from troughs to peaks, showing the number of percentage points by which growth rose from any given trough to the succeeding peak. Column (3) enables us to compare these differences with the long-term rate of growth achieved over the whole 80-year period. The measures tell us that GNP grew over the entire period at an overall average rate of just under 4 percent per annum. That, of course, is a familiar figure.

During long swings, however, after smoothing out business cycles, the rate of growth rose and fell, on the average, about 4 percentage points. Roughly, therefore, we can think of the long swings in the rate of growth of GNP as being of the same order of magnitude as the long-term rate of growth. They involve a movement of the rate of growth from about 2 percent per annum when it is low to about 6 percent per annum when it is high. I would like to point out that this is indeed a very considerable difference, the difference between 2 percent per annum and 6 percent per annum. It is the difference between the rate of growth during the last few years when I think many people have been concerned and dissatisfied with the rate of growth which the economy has achieved and the rate of growth which we would like to see the economy attain and, if possible, maintain consistently.

The most unsteady elements in the growth of total output are patently in the realm of capital formation. And within this area, the most volatile major division is construction whose rate of growth fluctuates through a range about twice as large as does the output of producer durable equipment and about four times as large as gross national product. On a net basis, of course, the fluctuations of capital formation are still more violent. I would like to point out that this behavior of construction, that is, the volatility of construction during the long swings, contrasts with its behavior in shorter fluctuations in which producer-durable equipment and more particularly, inventory investment are much more volatile than is construction. So we can begin to think, if you like, about these longer swings as being connected with great fluctuations in construction activity as contrasted with the shorter business-cycle movements which are more closely connected with fluctuations in producer-durable equipment and inventory investment.

The broad features of the process out of which these swings in output growth arise can be most conveniently grasped if we consider that changes in output resolve themselves into three elements: Changes in resources—labor, capital, and land—available for use; changes in the productivity of resources; and changes in the intensity with which resources are utilized. In principle, these various elements of economic change could speed up or slow down independently of one another. One of them might display long swings in growth and the others not.

Actually, it appears that the long swings in output growth arise out of an interlocked sequence of changes in all three elements, resource growth, productivity growth, and changes in the intensity of use of resources. All display long swings, and they do so in a certain order which gives us a first glimpse into the cause of these fluctuations.

The succeeding sections present some pieces of evidence about the participation of each constituent element in the long swings of output growth.

#### IV. LONG SWINGS IN THE GROWTH OF POPULATION AND LABOR SUPPLY

The long swings in output growth have been accompanied by long swings of similar duration in the growth of the population and of the labor force. Chart 3 brings out some of the essential facts about the fluctuations in population growth. It suggests, not only that population growth was subject to long swings, but also that these swings were somewhat smaller before World War I than they have been since that time. In part, this change arises from the great steadiness in the growth of the native-born population before 1914 and in part from the fact that changes in the growth of the native-born lagged behind those in the growth of the foreign-born and in immigration. So these two sources in change of population growth were to a certain extent counter balancing in the period before World War I but since that time not only have there been much larger fluctuations in the rate of growth of the native-born population but also those fluctuations have occurred more nearly synchronously with changes in the level of immigration, with the result that we have had much total fluctuation in the growth of the population.

The CHAIRMAN. Dr. Abramovitz, to what degree can you make comparisons of the growth of immigration and the period after 1924 as compared to the period before 1924, because we placed very restrictive legislation reducing the total flow of immigration into the country in the acts I believe of 1923 and 1924?

Mr. ABRAMOVITZ. Nevertheless, the changes in the level of immigration have been considerable. Immigration went down very markedly during the Great Depression, it rose again in the period of recovery from the Great Depression and these swings jibed in time with a similar swing in the rate of growth of the native-born population.

Senator BUSH. Is it not true that as the native-born population growth rate slowed down during the war so immigration did also?

Mr. ABRAMOVITZ. Yes; that is right.

Chart 3-A develops these points. It compares changes in the amounts of natural increase and of immigration with changes in the growth of total population. It is clear that before World War I, changes in the level of immigration were a far more important element in accounting for changes in population increase than were changes in natural increase of population. Since World War I, the position is reversed. Table 5 expresses this shift in figures. If you look in the last column of table 5, it tells us that before World War I, changes in the volume of immigration usually accounted for 60 percent or more, sometimes much more, of the changes in the decadal increases of population. Since World War I, however, changes in natural increase have been between 60 and 90 percent of the changes in population growth. This reversal has been due not so much to the fact that changes in immigration have become smaller, but that changes in the amounts of natural increase disturbed by two great wars and by a great and protracted depression, have become much larger.



Since long waves in the volume of immigration have been so prominent, it is no surprise that there have also been long waves in the growth of the labor supply, since of course the bulk of the immigrants were of working age. With one exception, each long swing in the rate of growth of gross national product was matched by a similar swing in the number of persons added to the labor force. The one exception occurs during World War I which interrupted the flow of immigrants and so pushed the growth of the labor force down at a time when the pace of output growth speeded up. Chart 4 shows that the swings in labor force additions reflect the large fluctuations in immigration, and before World War I, at least, it was the waves in immigration which dominated the fluctuations of labor force growth. I may add that since the First World War, however, with the restriction on immigration, it has been a fluctuation in the degree of participation of the native-born population which has accounted for fluctuations in the growth of the labor force. The reasons for that shift from relatively stable rates of participation of the native population in the labor force to one of fluctuation in the participation of the native-born in the labor force makes an interesting story and perhaps if the committee is interested later on I could say a few more words about it.

The long waves in immigration go back some time before the Civil War. This fact is portrayed in chart 4-A, which finds such swings as far back as 1851 in the form of actual increases and declines in the volume of immigrants and still further back in the form of acceleration and retardation in the growth of immigration.

Table 6 compares the dates when labor force growth and immigration reached their long-swing peaks and troughs with those when the rate of growth of output did. It is apparent that immigration lagged behind output growth and that the lag of labor force growth has been, if anything, still longer. This is a rather important point for an understanding of the forces out of which these long swings grow and what makes them cumulate because we can infer from this lag of labor force growth behind the rate of growth of output that the long swings in output growth cannot be due to changes in labor force growth along. The rate of growth of output typically begins to speed up while the growth of the labor force is still declining and begins to slow down while the growth of the labor force is still rising. So there must be some other forces at work which account for the early upswings in the rate of growth of output other than an increase in the rate of growth of our labor force.

Now just a few words about immigration. The great importance of the waves in net immigration, that is, in the balance of immigrants over emigrants, in producing waves in labor force growth, especially before 1914, naturally leads one to ask what controlled the volume of immigration. The most likely answer is the state of the job market as judged, for example, by the rate of unemployment. Several reasons may be assigned for this plausible connection. Although the basic decision to immigrate is one that depends on an assessment of long-term opportunities in this country, the time of immigration is likely to be postponed if jobs in this country become scarce for any considerable period. New arrivals traditionally had the most difficulty in finding work. Secondly, when unemployment rose, the number of foreign-born who chose to return home would

naturally rise. Recent immigrants were often the first to be laid off. Thirdly, many immigrants who depended on relatives in this country for passage money, would have found such help harder to obtain when unemployment here was high.

Chart 4 shows that there was a considerable similarity between the long swings in unemployment, which I plotted in an inverted direction, so when unemployment goes down this chart of unemployment rates goes up, and those in immigration since 1900, provided we disregard the time during World War I, when the two indexes naturally moved in opposite directions. This connection also helps account for the lag of immigration and of labor force growth behind the curve of output growth. The unemployment rate naturally falls most rapidly when output rises at the fastest pace. But when the growth of output first begins to decline, the rate of growth is still likely to be higher than that of labor force growth. So, for a time at least, unemployment continues to sink and immigration to rise.

#### V. LONG SWINGS IN CAPITAL FORMATION

Long swings also characterize the growth of the stock of capital. We may judge this from figures, representing the volume of capital formation, portrayed in chart 5. Here we see that the great waves in the level of capital formation are to be found chiefly in the volume of construction, particularly in residential and railroad construction. These volumes of construction have moved within a range which is double or triple at the peak what it is at the trough. The same might be said of capital expenditures of public utilities which are thrown together with those of railroads in a similar graph in chart 6, which you will look at in a moment. In other branches of capital formation the long waves show themselves only in attenuated form. They appear as waves of acceleration and retardation in growth. Total gross capital formation displays swings of intermediate severity. They reflect the towering waves of residential and public utility construction, but their declines are cushioned and shortened by the milder responses of other kinds of investment.

An interesting sidelight of chart 5 is the behavior of the output of producers' durable equipment. The long wave responses in this category have become progressively more severe with the passage of time and, unfortunately, with the increasing importance of this kind of investment. In the 1870's and 1880's when the mechanization of U.S. industry was first beginning, and when purchases of mechanical equipment were still very small, but growing very rapidly, producers' durable equipment showed no long swing declines at all. In the 1890's the decline was very brief and mild. But the declines after 1907, in the early 1920's and the early 1930's, became progressively deeper and longer. It is plausible to suppose that this behavior reflects the increasing maturity of this type of investment expenditure. It was able to resist long swing declines when its primary growth rate was extremely steep, but became less capable of resistance as its long term rate of growth declined.

Chart 6 is designed to cast at least a dim light upon the causes of the great swings in capital formation in residential building and in transport and public utilities development. Both rise and fall in waves which correspond roughly with those in population growth.

The rationale of the connection between population growth and these types of construction is, of course, not far to seek. It would, however, be too simple to consider changes in population growth as the sole or even dominant cause of the waves in building. Nevertheless, the connection is sufficiently important to be worth emphasis even in this brief introduction to the long swings process.

In tables 7-A and 7-B we compare the timing of the peaks and troughs of the rate of growth of output with those of the volume of capital formation. In the pre-Civil War period (table 7-A), we must depend on a variety of indicators to gage the turning points in total capital formation. In table 7-B we have the help of estimates of aggregate capital formation, both net and gross. In both tables the great preponderance of the evidence suggests that the volume of capital formation reaches the peaks and troughs of its long swings later, often much later, than does the rate of growth of economic activity at large.

Senator BUSH. Which table?

Mr. ABRAMOVITZ. Table 7-A or 7-B, it does not matter. It is the same story in both of them for two different periods. If you just look down the columns you will see the dates in the lower portions of the column which represent peaks and troughs of capital formation are almost invariably later in time than the peaks and troughs in the rate of growth of economic activity.

Senator BUSH. How do you account for that?

Mr. ABRAMOVITZ. I am going to account for it in just a moment, Senator.

But I would like to point out what inference we ought to draw from this first.

From this we may conclude, as we did in the case of labor supply, that the long swings in the rate of growth of output cannot be due to the swings in the rate of growth of capital stock alone. It is not just that we are getting to have more capital to work with which permits us to raise our rate of growth of output. The latter begins to speed up when the volume of additions to capital stock is still declining and it begins to fall when the volume of additions to capital stock is still rising. The force of this conclusion is further strengthened by the reflection that we measure additions to capital stock by the volume of investment. The actual completion of workable units of capital stock, installing them in the factories, making them ready for use, bringing them in to a shape in which they are ready for use, however, necessarily lags behind the volume of investment by some time, long or short, depending upon the nature of the capital. So I have pointed out that the long swings in the rate of growth of output cannot depend simply on the rate of growth of stock of labor, supply of labor, nor on the long swings of the rate of growth of the stock of capital, and now I have to say something to explain this gap in the argument so far, and in the next section I am going to try to do that.

## VI. LONG SWINGS IN PHYSICAL OUTPUT, INPUT, AND PRODUCTIVITY

The fact that the long swings in the rate of growth of total output begin to rise while the growth of our stock of resources, both labor and capital, is still falling and begin to fall while the pace of resource growth is still rising can be accounted for by the behavior of the long

swings in productivity growth. Chart 7 displays curves representing the rate of growth of GNP, of an index of physical output (that is, of tangible commodities, not services), of an index of the total input of resources, including both labor and capital, and of an index of productivity (that is of output per unit of labor and capital combined).

Perhaps I ought to say a sentence about the meaning of total index resources that combines both labor and capital. I think the best way to grasp the meaning of such index of total input of resources is to think of it as an index which shows how total physical output would have behaved if the productivity of labor and capital had remained fixed and only the amounts of labor and capital utilized had been changed. We are getting a picture of how output would have changed if productivity had been constant. That is the real meaning of an index of total input. Then by dividing this input into output we obtain an indicator of output per unit of input, that is, of productivity.

Senator BUSH. Do you mind my asking you how you define input? I am not quite familiar with that.

Mr. ABRAMOVITZ. Perhaps the simplest way to think of it is as real man-hours of labor utilized. That is the chief component of this index of total input. It is an estimate of number of man-hours of labor actually used. This is also—

The CHAIRMAN. To what degree do you take capital into consideration?

Mr. ABRAMOVITZ. What is that, sir? Let me go on. With this there is combined an index of the amount of capital utilized and these two components of the resources which we use, labor and capital, have been weighted in a way which expresses their importance in the base period.

The CHAIRMAN. Do you use a system of weights by the amounts?

Mr. ABRAMOVITZ. As measured by the income going to these two.

The CHAIRMAN. Amounts they received?

Mr. ABRAMOVITZ. What is that, sir?

The CHAIRMAN. The amounts that are paid?

Mr. ABRAMOVITZ. The amounts that are paid for them. That is right. I should add that these figures which you are looking at now are the same figures of input and of productivity growth which Mr. Fabricant presented to you a couple of days ago.

Senator BUSH. Just one more question, Mr. Chairman.

The CHAIRMAN. Certainly.

Senator BUSH. How reliable are these figures on which you base these charts going back so far? I would like you to comment on that.

Mr. ABRAMOVITZ. It is difficult to frame a brief comment, sir.

Senator BUSH. Yes.

Mr. ABRAMOVITZ. It is difficult to frame a brief comment about that.

Senator BUSH. I will withdraw the question because we want to get on with this statement. I will withdraw the question.

Mr. ABRAMOVITZ. Chart 7 enables us to make a number of observations. In the first place, with minor qualifications, the long swings in physical output have been much like those in GNP. In the second place, the long swings in total input resemble those in physical output. Since the most important element in input is the number of man-hours of labor employed, this is, of course, only to be expected. As chart 7 and table 8 make clear, however, the fluctuations of total

input, in percentage points, are smaller than those in physical output. Indeed, the showing of table 8 in this respect would have been much more impressive had we measured the changes in the rate of growth of output for periods strictly comparable with the long swings in total input. The relative steadiness of total input implies a long swing in productivity growth. And as chart 7 indicates, the turning points of the long swings in total input and in productivity occur at about the same time as those in physical output. Table 9 confirms this observation and, indeed suggests that input may tend to move in long swings which are not only smaller than those of output but which also lag behind them by a short period. The result is that there is some evidence for the view that productivity growth tends to rise and fall in waves which precede those of output by a short interval. While these are the indications, the differences in time are neither long enough nor consistent enough to insist upon in view of the general crudity of our measures.

The CHAIRMAN. Dr. Abramovitz, may I ask a technical question on chart 7?

Mr. ABRAMOVITZ. Yes.

The CHAIRMAN. In your measurement of output per unit of input you seem to have that upon a negative scale, namely minus 2, and minus 4. Is that a typographical error?

Mr. ABRAMOVITZ. The scale for output per unit of input is on the right side of the chart, but I ought to have the negative figures on the left side removed, quite right.

The CHAIRMAN. All right.

Senator BUSH. That left-hand column then would apply to what?

Mr. ABRAMOVITZ. Each of these little graphs, Senator Bush, has its own scale on the left side. You will see that for total input there is a scale running from 0 to 4 more or less on the same level with the graph.

The CHAIRMAN. I suggest you put the unit of input on a different chart.

Mr. ABRAMOVITZ. Let me make an attempt to get the chart re-designed. You are quite right. There was some rush in preparing the charts.

We have it then that the tendency for long swings in the rate of growth of total output to precede those in the rate of growth of resources depends upon an equally early swing in the rate of growth of productivity. We must not suppose, however, that these long swings in productivity growth represent only, or even chiefly, an alternation in the rate at which advances in applied technology or in organizational techniques are exploited. The difficulty is that our measures do not isolate the effects of such progress on observed productivity growth from the effects of changes in the intensity of utilization of employed resources. We have already seen that there are long swings in unemployment rates, and we may take this to mean that there are also long waves in the intensity of resource use generally. Our measures of input and productivity do make some allowance for the intensity with which resources are used, for labor input is measured in terms of the number of man-hours actually employed. But they do not allow for changes in the intensity with which employed workers are used. They do not, in short, allow for changes in the flow of work. This is important even in the case of production workers in

industry. It is still more important in the case of nonproduction workers in industry, many of whom are kept on the job regardless of the state of demand.

Finally, the measures of input and productivity make no allowance for idle capital. Since, as we shall see below, the acceleration in the rates of growth of output and, therefore, of input, occur in good part in the course of recoveries from deep depressions, I am inclined to assign an important share of the responsibility for the concomitant accelerations in productivity growth to a rapid rise in the intensity of the use of employed resources. Similarly, I believe that one factor, perhaps the chief factor, which causes the rate of growth of productivity to slow down is that the economy approaches full utilization of its employed workers and of the stock of capital already installed. Thereafter, so long as nearly full utilization of employed resources is maintained, productivity can grow only in the degree that the quality of equipment and the organization of industry can be improved. Still later in each long swing, however, the rate of growth of productivity slows up still more. As we shall see, the culminating event of each long swing is the occurrence of a severe depression during which the load factor, so to speak, upon employed resources deteriorates, and this checks still more the observed rate of growth of productivity and sometimes pushes it down to negative figures.

Now I come to the question of the connection between long swings and severe depressions.

#### VII. LONG SWINGS AND SEVERE DEPRESSIONS

The connection between the long swings in economic growth and the occurrence of severe depressions was noted years ago by Arthur F. Burns (2). We may describe this connection in the following terms. The retardation phase of each long swing in output growth has culminated in a depression of unusual severity or in a succession of depressions of lesser severity interrupted by only short-lived or disappointing recoveries. The evidence supporting this generalization is somewhat more extensive than Burns was able to produce. Whereas Burns' survey was confined to the period beginning in the 1880's, the observations presented in table 10 go back to the second decade of the 19th century.

To select periods of severe depression, I have relied primarily upon Willard Thorp's famous book, "Business Annals." The manner in which Thorp characterized each year from 1812 to 1931 is reproduced in the appendix note to table 10. I used the National Bureau annual chronology of business-cycle peaks and troughs to determine the peak years preceding the beginning of severe depressions and the trough years preceding the beginning of sustained recovery. My selection of periods of severe depressions corresponds with Burns during the period he covered, that is, since 1870. Burns, however, considered that a depression had given way to recovery at the beginning of any business-cycle revival of whatever magnitude. He therefore took the severe slump beginning in 1892 to have ended in 1894 and that beginning in 1907 to have ended in 1908.

Guided by Thorp's "Annals" and, after 1900, also by Lebergott's estimate of unemployment (see chart 4 above), I assume that the re-

vivals of 1894-95 and of 1908-10 and 1911-13 were weak, incomplete, or transient and that sustained recoveries did not begin until 1897 and 1915, respectively. Let me add that this selection of severe depression would correspond to a selection which any economic historian would make, almost without reference to such a standard source as Thorp's "Business Annals." They represent the famous great depressions of our history.

The CHAIRMAN. In 1873 to 1879?

Mr. ABRAMOVITZ. Yes.

The CHAIRMAN. The years from 1893?

Mr. ABRAMOVITZ. That is correct. 1907 and on, 1920-21, and 1929-32. And before the Civil War the depression beginning around 1858 and ending around 1858, and before that 1837 down to 1843.

In table 10, I compare the peaks and troughs of the severe contractions with those of the long swings in the volume of capital formation as indicated by the weight of the evidence in tables 7-A and 7-B, and from 1892, by the behavior of total gross and net capital formation. The rationale of this comparison is the hypothesis that so long as the long-term demand for additional capital is strong and rising, business recessions will not cause, or be accompanied by, serious slumps in investment in durable equipment and construction. Business recessions will, therefore, tend to be mild and brief and recoveries will carry the economy back to full employment. Contrariwise, when the long-term demand for additional capital equipment slumps, depressions will be deep; revivals, if they occur, will be weak or transient and sustained recovery delayed.

If we may assume that the long-term demand for additional capital equipment is rising when the volume of long-term capital formation is in the upward phase of a long swing, then we should expect these periods to be free of serious depressions, but when the peaks of the long swings in capital formation have been reached and passed, we may expect a severe depression to occur. The period of depression, in turn, may be expected to last until the long swing in capital formation has turned up again. In short, the peaks and troughs of severe depressions may be expected to occur at about the same time as those of the long swings in long-term investment.

The general showing of table 10 is clearly consistent with these expectations. Of course, even if this hypothesis is valid, we have gone only a short step toward an explanation of the depth and duration of serious depressions. We still have to explain why there are long swings in the volume of long-term investment. The next section refers to some alternative lines of explanation.

#### VIII. FIVE BASIC CHRONOLOGIES IN THE LONG SWING PROCESS

It is now possible to draw together a good deal of the evidence presented in earlier sections and to attempt a brief description of the sequence in which certain important processes involved in the long swings take place. We do this by providing in table II a combined chronology of the peaks and troughs of the long swings in the various processes already discussed.

What emerges from a study of this chronology is the conclusion that there is a roughly uniform sequence of events during long swings, at

least with respect to the processes and occurrences described earlier. By and large events follow one another in a round indicated by the order in which the various processes are arranged in the table. Sustained recovery from depression brings a period of accelerated growth in productivity and output which is succeeded by retardation in growth fairly early in the course of the long swing.

The rates of growth of labor supply and capital stock, more particularly the stock of structures, however, keeps rising for some years after retardation in output and productivity growth begin. When additions to resources, especially the volume of additions to capital stock, begin to fall off, the economy drops into a severe and usually protracted depression. That of course is because additions to capital stock is another name for the level of investment and the level of investment is a large part of total expenditure.

In the course of that depression the secular rate of growth of output and productivity, that is the rate corrected for business cycles, falls still further. Though it reaches bottom fairly soon, the volume of additions to resources continues to fall for sometime. And not till the volume of capital formation enters a new long unswing does the economy enjoy sustained recovery from depression, a development which in turn drives the rate of growth of output and productivity to high levels once more.

The recurrent sequence of events just traced is a logical one, in the sense that each occurrence in the sequence helps account for the next. Let me mention a few of the more important connections.

To begin with, sustained recovery from depression leads to acceleration in output growth. This is, in part, a mere reflection of the increase in long-term investment and consumption which are normal parts of recovery. Still more, however, it reflects the need to build up inventories which were liquidated in the previous depression and are now needed to support higher levels of output and sales. The acceleration, finally, is facilitated by the existence of a large body of idle labor and capital.

Next, the rapid growth of output permits employed labor and existing equipment to be used more intensively. There is, therefore, a concomitant rise in the rate of growth of productivity.

The forces that make for acceleration of output and productivity growth, however, are necessarily self-limiting. The rate of growth of output must slow down after a time if only because existing capacity is becoming more fully employed. Bottlenecks appear, first at isolated points in the economy, and then with increasing frequency as full employment of labor and capital is approached. As the rate of growth output tapers off, inventory investment, which is closely tied to output, begins to decline, and this reduces the growth of demand.

Similar causes also act to inhibit the growth of productivity. Just as acceleration of productivity growth was based on more intensive utilization of employed labor and existing capital, the gradual disappearance of idle capacity and the need to hire additional workers forces productivity growth to depend more nearly exclusively on the progress of technology and organization.

The factors which bring acceleration in output growth to an end and lead to retardation, also act to promote a continued rise in the rate



of growth of resources. Foremost in importance are the decline in unemployment and the more intensive utilization of capital. The reduction of unemployment spurs the growth of the labor force, partly by encouraging a flow of immigrants and partly because many marginal members of the working force enter the labor market when jobs become easier to find in convenient places and at convenient hours.

Improvement in the job market also spurs population growth. This is in part the consequence of a rise in immigration. In part also, it reflects the response of the marriage rate and the birth rate to the greater security that accompanies a firm labor market.

The rise in population growth stimulates several important elements of long-term capital formation, namely, housing construction, public utility investment, and the building of community facilities. The gradual disappearance of idle capacity stimulates others, namely industrial and commercial construction. We should also note that when new industrial capacity is installed, it will not be distributed geographically in the same way as existing capacity was. The evolution of technology and markets dictates a geographical shift in production. This requires a redistribution of population and increases still more the need for residential, public utility and local government construction.

Indeed there is clear evidence of long swings in internal migration which accompany the long swings in the growth of resources.

So long as long-term investment expenditures continue to grow fast enough, they generate a rising demand for goods which absorbs our growing capacity to produce. The economy then enjoys a period of steady growth at a pace which is constrained by the growth of resources themselves and by the progress of technology and interrupted only by minor recessions. But if the growth of demand for additional durable capital tapers off enough, still more if it declines, the economy falls into a severe depression. There then ensues a progression of responses in the realms of productivity growth, population growth, and capital formation which causes the economy to operate below capacity for a protracted period.

While we can detect the logic in the progression of events during the long swings, and while it is patent that each event helps explain the occurrence of the next, such a recital as I have just made is woefully incomplete as a theory of the long swings as a whole. The most important missing element, among many, is an explanation of the fact that, after a time, the amounts we are adding to resources, particularly the volume of capital formation, cease to grow at an adequate rate, begin to fall, and so set the stage for depression. Why do these processes not settle down to a steady rate of advance which would sustain steady growth in demand and in output at large?

Several lines of explanation suggest themselves, and these must still be investigated. One stems from the observation made earlier that construction activity, especially residential, railroad, and public utility construction, has moved in long waves of about the same duration as that of our long swings in output growth. This leads to the hypothesis that there is something in the nature of the construction industry and of the real estate market which tends to produce a long cycle in

building. This long wave in construction may well be enough to account for the recurrence of severe and protracted depressions and for the long swings in productivity, output, and population growth which flow from them. Needless to say any such theory would need to take into account the reciprocal influence of events in the rest of the economy upon the construction industry itself.

Another line of explanation would place heavy emphasis on changes in money supply and other developments in the financial markets. Professor Friedman, who I understand will appear before this committee later in its sessions, has shown that there have been long swings in the rate of growth of the supply of money which have run along with, but lagged behind, those in the rate of growth of output. He has also shown that, whereas in ordinary recessions, there is mere retardation in the growth of the money supply, severe slumps were marked by an actual decline in the money stock. These facts can be fitted into the story already related without difficulty. We can put the case in the following terms. So long as the stock of money, corrected for business cycles, rises at a sufficient rate, prosperity is well maintained, and output rises steadily, subject only to minor recessions. Presumably, such steady growth would be traceable to the stimulus which rising money balances afford to expenditures of all kinds. But if the rate of growth of money balances falls below a certain level, a fortiori, if money stock declines, demand ceases to rise fast enough to absorb our growing capacity to produce, and investment expenditure then falls.

The CHAIRMAN. Mr. Abramovitz, how do you define the term "stock of money rising at a sufficient rate"? Do you mean that prices were steady or rising sufficiently to cause output to rise, or what?

Mr. ABRAMOVITZ. It has to rise at a rate which is sufficient with prices steady or at a rate which is sufficient, taking account of the rise in prices which may occur.

The CHAIRMAN. This raises a question.

Mr. ABRAMOVITZ. In short, the real demand for output has to grow and the real demand for output in Friedman's opinion is connected with the rate of growth of the money supply. That is with the rate of growth of real money balances held by people.

The CHAIRMAN. I do not want to anticipate what you said but the period 1897 to 1914 was one of very rapid increase in the gold supply and the money supply, a period of rising prices, but I will think you will find it was a period of a slowing down of the rate of economic growth, is not that true?

Mr. ABRAMOVITZ. From 1897 to 1914?

The CHAIRMAN. Yes.

Mr. ABRAMOVITZ. The period from the middle nineties to about 1900 was one of great acceleration but then from about 1900 on we suffered retardation in the rate of growth.

The CHAIRMAN. Yet that was a period in which the gold supply was rising, the money supply was rising, prices were rising?

Mr. ABRAMOVITZ. Quite true.

The CHAIRMAN. And yet economic growth was slowing down?

Mr. ABRAMOVITZ. Slowing down presumably because we had already mobilized our existing resources and so real output could not increase faster after that point than the growth of resources and productivity.

The CHAIRMAN. I am saying Mr. Friedman's explanation that you have to have an adequate increase in the supply of money certainly was not true in this period. You did have more than an adequate increase in the supply of money and yet the rate of growth slowed down.

Mr. ABRAMOVITZ. But it was sufficient in his opinion to keep demand high enough to absorb our growing resources and so to prevent the recurrence of a serious depression.

The CHAIRMAN. You mean if we had not had this development in the supply of gold we would have had a major collapse.

Mr. ABRAMOVITZ. You would have had a major collapse sooner.

The CHAIRMAN. That is hypothetical, I would say.

Mr. ABRAMOVITZ. These various explanations of the rate of growth, I am afraid, are hypothetical.

Representative REUSS. Is it not Mr. Friedman's point that while an adequate rise in the stock of money currency and demand deposits is necessary to sustain growth, the converse is not necessarily true, that is, you can have an adequate supply of money but for other reasons you may not get growth?

Mr. ABRAMOVITZ. For other reasons we might suffer retardation.

Representative REUSS. Would that be a fair statement of—

Mr. ABRAMOVITZ. That would be a fair statement of his position and up to that point one which I would support.

Representative REUSS. That answers by second question. Do I understand that you and Mr. Friedman are in agreement on this point, sir?

Mr. ABRAMOVITZ. That is right.

Representative REUSS. Thank you.

Mr. ABRAMOVITZ. If one asks what controlled the rate of growth of our money supply, Friedman's answer is that it was a set of accidents in gold discoveries and in the progress of technology in gold extraction combined with the vagaries of an often misguided monetary policy. It seems possible, however, that a more systematic explanation of the long swings of our money supply, and of their relation to the volume of expenditure and investment, may yet be devised when we can take into full account the impact of income growth on our trade balances, therefore, on the flows of gold, on the character of the assets necessarily absorbed by banks and other financial institutions, and on the volume of liquid assets demanded by business and households and supplied by finance and government.

Finally, a third line of explanation would attribute the severe depressions in investment and output to a variety of factors in the nature of accidents or episodic disturbances. In this view, our economy has a built-in tendency to grow steadily—minor recessions apart. But it has been upset from time to time by the aftereffects of great wars, by speculative excesses of obscure origin, and by financial panics whose occurrence cannot be tied in to the other events of long swings in a systematic way.

No one is now in a position to choose confidently among these possibilities. Indeed, it is certain that episodic disturbances have been and will be important even if there is some stable mechanism which causes long swings to recur.

These great gaps in explanation obviously reflect the fact that there are also great gaps in our empirical knowledge of long swings. My statement has stressed the physical side of these fluctuations. But there are numerous other aspects concerned with prices and costs, saving and finance, external trade and capital movements which are undoubtedly important. They need to be carefully measured and their behavior assimilated into a general description of the course of events during the long swings in economic development.

Thank you, Mr. Chairman.

(The tables and charts follow :)

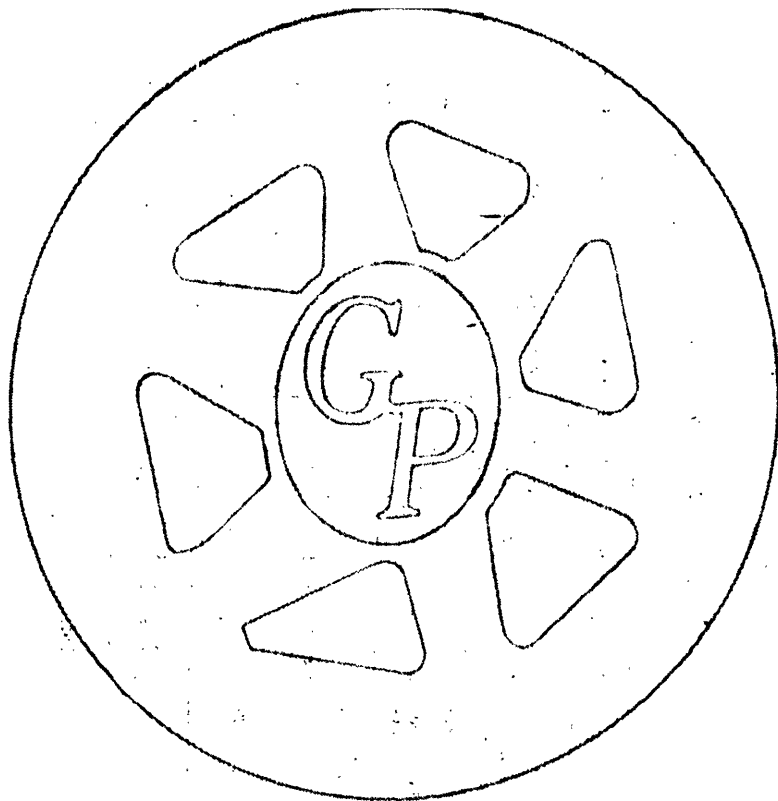


TABLE 1.—Rate of growth of economic activity—Peaks and troughs of rates of change between average reference cycle standings, selected series, 1860–1948

	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks
1. Gross national product, 1929 prices.....			<sup>1</sup> 1874.25	1886.5	1889.75	1892.25	1899	1911	1914.5	1920.25	1923	1930.25	1938.5		
2. Index of industrial production.....	<sup>2</sup> 1864.25	1874.25	1881	1884	1888	1892.25	1899	1906.75	1913.25	1920.25	1923	1930.25	1938.5		
3. Flow of goods to consumers, 1929 prices.....			<sup>1</sup> 1874.25	1888	1891	1892.25	<sup>2</sup> 1899	1914.5			1921.25	1930.25	1943.25		
4. Gross capital formation, 1929 prices.....			<sup>1</sup> 1874.25	1884	1889.75	1893.75	1899	<sup>2</sup> 1907.75	1917.25	1920.25	1923	1930.25	1938.5	1943.25	
5. Gross construction, 1929 prices.....		<sup>1</sup> 1874.25	1884	1886.5	1889.75	1893.75	1900	1914.5			1921.25	1930.25	1938.5	1943.25	1948.25
6. Nonfarm residential construction, 1929 prices.....		<sup>1</sup> 1874.25	1884		( <sup>2</sup> )	1899	1904	1917.25			1921.25	1930.25			1948.25
7. Capital expenditure in transportation and utilities, 1929 prices.....			<sup>2</sup> 1877.75	1884	1891	1893.75	<sup>2</sup> 1899	1914.5			1921.25	1932.25			
8. Urban building.....	1866.5	1874.25	1884			1892.25	<sup>2</sup> 1903	1917.25			1920.25				
9. Wholesale prices.....	1862	1869	1881	1884	1888	1894	1899	1911	1917	1921.25	1924	1928			1944.75
10. Money supply.....				1886.5	1889.75	1893.75	1899	<sup>2</sup> 1907.75	1917.25	1921.25	1924	1930.25	1943.25		
11. Net capital imports, 1929 prices.....	<sup>1</sup> 1866.25	1874.25			{ 1884 <sup>2</sup> 1886.5 }	21896.5	1907.75	1914.5			1920.25	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	
12. New incorporations.....		1868.75	1881	1884	1888	1892.25	<sup>2</sup> 1899	1913.5	1918.25	1921.25	1926	1936.75	1944.75	1949.5	
13. Common stock prices.....			<sup>2</sup> 1878			1893	<sup>2</sup> 1899	1913	1917	1920	1926	1930	1944	1949	
14. Railroad bond yields.....	1869	1878			1891	1899	1906.5	<sup>2</sup> 1913	1918	1921	<sup>2</sup> 1923				
15. Immigration.....	1864.25	1871.25	1877.75	1884	1889.75	1893.75	1899	<sup>2</sup> 1917.25			1920.25	1932.25			

<sup>1</sup> Tentative.

<sup>2</sup> Extra cyclical movement in this period.

<sup>2</sup> Series has inverted pattern after World War I.

TABLE 2.—Rate of growth of economic activity—Peaks and troughs of rates of change between average reference cycle standings, selected series, 1800-60<sup>1</sup>

	Peak	Trough	Peak	Trough	Peak	Trough
1. Urban building.....	(?)	(?)	<sup>1</sup> 1836	<sup>1</sup> 1838. 25	1845. 75	1858
2. Railroad construction.....	(?)	(?)	1838. 25	1842. 5	1845. 75	1860
3. Canal construction in New York, Pennsylvania, and Ohio.....	(?)	(?)	1838. 25	1842. 5	1848	(?)
4. Merchant vessels built.....	1814. 75	1819	1831. 25	<sup>4</sup> 1839. 75	1845. 75	1858
5. New incorporations.....	1812. 5	1816. 25	1833. 75	1839. 75	1849. 25	1856. 25
6. Federal land sales.....	1812. 5	1821. 25	1833. 75	1838. 25	1852. 25	(?)
7. Net capital imports <sup>6</sup> .....	1814. 75	1819	1833. 75	1838. 25	1849. 25	(?)
8. Immigration.....	(?)	(?)	1831. 25	1835. 75	1845. 75	1856. 25
9. Tonnage moved on New York canals.....	(?)	(?)	(?)	(?)	1845. 75	1856. 25
10. Anthracite coal production.....	(?)	(?)	(?)	1838. 25	1845. 75	1858
11. Bituminous coal production.....	(?)	(?)	1838. 25	1845. 75	1849. 25	1856. 25
12. Federal expenditures, civil and miscellaneous.....	<sup>1</sup> 1814. 75	1821. 25	1835. 75	1839. 75	1849. 25	1858
13. Federal expenditures, total.....	(?)	1816. 25	1835. 75	1842. 5	1845. 75	1849. 25 T 1854 P 1858 T
14. U.S. postal revenues.....	(?)	1819	1835. 75	1844	1848	1858
15. Value of merchandise imports.....	1814. 75	1819	1833. 75	1838. 25	1849. 25	1860
16. Value of merchandise exports.....	1814. 75	1819	1833. 75	1842. 75	1852. 25	1860
17. Deflated value of merchandise exports <sup>7</sup> .....	1821. 25	1831. 25	1839. 75	1844	<sup>8</sup> 1852. 25	(?)
18. Money supply in hands of public.....	(?)	(?)	(?)	<sup>1</sup> 1839. 75	1845. 75	<sup>1</sup> 1858
19. Wholesale prices.....	<sup>1</sup> 1812. 5	1819	1835. 75	1839. 75	1852. 25	1858
20. Bank and insurance company stock prices.....	(?)	1825	1831. 25	1838. 25	(?)	(?)
21. Commercial paper rates, Boston and New York.....	(?)	(?)	(?)	<sup>1</sup> 1839. 75	1845. 75	<sup>1</sup> 1858
22. Railroad stock prices.....	(?)	(?)	(?)	(?)	<sup>1</sup> 1845. 75	1856. 25

<sup>1</sup> Dates expressed in whole years refer to years with midpoints at June 30. Dates expressed in whole years plus fractions have midpoints later than June 30 by the specified fraction of a year.

<sup>2</sup> The series did not cover the period in the neighborhood of the turning point.

<sup>3</sup> Tentative.

<sup>4</sup> 1835.75 slightly lower.

<sup>5</sup> The cycle was skipped.

<sup>6</sup> Based on absolute changes per annum.

<sup>7</sup> An inverted series in most of this period in terms of rate of growth.

<sup>8</sup> 1854 identical with 1852.5.

TABLE 3.—Peaks and troughs of long swings in the rate of growth of output and economic activity; duration of the long swings, 1815-1940

Peak	Trough	Duration (in years) of long swings in the rate of growth of economic activity			
		Expansion	Contraction	Full cycle	
				Peak to peak	Trough to trough
1814.....	1819.....		5		
1834.....	1840.....	15	6	20	21
1846.....	1858.....	6	12	12	18
1864.25.....	1874.25.....	6.25	10	18.25	16.25
1881.....	1886.5.....	6.75	5.5	16.75	12.25
1899.75.....	1892.25.....	3.25	2.5	8.75	5.75
1899.....	1911.....	6.75	12	9.25	18.75
1914.5.....	1920.25.....	3.5	5.75	15.5	9.25
1923.....	1930.25.....	2.75	7.25	8.5	10.0
1938.5.....		8.25		15.5	
Average, all cycles.....		5.21	7.33	13.83	13.91
Average, since 1874.....		6.5	6.6	12.38	11.2

TABLE 4.—Amplitude of long swings in rates of growth of gross national product and its major components, 1871-1950

Series	Average change in rate of growth from—		Long-term rate of growth	Relative amplitude	
	Peak to trough	Trough to peak		Peak to trough <sup>1</sup>	Trough to peak <sup>2</sup>
	(1)	(2)	(3)	(4)	(5)
	<i>Percentage points</i>	<i>Percentage points</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Gross national product.....	4.25	3.80	3.76	113.03	101.06
Net national product.....	4.64	4.17	3.65	127.12	114.25
Consumer durables.....	6.98	7.74	4.22	165.40	183.41
Consumer perishable and semidurables.....	3.71	3.27	3.57	103.92	91.60
Consumer services.....	5.82	5.10	3.98	146.23	123.14
Total gross capital formation.....	9.83	11.51	3.55	276.90	324.23
Net capital formation.....	27.81	25.70	2.34	1,188.46	1,098.29
Producer durables.....	10.98	11.67	4.66	235.62	250.43
Total gross construction.....	15.32	15.46	3.15	486.35	490.79

<sup>1</sup> Col. (1) + col. (3) × 100.<sup>2</sup> Col. (2) + col. (3) × 100.

TABLE 5.—Share of changes in net immigration and natural increase in changes in total population increase, overlapping decades, 1870-1955

Period <sup>1</sup>	Changes in—			Proportion of change in total population increase due to—	
	Natural increase	Net immigration	Total population increase	Natural increase	Net immigration
	<i>Millions of persons</i>	<i>Millions of persons</i>	<i>Millions of persons</i>	<i>Percent</i>	<i>Percent</i>
1875-85.....	0.17	1.27	1.44	11.81	88.19
1890-90.....	.82	.93	1.75	46.86	53.14
1895-95.....	.68	-1.22	-.54	-125.93	225.93
1890-1900.....	.27	-.72	-.45	-60.00	160.00
1895-1905.....	0	.88	.88	0	100.00
1900-10.....	.97	2.02	2.99	32.44	67.56
1905-15.....	1.18	.14	1.32	89.39	10.61
1910-20.....	-.54	-2.46	-3.00	18.00	82.00
1915-25.....	1.40	-1.07	.33	424.24	-324.24
1920-30.....	1.35	.54	1.89	71.43	28.57
1925-35.....	-3.02	-2.04	-5.06	59.68	40.32
1930-40.....	-1.90	-.95	-2.85	66.67	33.33
1935-45.....	2.40	.23	2.63	91.25	8.75
1940-50.....	5.44	.58	6.02	90.37	9.63
1945-55.....	4.96	.82	5.78	85.81	14.19

<sup>1</sup> Figures refer to the change in each category compared with a decade beginning 5 years earlier.

TABLE 6.—Relative timing of peaks and troughs of long swings in rate of growth of economic activity or output additions to total labor force and immigration, 1846-1940

	Turning points			Lead (-) or lag (+) (in years) relative to rate of growth in activity	
	Rate of growth of output	Additions to labor force	Immigration	Labor force additions	Immigration
Peak.....	1846	(1)	1851.5	(1)	+6.5
Trough.....	1856	(1)	1859.5	(1)	+1.5
Peak.....	1864.25	(1)	1871	(1)	+6.75
Trough.....	1874.25	(1)	1874.25	(1)	0
Peak.....	1881	1884.5	1881	+3.5	0
Trough.....	1886.5	1886.5	1886.5	0	0
Peak.....	1889.75	1893.5	1891	+4.25	+1.25
Trough.....	1892.25	1896.5	1895	+4.25	+2.75
Peak.....	1899	1906.5	1905	+7.5	+6.0
Trough.....	1911	1919.5	1919	(2)	(2)
Peak.....	1914.5	(2)	(2)	(2)	(2)
Trough.....	1920.25	(2)	(2)	(2)	(2)
Peak.....	1923	1924.5	1924.5	+1.5	+1.5
Trough.....	1930.25	1935.5	1935	+5.25	+4.75
Peak.....	1938.5	.....	1945	(2)	+6.5

<sup>1</sup> Not available.  
<sup>2</sup> Both labor force growth and immigration continued to decline after the upturn of output growth due to causes connected with World War I.  
<sup>3</sup> Turning point skipped.  
<sup>4</sup> Last observation.

TABLE 7-A.—Peaks and troughs in the rate of growth economic activity and in the volume of additions to capital stock, pre-Civil War period <sup>1</sup>

	Peak	Trough	Peak	Trough	Peak	Trough
1. Economic activity (rate of growth).....	1814.0	1819.0	1834.0	1840.0	1846.5	1858.0
2. Urban building.....	(2)	(2)	<sup>3</sup> 1836.0	1842.0	1854.5	1864.0
3. Railroad mileage added.....	(2)	(2)	1840.5	1844.5	1856.5	1862.0
4. Canal construction New York, Pennsylvania, and Ohio.....	(2)	(2)	1840.5	1846.0	1856.5	(2)
5. Merchant vessels built.....	1816.5	1821.5	1834.0	1842.0	1854.5	1859.5
6. Net capital imports.....	1816.5	1824.5	1836.0	1847.0	1854.5	(2)
7. New incorporations.....	1814.5	1821.5	1837.5	1842.0	1854.5	1859.5
8. Federal land sales.....	1818.0	1824.5	<sup>4</sup> 1836.0	1850.0	1854.5	(2)

<sup>1</sup> Dates expressed in whole numbers refer to years with midpoints at June 30. Dates expressed in mixed numbers have midpoints later than June 30 by the specified fraction of a year.  
<sup>2</sup> Series did not cover the period in question.  
<sup>3</sup> Initial or terminal observation.  
<sup>4</sup> Cycle was skipped.  
<sup>5</sup> Extra cyclical movement in the period.



TABLE 7-B.—Peaks and troughs in the rate of growth of economic activity and in the volume of additions to capital stock, post-Civil War period<sup>1</sup>

	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak
1. Economic activity (rate of growth).....	1884. 25	1874. 25	1881. 0	1896. 5	1899. 75	1902. 25	1909. 0	1911. 0	1914. 5	1920. 25	1923. 0	1930. 25	1938. 5
2. Net capital formation, 1929 prices.....	(?)	(?)	(?)	(?)	1901. 0	1905. 0	1905. 0	<sup>2</sup> 1912. 5	1919. 0	1921. 5	1925. 5	1935. 0	1940. 5
3. Gross capital formation, 1929 prices.....	(?)	(?)	(?)	(?)	1892. 5	1895. 0	(?)	(?)	1919. 0	1921. 5	1927. 5	1932. 0	<sup>4</sup> 1961. 5
4. Producer durable equipment, 1929 prices.....	(?)	(?)	(?)	(?)	1892. 5	1903. 5	1906. 0	1908. 5	1919. 0	1921. 5	1927. 5	1932. 0	1948. 0
5. Residential construction, 1929 prices.....	(?)	(?)	(?)	(?)	1898. 5	1901. 0	1906. 0	(?)	(?)	1919. 0	1925. 5	1935. 0	<sup>4</sup> 1955. 0
6. Urban building permits.....	1871. 0	1877. 5	(?)	(?)	1891. 0	1901. 0	1909. 5	(?)	(?)	1919. 0	1925. 5	(?)	(?)
7. Capital expenditures on transport and public utilities, 1929 prices.....	1871. 0	1877. 5	1881. 5	1884. 5	1892. 5	1895. 0	1911. 5	(?)	(?)	1919. 0	1927. 5	1935. 0	(?)
8. Net capital imports.....	1871. 0	1881. 5	(?)	(?)	1898. 5	1901. 0	1909. 5	(?)	(?)	(?)	(?)	(?)	(?)

<sup>1</sup> Dates expressed in whole numbers refer to years with midpoints at June 30. Dates expressed in mixed numbers have midpoints later than June 30 by the specified fraction of a year.

<sup>2</sup> Cycle was skipped.

<sup>3</sup> 1909.5 was slightly lower.

<sup>4</sup> Initial or terminal observation.

<sup>5</sup> Series did not cover the period in question.

<sup>6</sup> Omitted because of irregularity of behavior after World War I.

TABLE 8.—Amplitude of long swings in rates of growth of physical output, total input and productivity, 1892-1953

Series	Average change in rate of growth between—		Long-term rate of growth	Relative amplitude	
	Peak and trough	Trough and peak		Peak to trough col. (1) + (3)	Trough to peak col. (2) + (3)
	(1)	(2)		(4)	(5)
Total input.....	Percent 4.44	Percent 3.70	Percent 1.67	Percent 265.87	Percent 221.56
Gross physical output.....	4.76	4.93	3.36	141.67	148.73
Output per weighted unit of labor and capital combined.....	1.73	1.91	1.67	103.59	114.37

TABLE 9.—Peaks and troughs of long swings in the rates of growth of output, input and productivity, 1892-1953<sup>1</sup>

	Turning points of long swings in rates of growth of—			Lead (–) or lag (+), in years, relative to turning points in physical output	
	Physical output	Total input	Productivity	Input	Productivity
Trough.....	(t) 1892.5	1893.75	(t) 1892.5	+1.25	0
Peak.....	1899	1900	1896.5	+1.00	-2.5
Trough.....	1906.75	1907.75	1907.75	+1.00	+1.0
Peak.....	1911	1910	1910	-1.00	-1.0
Trough.....	1914.5	-----	1913.5	-----	-1.0
Peake.....	1917.25	-----	1918.25	-----	+1.0
Trough.....	1920.25	1920.25	1920.25	0	0
Peak.....	1923	1923	1923	0	0
Trough.....	1930.25	1930.25	1927.5	0	-2.75
Peak.....	1936.75	1938.5	1938.5	+1.75	+1.75
Trough.....	1948.25	-----	1944.75	-----	-3.50
Peak.....	1949.5	-----	1949.5	-----	0

<sup>1</sup> Dates expressed in whole numbers refer to years with midpoints at June 30. Dates expressed in mixed numbers have midpoints later than June 30 by the specified fraction of a year.

Source: See appendix notes.

TABLE 10.—Chronology of severe contractions compared with peaks and troughs of long swings in capital formation

Peaks in capital formation	Peak years preceding severe contractions	Troughs in capital formation	Trough years preceding sustained recovery
(1)	(2)	(3)	(4)
1815-18.....	1815	1821-24	1821
1836-37.....	1836	1842-44	1843
1854-55.....	1853	1862-64	1856
1871.....	1873	1877-78	1878
	1882	-----	1885
1892-93.....	1892	1895	1896
1906.....	1907	1912-13	1914
1919.....	1920	1921-22	1921
1927-28.....	1929	1933	1932

Sources: Capital formation, tables 7-A and 7-B; severe contractions, see text and app. note to table 10.

TABLE 11.—A chronology of the peaks and troughs in 5 basic aspects of the long swings in economic growth

## LONG SWING PEAKS

Rate of growth of productivity	Rate of growth of output	Volume of additions to labor force	Volume of additions to capital stock = capital formation	Years preceding severe contraction
(1)	(2)	(3)	(4)	(5)
(1)	1814	(1)	1815-18	1815
(1)	1834	(1)	1830-7	1830
(1)	1846	1851.5	1854-5	1853
(1)	1864.25	1871	1871	1873
(1)	1881	1884.5	(2)	1882
(1)	1889.75	1893.5	1893-3	1892
1896.5	1899	1906.5	1906	1907
(3)	1914.5	(3)	1919	1920
1923	1923	1924.5	1927-8	1929
1938.5	1938.5	(4)	(5)	(5)

## LONG SWING TROUGHS

Rate of growth of productivity	Rate of growth of output	Volume of additions to labor force	Volume of additions to capital stock = capital formation	Years preceding sustained recovery
(6)	(7)	(8)	(9)	(10)
(1)	1819	(1)	1821-4	1821
(1)	1840	(1)	1842-4	1843
(1)	1858	1859.5	1862-4	1858
(1)	1874.25	1874.25	1877-8	1878
(1)	1896.5	1896.5	(2)	1885
1892.5	1892.25	1896.5	1895	1896
1907.75	1911	1919.5	1912-13	1914
1920.25	1920.25	(3)	1921-2	1921
1927.5	1930.25	1935.5	1933	1932

Not available.

<sup>1</sup> Turning point skipped or, at end of table, not yet reached.

<sup>2</sup> Extra movement makes comparison with GNP impossible.

Sources: Cols. (1) and (6), table 8; cols. (2) and (7), table 8; cols. (3) and (8), table 6; cols. (4) and (9), table 10; cols. (5) and (10), table 10.

CHART 1A

GROSS NATIONAL PRODUCT IN 1929 PRICES, 1869-1953; ANNUAL DATA AND AVERAGE REFERENCE CYCLE STANDINGS

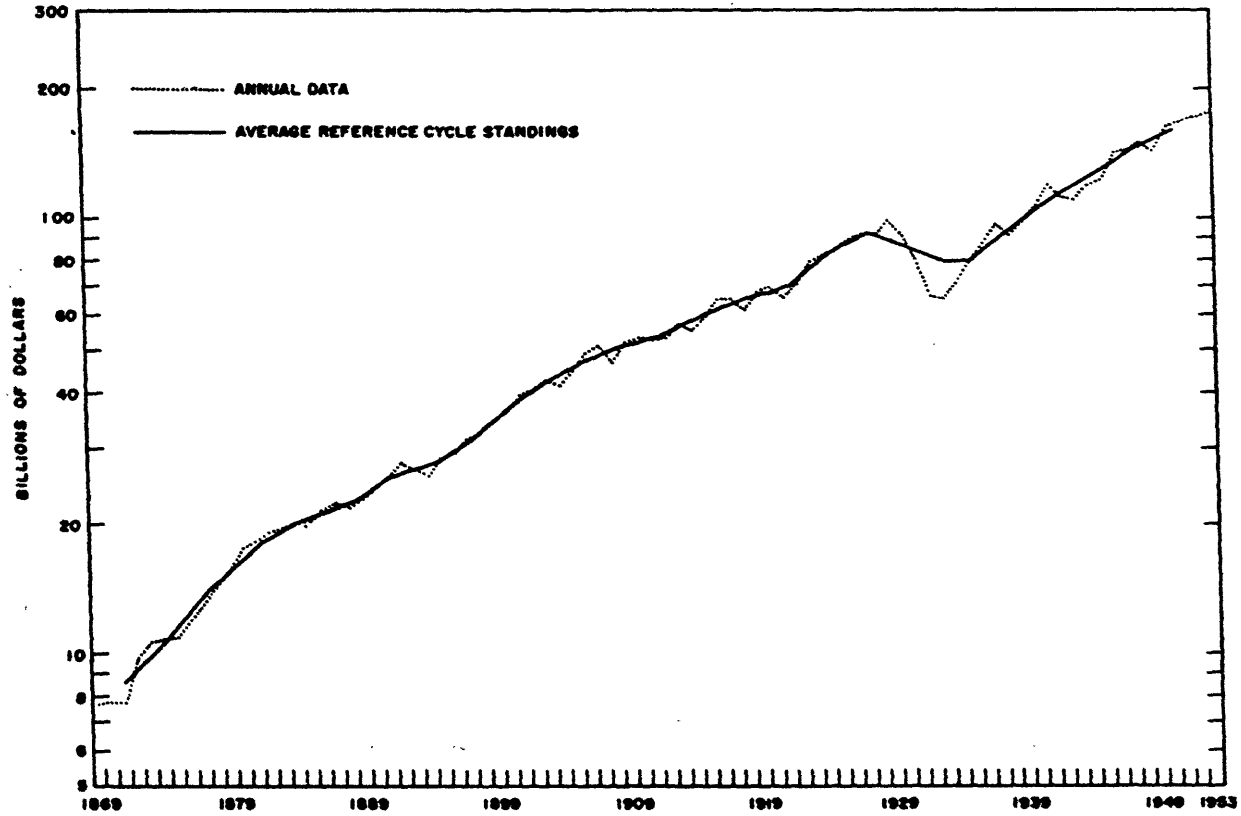


CHART 16  
GROSS NATIONAL PRODUCT IN 1929 -PRICES; RATES OF GROWTH PER ANNUM  
BETWEEN AVERAGE REFERENCE CYCLE STANDINGS

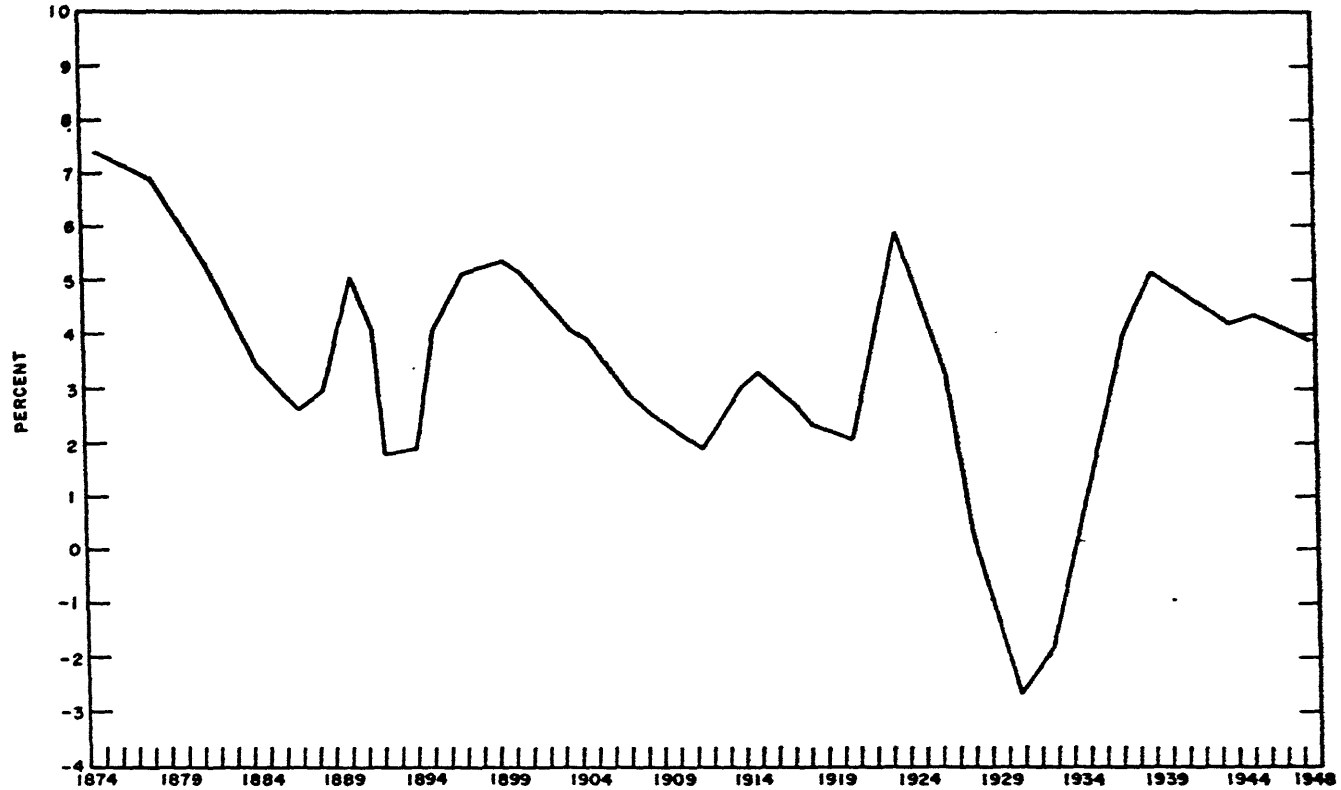


CHART 2

SELECTED INDICATORS OF ECONOMIC ACTIVITY, 1860-1950.  
RATES OF GROWTH PER ANNUM BETWEEN AVERAGE REFERENCE CYCLE STANDINGS

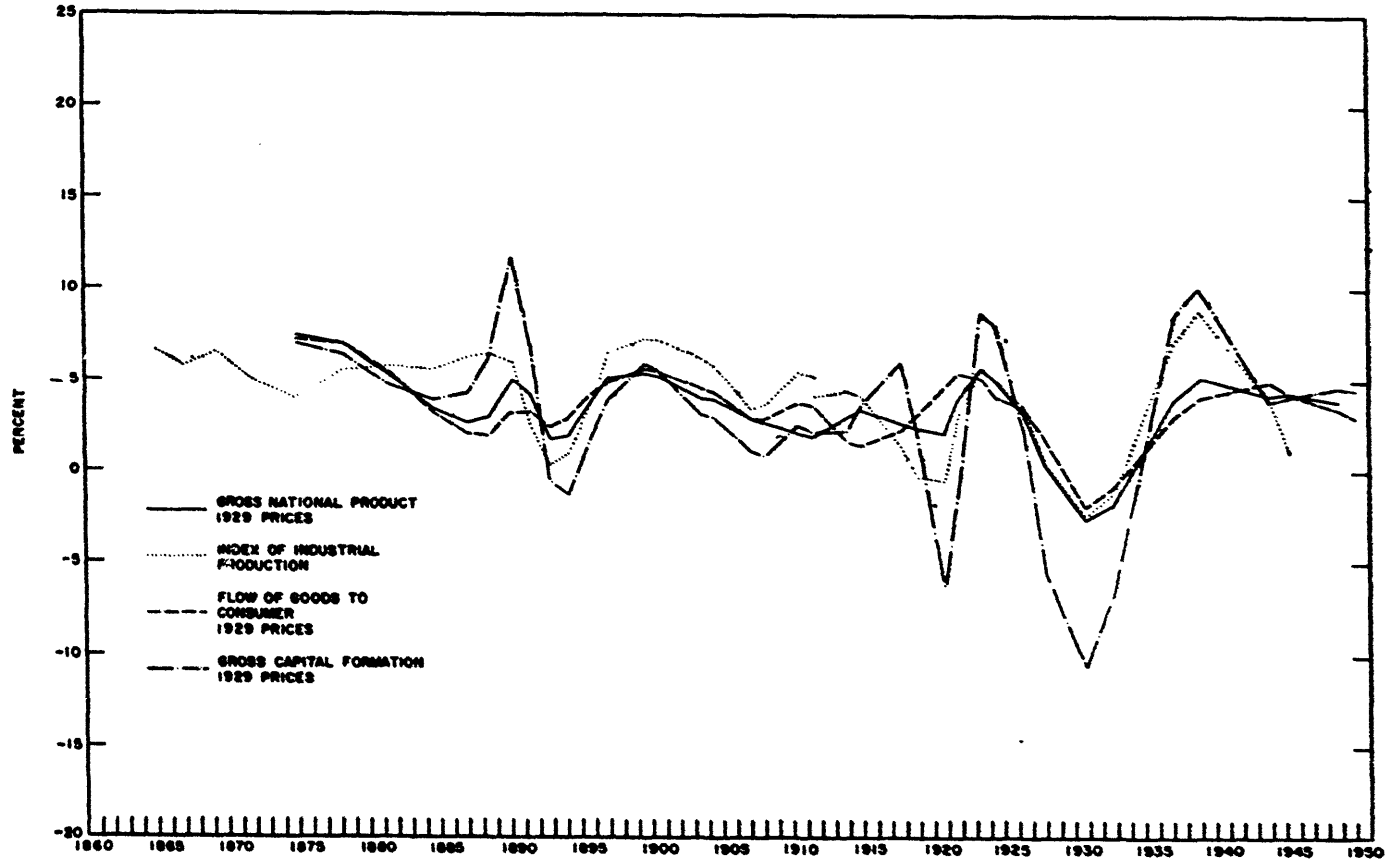


CHART 2 (Continued)

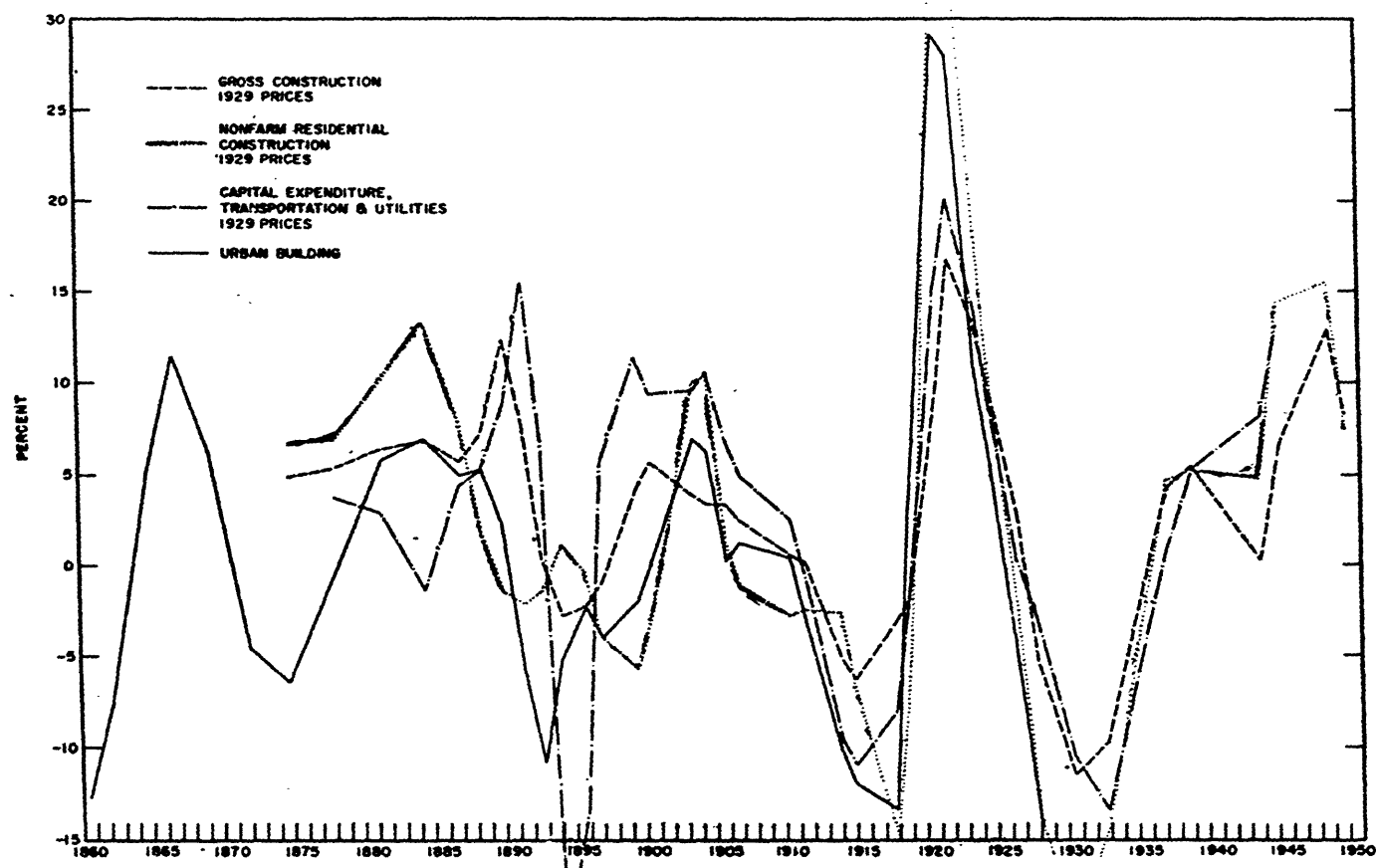


CHART 2 (Continued)

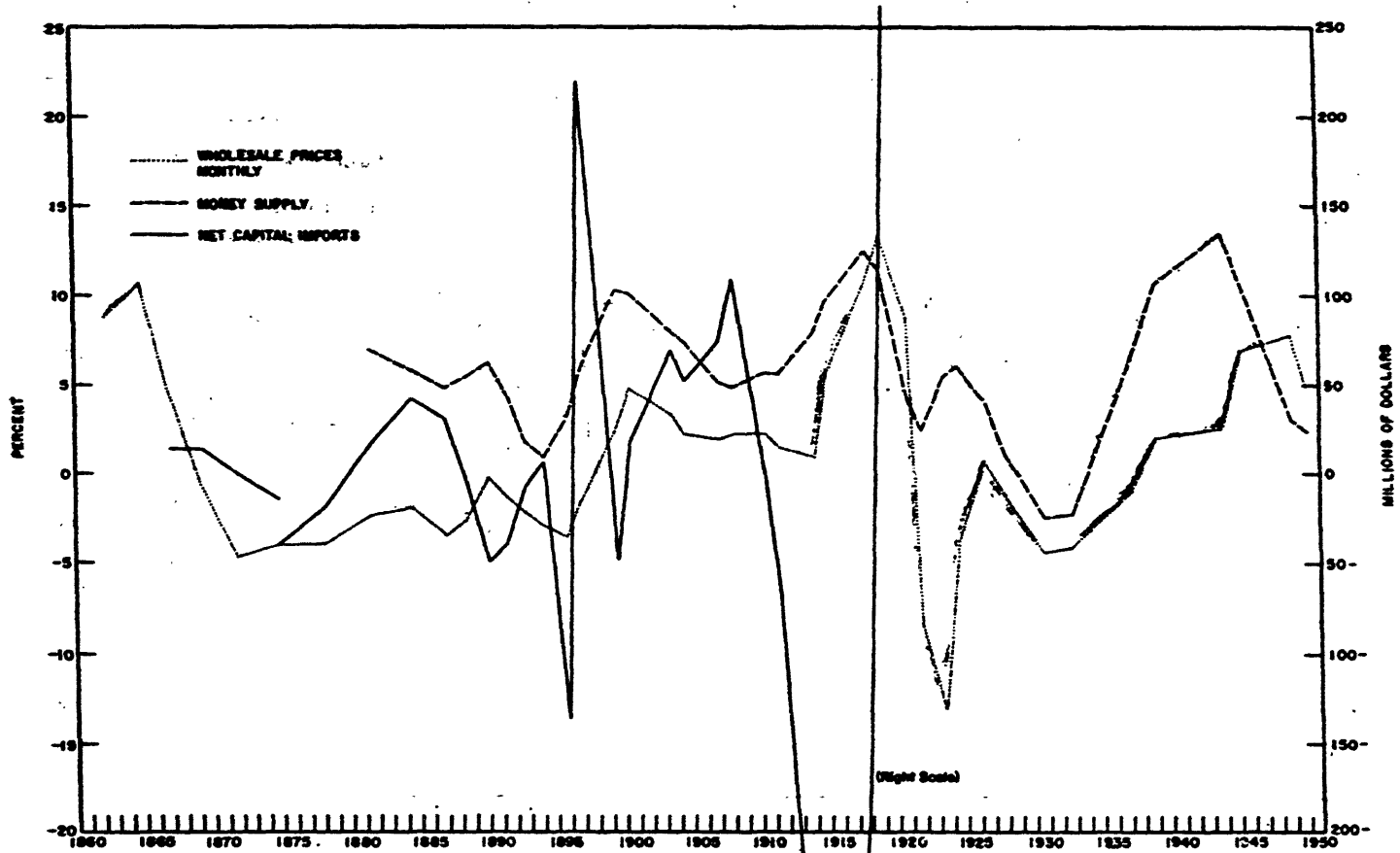
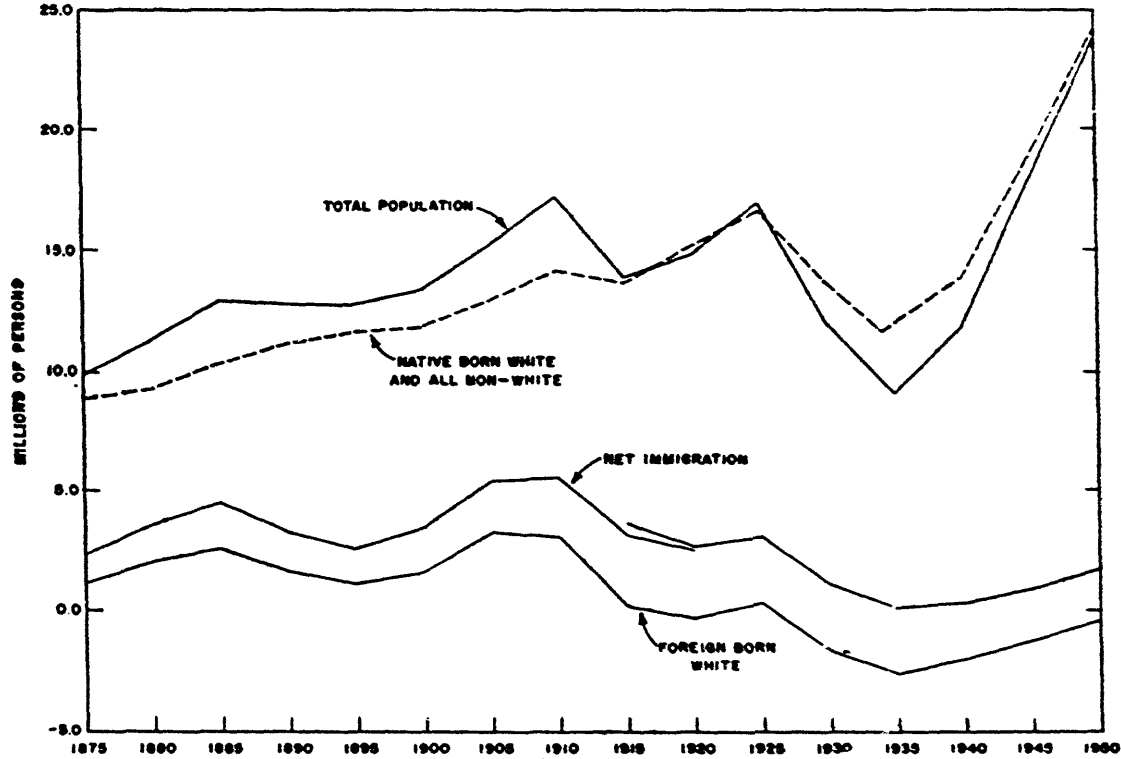






CHART 3  
NET ADDITIONS TO POPULATION BY NATIVITY  
AND NET IMMIGRATION, OVERLAPPING DECADES, 1875-1950



\* DATES INDICATE THE MID-POINTS OF DECADE INTERVALS: 1875-80, 1875-85, ETC.

CHART 3A

CHANGES IN NATURAL INCREASE, NET IMMIGRATION  
AND TOTAL POPULATION INCREASE, OVERLAPPING DECADES, 1877-1947

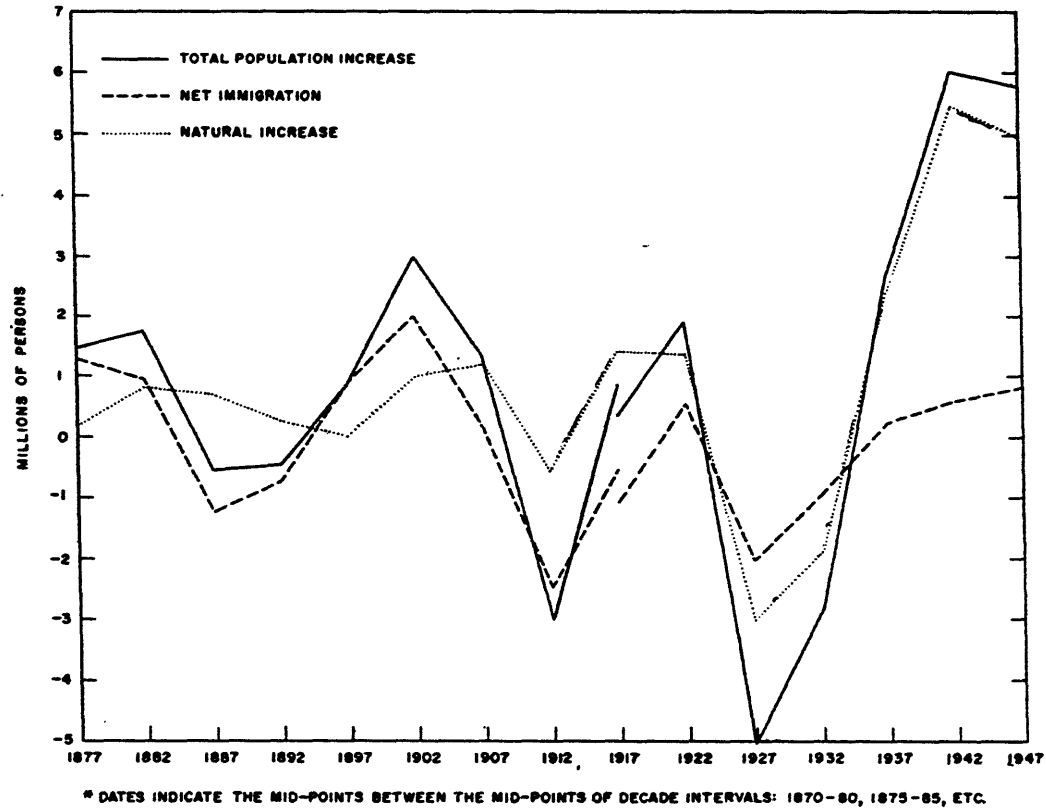


CHART 4

ADDITIONS TO THE TOTAL LABOR FORCE, IMMIGRATION AND NON-FARM UNEMPLOYMENT RATES;  
AVERAGE REFERENCE-CYCLE STANDINGS, 1871 - 1955

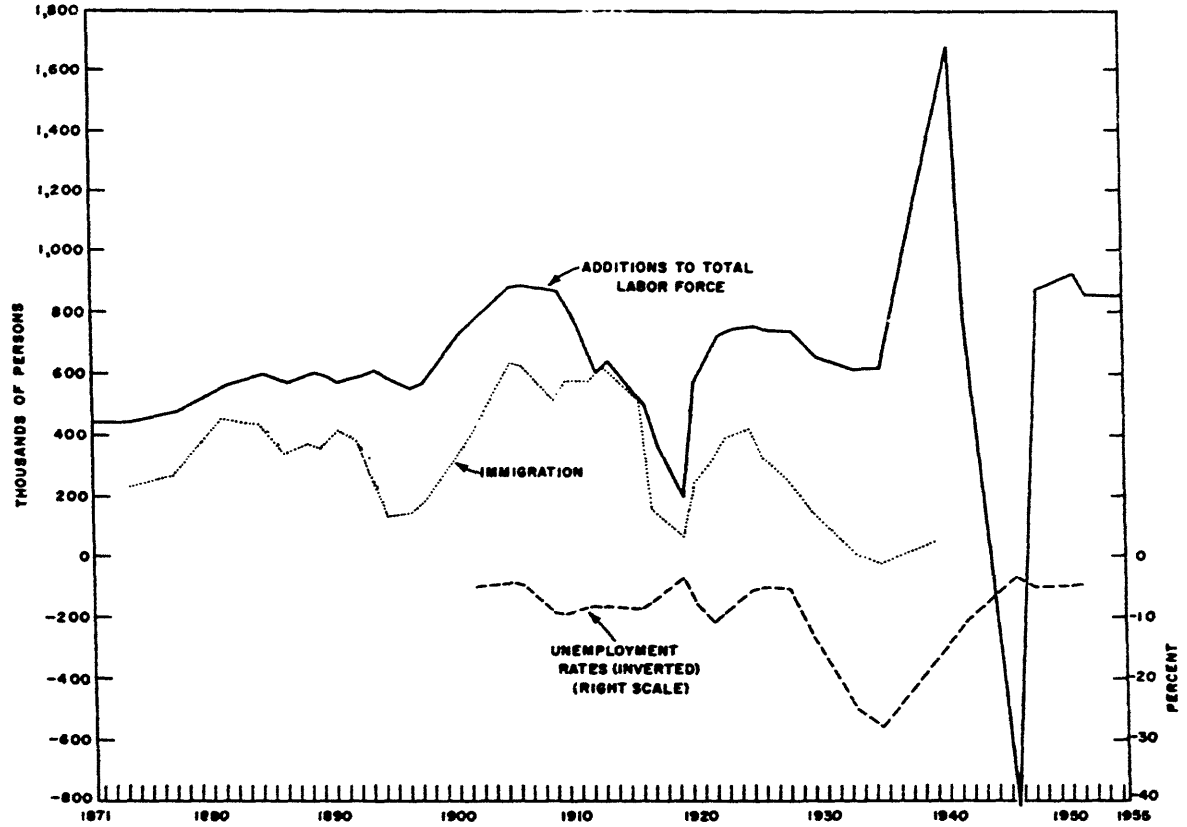


CHART 4A  
IMMIGRANTS FROM ALL COUNTRIES;  
AVERAGE REFERENCE-CYCLE STANDINGS, 1824-1881

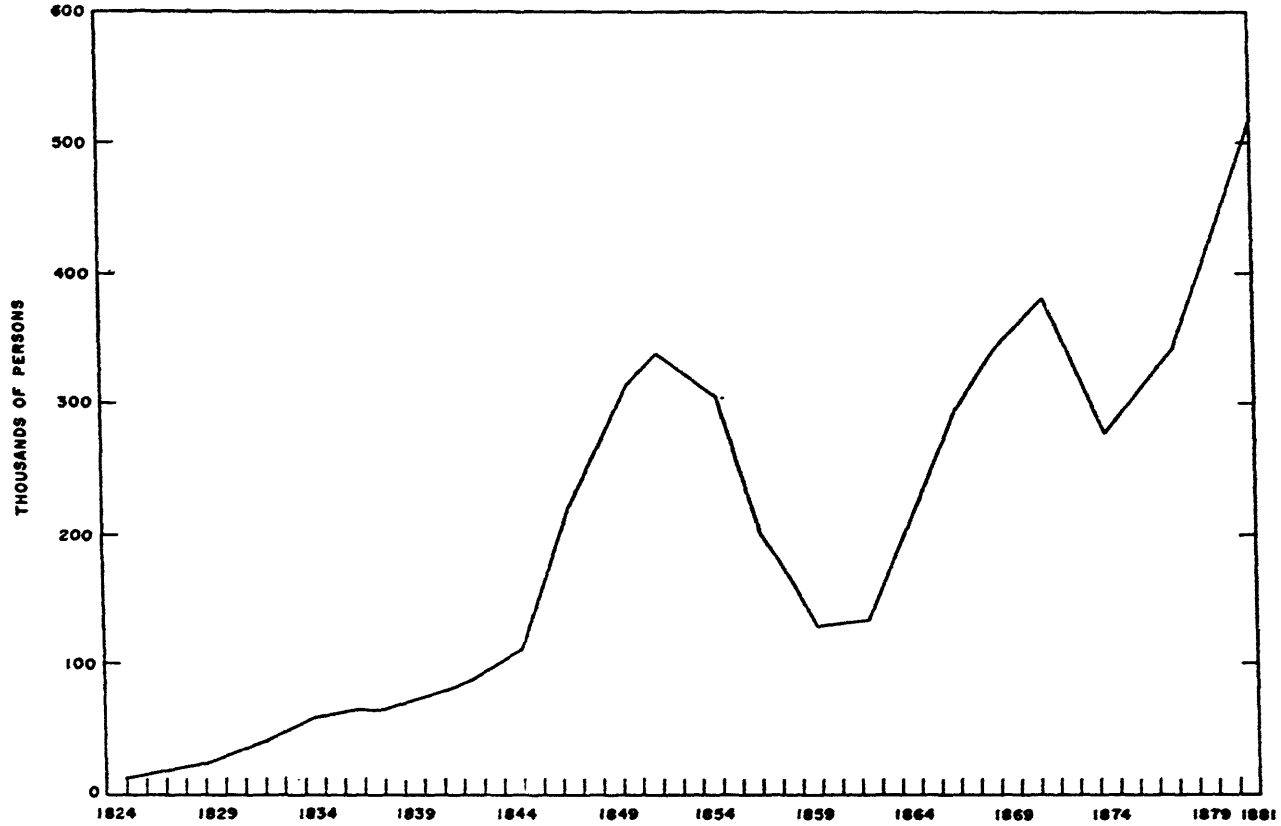


CHART 5

GROSS CAPITAL FORMATION AND ITS COMPONENTS (1929 PRICES)  
AVERAGE REFERENCE-CYCLE STANDINGS, 1871-1951

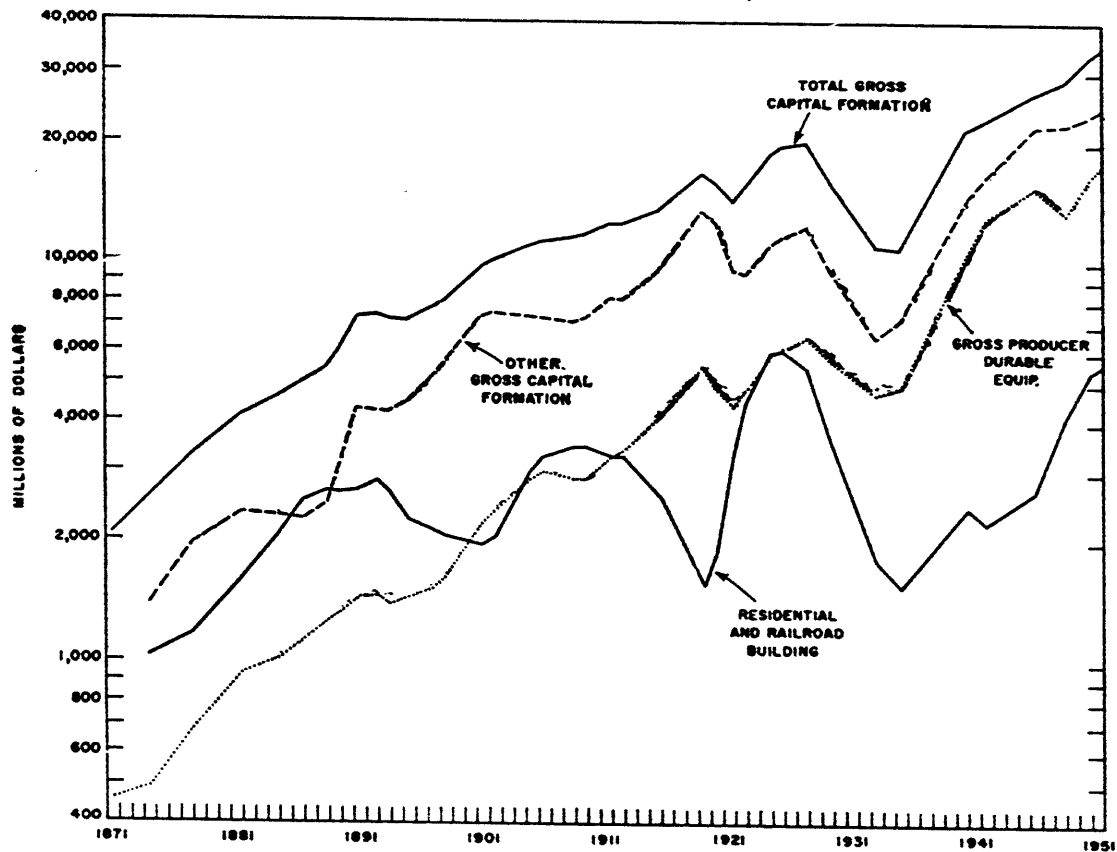


CHART 6

RESIDENTIAL CONSTRUCTION AND CAPITAL EXPENDITURES BY RAILROADS  
AND PUBLIC UTILITIES (1929 PRICES) AND ADDITIONS TO POPULATION,  
AVERAGE REFERENCE-CYCLE STANDINGS, 1871-1955

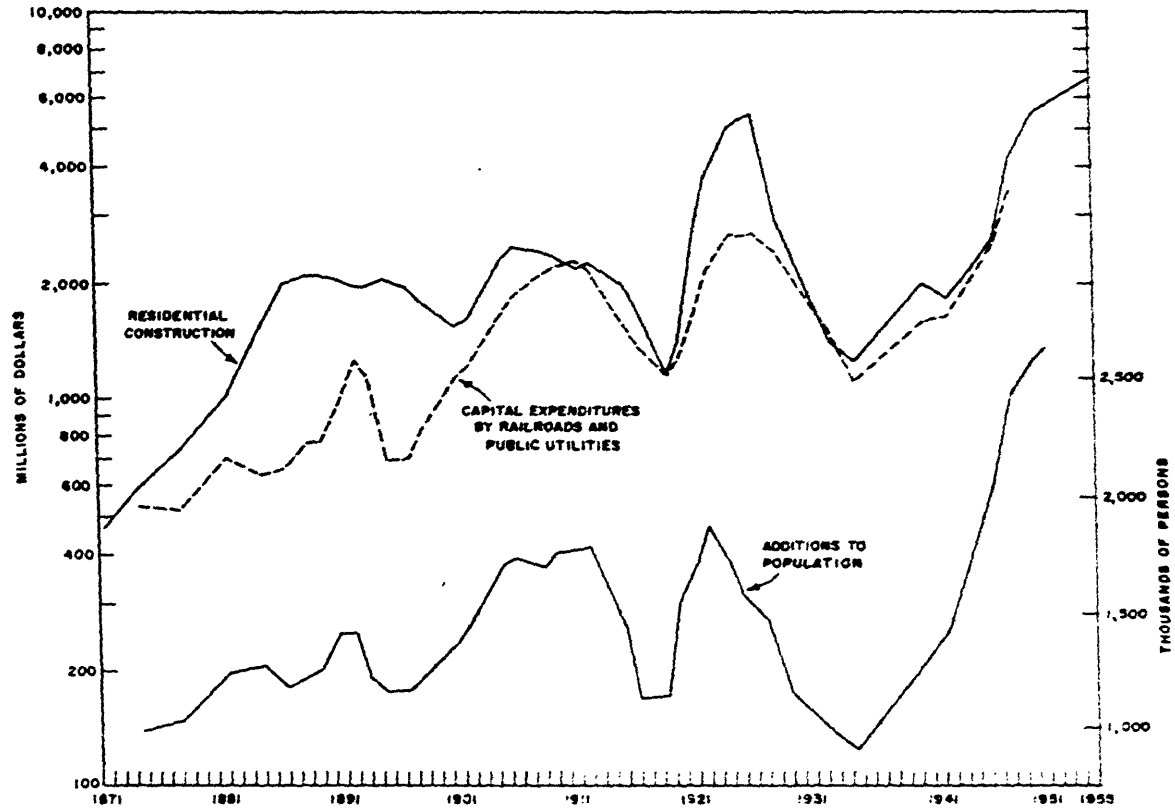
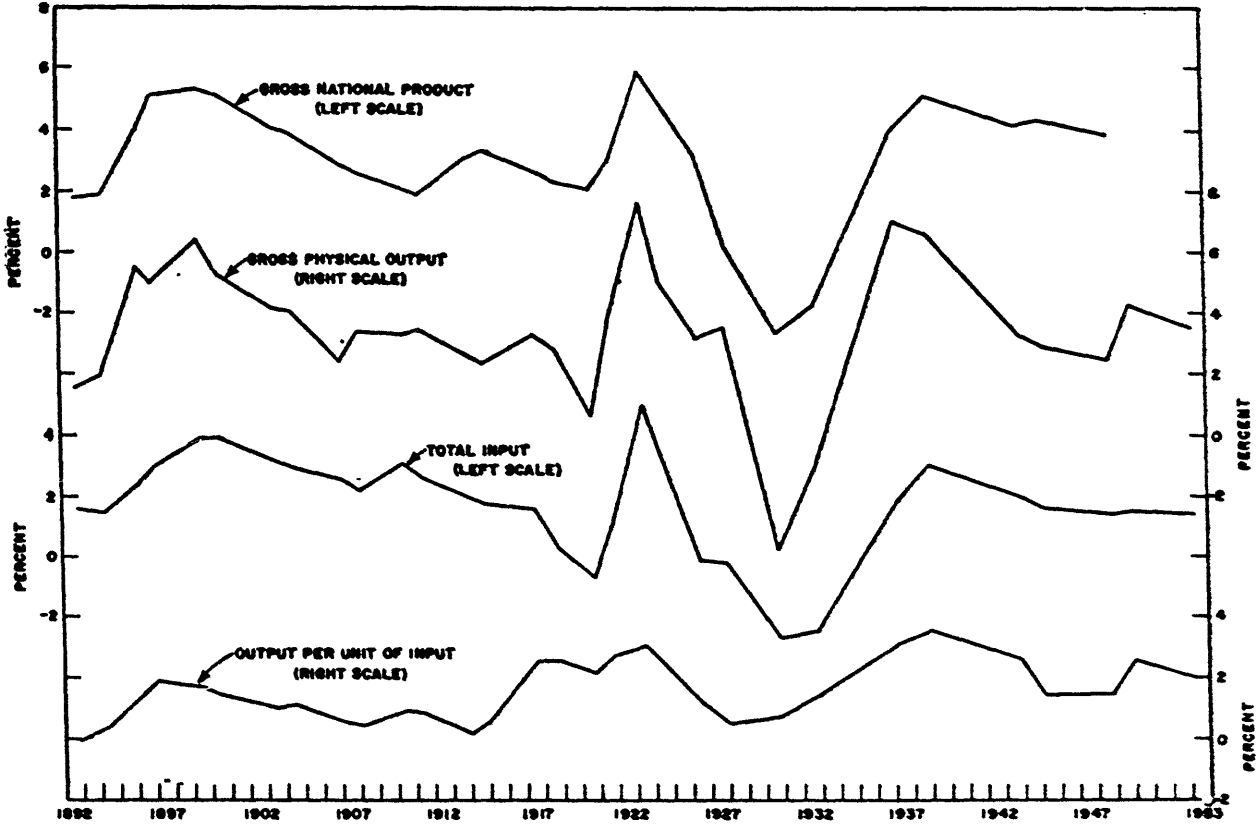


CHART 7  
 OUTPUT, INPUT AND PRODUCTIVITY, RATES OF GROWTH PER ANNUM  
 BETWEEN AVERAGE REFERENCE-CYCLE STANDINGS, 1892-1953





## SOURCE NOTES FOR TABLES AND CHARTS

The following notes identify the sources from which the data underlying the tables and charts were taken.

TABLE 1

1. Gross National Product, 1929 Prices. Simon Kuznets, Technical tables underlying the statistical supplement to Capital in the American Economy: Its Formation and Financing, National Bureau of Economic Research (in press).
2. Index of Industrial Production. Edwin Frickey, Production in the United States, page 127, table 20. Frederick C. Mills, Index of Output of Five Industries, 1899-1951 (unpublished).
3. Flow of Goods to Consumers, 1929 Prices. Simon Kuznets, op. cit.
4. Gross Capital Formation, 1929 Prices. Simon Kuznets, op. cit.
5. Gross Construction, 1929 Prices. Simon Kuznets, op. cit.
6. Nonfarm Residential Construction, 1929 Prices. Simon Kuznets, op. cit.
7. Capital Expenditure in Transportation and Utilities, 1929 Prices. Melville J. Ulmer, Capital in Transportation, Communication, and Public Utilities, National Bureau of Economic Research (in press), appendix B, table B-1, column 4.
8. Urban Building. John R. Riggleman, Variations in Building Activity in U.S. Cities, Doctoral Dissertation, Johns Hopkins University, 1934.
9. Wholesale Prices. Series prepared by the National Bureau of Economic Research on the basis of underlying estimates by G. F. Warren and F. A. Pearson, Wholesale Prices in the United States for 135 Years, for the years 1850 to 1889 and by the Bureau of National Statistics thereafter.
10. Money Supply. Preliminary estimates supplied by Milton Friedman and Anna Schwartz, Money Supply (preliminary manuscript).
11. Net Capital Imports. Mathew Simon, Statistical Estimates of the Balance of International Payments and the International Capital Movements of the United States, 1861-1900, Conference on Research in Income and Wealth, Williamstown, Mass., September 1957, table XXVII, line 32, pages 116-118. Simon Kuznets, op. cit.
12. New Incorporations. George H. Evans, Jr., Business Incorporations in the United States, 1800-1943, table 13, page 34.
13. Common Stock Prices. 1871-1917 from Cowles and Associates, Common Stock Indexes; 1918-1956 from Standard & Poor's Corp., Trade and Securities Statistics, Security Price Index Record.
14. R. R. Bond Yields. Fred R. Macaulay, Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields, and Stock Prices in the United States since 1856.
15. Immigration. 1860-70 from Treasury Department, Bureau of Statistics, Monthly Summary of Commerce and Finance of the United States, No. 12, Series 1902-3, pages 4345-4357; 1870-1945 from Simon Kuznets and Edward P. Rubin, "Immigration and the Foreign Born," National Bureau of Economic Research, Occasional Paper No. 46, pages 95-96.

TABLE 2

1. Urban Building. See table 1, series 8.
2. Railroad Construction. Poor's Railroad Manual, 1912.
3. Canal Construction in New York, Pennsylvania, and Ohio. Harvey H. Segel, Canal Cycles, 1834-61, chapter V, table 1, pages 283-284.
4. Merchant Vessels Built. Merchant Marine Statistics, 1936, pages 42-45.
5. New Incorporations. Index prepared by Moses Abramovitz by combining G. H. Evans' estimates on new incorporations in four sectors. For source of Evans' figures, see table 1, series 12.
6. Federal Land Sales. Walter B. Smith and Arthur H. Cole, Fluctuations in American Business, 1790-1860, appendix D., page 185, table 71.
7. Net Capital Imports. Douglas C. North, The United States Balance of Payments, 1790-1860, Conference on Research in Income and Wealth, Williamstown, Mass., September 1957 (mimeo.).
8. Immigration. Treasury Department, Bureau of Statistics, Monthly Summary of Commerce and Finance of the United States, No. 12, series 1902-3, pages 4345-4357.
9. Tonnage Moved on New York Canals. New York Department of Public Works, Annual Report, 1954, page 198.

10. Anthracite Coal Production. Bureau of Mines of the U.S. Department of the Interior, Mineral Resources of the United States, 1923, part II, table 22, page 549.

11. Bituminous Coal Production. See preceding reference.

12. Federal Expenditures, Civil and Miscellaneous. Annual Report of the Secretary of the Treasury, 1940, table 6, pages 545-549.

13. Federal Expenditures, Total. Annual Report of the Secretary of the Treasury, 1940, table 2, pages 366-371.

14. U.S. Postal Revenue. Annual Report of the Secretary of the Treasury, 1940, table 13, pages 419-421.

15. Value of Merchandise Imports. Foreign Commerce and Navigation of the United States, 1912, pages 43-44.

16. Value of Merchandise Exports. See preceding reference.

17. Deflated Value of Merchandise Exports. Douglas C. North, op. cit.

18. Money Supply in the Hands of the Public. Reports of the Comptroller of the Currency and estimates for 1852-53 by National Bureau of Economic Research.

19. Wholesale Prices. George F. Warren and Frank A. Pearson, Prices, table 1, pages 11-13.

20. Bank and Insurance Co. Stock Prices. Walter B. Smith and Arthur H. Cole, Fluctuations in American Business, 1790-1860, page 174.

21. Commercial Paper Rates, Boston and New York. See preceding reference, pages 192-194.

22. Railroad Stock Prices. See preceding reference, page 182.

TABLE 3

Based on tables 1 and 2. See text.

TABLE 4

The original data from which the calculations in this table were made were taken from Simon Kuznets, op. cit.

TABLE 5

Source: Simon Kuznets, "Long Swings in the Growth of Population and in Related Economic Variables," Proceedings of the American Philosophical Society, volume 102, No. 1, February 1958, table 7.

TABLE 6

Rate of Growth of Output. See table 3.

Additions to Labor Force. See chart 4.

Immigration. See chart 4.

TABLE 7-A

Line 1. See table 3.

Peaks and troughs of the long swings of the series in lines 2 through 8 were identified from charts of average reference cycle standings of these series, the sources of which were cited under table 2 above.

TABLE 7-B

1. Line 1. See table 3.

2. The peaks and troughs of the long swings of the series in lines 2 through 8 were derived from charts of average reference cycle standings. The sources of the data were as follows:

(a) Lines 2 to 5. Simon Kuznets, Technical Tables, op. cit., see table 1, series 1.

(b) Line 6. See table 1, series 8.

(c) Line 7. See table 1, series 7.

(d) Line 8. See table 1, series 11.

TABLE 8

From Solomon Fabricant. "Basic Facts on Productivity Change, National Bureau of Economic Research," Occasional Paper No. 63.

TABLE 9

Turning points were selected on the basis of charts drawn from data identified in table 8.

TABLE 10

See text for a general description of the method used to select periods of severe business contraction. The following data indicates the manner in which Thorp's "Business Annals" and the National Bureau's chronology of business-cycle peaks and troughs were used to derive the dates in table 10, columns (2) and (4).

Year (1)	Thorp's characterization (2)	Contraction period selected* (3)	National Bureau's turning points corresponding to beginning and end of selected contraction period	
			Peak (4)	Trough (5)
1812	Brief recession; uneven prosperity			
1813	Prosperity			
1814	Prosperity; financial distress			
1815	Prosperity; panic; recession			
1816	Depression			
1817	Mild depression	(•)		
1818	do	(•)		
1819	Severe depression; financial panic	(•)		
1820	Depression	(•)		
1821	Depression; revival	(•)		
1822	Mild recession			
1823	Revival			
1824	Prosperity			
1825	Prosperity; panic; recession			
1826	Depression; revival			
1827	Moderate prosperity			
1828	Prosperity; recession			
1829	Depression; revival			
1830	Moderate prosperity			
1831	Prosperity			
1832	Moderate prosperity			
1833	Prosperity; panic; recession			
1834	Mild depression			(1)
1835	Revival; prosperity		(1)	
1836	Prosperity		1836	
1837	Prosperity; panic; recession; depression			
1838	Depression; slight revival	(•)		
1839	Revival; panic; recession	(•)		
1840	Depression	(•)		
1841	do	(•)		
1842	do	(•)		
1843	Depression; revival	(•)		1843
1844	Revival; prosperity			
1845	Prosperity; brief recession			
1846	Recession; mild depression			
1847	Revival; prosperity; panic; recession			
1848	Mild depression; revival			
1849	Prosperity			
1850	do			
1851	do			
1852	do			
1853	Prosperity; recession		1853	
1854	Recession; depression	(•)		
1855	Depression; revival	(•)		
1856	Prosperity	(•)		
1857	Prosperity; panic; recession; depression	(•)		
1858	Depression	(•)		1858
1859	Revival			
1860	Prosperity; recession			
1861	Mild depression; revival			
1862	War activity			
1863	do			
1864	do			
1865	Boom; recession			
1866	Mild depression			
1867	Depression			
1868	Revival			
1869	Prosperity; monetary difficulties			
1870	Recession; mild depression			

Year (1)	Thorpe's characterization (2)	Contraction period selected* (3)	National Bureau's turning points corresponding to beginning and end of selected contraction period	
			Peak (4)	Trough (5)
1871	Revival; prosperity			
1872	Prosperity			
1873	Prosperity; panic recession		1873	
1874	Depression	⊙		
1875	do.			
1876	Depression			
1877	do.	⊙		
1878	Depression; revival			
1879	Revival; prosperity			1878
1880	Prosperity			
1881	do.			
1882	Prosperity; slight recession		1882	
1883	Recession	⊙		
1884	Depression			
1885	Depression; revival			1885
1886	Revival			
1887	Prosperity			
1888	Brief recession			
1889	Prosperity			
1890	Prosperity; recession			
1891	Depression; revival			
1892	Prosperity		1892	
1893	Recession; panic; depression			
1894	Deep depression	⊙		
1895	Depression; revival			
1896	Recession; depression			
1897	Depression; revival			1896
1898	Revival; prosperity			
1899	Prosperity			
1900	Prosperity; brief recession			
1901	Prosperity			
1902	do.			
1903	Prosperity; recession			
1904	Mild depression; revival			
1905	Prosperity			
1906	do.			
1907	Prosperity; panic; recession; depression		1907	
1908	Depression	⊙		
1909	Revival; mild prosperity			
1910	Recession			
1911	Mild depression	⊙		
1912	Revival; prosperity			
1913	Prosperity; recession			
1914	Depression			1914
1915	Revival; prosperity			
1916	Prosperity			
1917	Prosperity; war activity			
1918	War activity; recession			
1919	Revival; prosperity			
1920	Prosperity; recession; depression		1920	
1921	Depression	(*)		1921
1922	Revival; prosperity			
1923	Prosperity; recession			
1924	Mild depression; revival			
1925	Prosperity			
1926	do.			
1927	Prosperity; recession (III)			
1928	Revival; prosperity (II)			
1929	Prosperity; recession (III)		1929	
1930	Depression	⊙		
1931	Depression [End of Thorpe's Annals]			
				1932

\* Bureau chronology begins.

TABLE 11

Sources identified in footnotes to table 11.

CHART 1A

See table 1, series 1.

CHART 1B

See table 1, series 1.

## CHART 2

See notes to table 1.

## CHART 3

Source: Simon Kuznets, "Long Swings in the Growth of Population and in Related Economic Variables," "Proceedings of the American Philosophical Society," volume 102, No. 1, February 1958.

1. Total population. Table 2, column 7.
2. Native-born white and all nonwhite. Table 7, columns 1 and 3.
3. Foreign-born white. Table 2, column 5.
4. Net immigration. Table 6, column 5.

## CHART 3A

Source: See chart 3.

1. Change in natural increase. Table 7, column 2.
2. Change in net immigration. Table 7, column 3.
3. Change in total population increase. Table 7, column 4.

## CHART 4

1. Additions to total labor force. Preliminary estimate supplied by Richard Easterlin, National Bureau of Economic Research.
2. Immigration. Simon Kuznets and Edward P. Rubin, "Immigration and the Foreign Born," National Bureau of Economic Research, Occasional Paper No. 46.
3. Unemployment. Stanley Lebergott, "Annual Estimate of Unemployment in the United States 1900-54," in "The Measurement and Behavior of Unemployment," National Bureau of Economic Research, 1957, pages 215-216.

## CHART 4A

Immigration. See table 2, series 8.

## CHART 5

1. Gross capital formation, 1929 prices. Simon Kuznets, Technical Tables, op. cit., see table 1, series 1.
2. Gross producers, durable equipment, 1929 prices. Simon Kuznets, op. cit.
3. Other gross capital formation, 1929 prices. Calculated by subtracting the sum of nonfarm residential construction (table 1, series 6) and railroad construction (M. J. Ulmer, op. cit) from total gross capital formation (see series 1 above).
4. Residential and railroad building. See series 3 above.

## CHART 6

1. Residential construction. See table 1, series 6.
2. Capital expenditures by railroads and public utilities. See table 1, series 7.
3. Additions to population. Simon Kuznets, op. cit.

## CHART 7

1. Gross national product. See table 1, series 1.
2. Gross physical output. Solomon Fabricant, "Basic Facts on Productivity Change," National Bureau of Economic Research, Occasional Paper No. 63.
3. Total input. See reference above.
4. Output per unit of input. See reference above.

The CHAIRMAN. Thank you very much.

Yesterday Dr. George Taylor presented a very interesting index number of wholesale prices and the cost of living for 1800 to the present time and showed the sharp rise in wartime and subsequent fall in peacetime of these price levels, with the exception of recent years—in fact there has been no comparable fall as yet in our price level which accompanied the Second World War.

Have you made any study as to the effect changes in the general price level have upon the rate of economic growth?

Mr. ABRAMOVITZ. I can say this much, and I wish my charts had been better drawn. I hope to have them better drawn before they are reproduced for the committee. There has been a long swing in the rate of change of prices which accompanies the long swing in the rate of growth of output but has lagged behind them somewhat.

This does not appear in my charts, as I say, because the price curves were badly drawn. This need not mean more, however, than that upon recovery from a serious depression we also have a recovery in the level of prices and that the rate——

The CHAIRMAN. I am not speaking of the cyclical fluctuation of prices. I am speaking of secular changes in the price level.

Mr. ABRAMOVITZ. I see, yes.

The CHAIRMAN. You take the period from 1870 to 1896, this or the particular period from 1873, I would say to 1896, you have on the whole a quarter of a century where prices went down, then you have a period of 18 years in which prices rose in peacetime. What about the rates of growth in the quarter century prior to 1896, let us say, and the period subsequent to that?

Mr. ABRAMOVITZ. I think it is perfectly clear that we enjoyed very rapid economic growth in the last quarter century of the 19th century, a period from 1870 to 1890.

The CHAIRMAN. You mean despite——

Mr. ABRAMOVITZ. Despite the fall in prices and that we enjoyed a rate of growth in the first quarter of the present century which was not clearly greater and may have been somewhat lower, in spite of a tendency for prices to rise during that period.

Now this, of course, says nothing about the connection between price movements and rates of growth in output within the two periods. We have to remember that the period after the Civil War was the period of our early industrialization and might be expected to be a period of extremely rapid growth in output regardless of what was happening to prices.

The CHAIRMAN. So you are not ready to generalize on this point?

Mr. ABRAMOVITZ. I will not say that a long-term decline in prices promotes rapid growth in output.

The CHAIRMAN. Nor are you saying that a longtime increase in prices discourages growth?

Mr. ABRAMOVITZ. That is right. And I am particularly not saying that.

The CHAIRMAN. I rather gather that you think that the greatest negative effect on the rate of growth, is a severe depression from time to time, and that if those could be prevented the total output would appear to be larger?

Mr. ABRAMOVITZ. My feeling is that the rate of growth of output would be obviously steadier in the absence of severe——

The CHAIRMAN. The next question I am going to ask is this: Is the rate of growth speeded up later by the fact that it has been preceded by a depression?

Mr. ABRAMOVITZ. Undoubtedly.

The CHAIRMAN. That is used as an argument for having depressions, wouldn't you say?

Mr. ABRAMOVITZ. I think this obviously is an invalid argument. The rate of growth is speed up later only because—

The CHAIRMAN. That argument comes from very eminent sources at times. I would like to have you point out for the record why it is invalid.

Mr. ABRAMOVITZ. The rate of growth speeds up after a great depression only because there are certain temporary factors created by the depression which permit us for a time, and only for a short time, to enjoy very rapid growth. One is the fact that we have a lot of unemployed resources which we can quickly bring back into production. But they need never have been unemployed. And the second is that we have permitted our stock of commodities to run down and in rebuilding that stock of commodities we also produce a great pressure of demand upon the economy which for a time helps stimulate rapid growth in output. Then when those stocks of commodities have been rebuilt to normal levels that stimulus to demand disappears.

The CHAIRMAN. I think the doctors will tell us when a patient has been very ill that his rate of improvement is greater in the early stages than in the later stages but this is not an argument that he should become ill in order that he may later improve.

Mr. ABRAMOVITZ. No, that is right.

The CHAIRMAN. Senator Bush?

Senator SPARKMAN. It is like the modern seizure. The person gets a bad cold, running into pneumonia. So you are getting well.

Senator BUSH. Professor, I certainly have been interested in your statement this morning and congratulate you. There is a lot of work behind this. I appreciate this, as we all do, I am sure.

We are in a strange situation right now of having been through a sharp recession in business and yet having recovered, according to the index of industrial production. Retail sales and other indexes are to new high ground and still we have an unemployment factor which is serious. Even though that is improving it certainly does not seem to have improved commensurate with the other indexes, production, sales, so forth.

Have you any comment to make on that? Could you enlighten us to why you think that is the case? In other words, it was only 2 short years ago that employment was at a peak, you might say, and we had only very moderate unemployment which you might say was always to be expected at the level that it reached then. Yet we reestablished the same levels of operation in most industrial and commercial fields but we have a few mililon more unemployed than we did at that time. What is the explanation of that as you see it?

Mr. ABRAMOVITZ. The immediate explanation, I think, is simple. The rate of growth of output corrected for business cycles after you get back to the same stage so to speak in a business cycle, has not been great enough to absorb the growth in the labor supply and in the stock of capital. We are now passing through a period of low rate of growth, after allowing for business cycles, and it is in that sort of period that we begin to accumulate idle resources, both of labor and capital and you will appreciate that the accumulation of such idle resources of labor and capital is exactly the sort of development which puts us in danger, certainly used to put us in danger of suffering a serious depression.

Senator BUSH. Why has there been this lag in development of capital? Why does that exist?

Mr. ABRAMOVITZ. Because I believe that there has been a serious change in the conditions controlling the demand for additional long-term investment. You know that we experienced after the end of the Second War, the end of the World War, a great boom in the demand for all kinds of capital equipment. That boom reflected a big gap in our stock of capital which had developed first in the course of the preceding great depression and secondly because of the restrictions during the war on capital investment. It also reflected an amazing upsurge in population growth. For almost a decade, therefore capital investment proceeded at a high level and at an increasing level which year by year increased the total demand for all kinds of goods through the income which was distributed in the course of building the capital.

Now, however, I think we have reached a stage in which the steam behind this great boom has begun to peter out. We have caught up in good part with the backlog of demand for capital equipment, which grew up during the depression and during the war, and, secondly, the rate of population growth has tapered off although it is much higher than we might expect it to be. It is no longer growing year by year as it was doing for 12 to 14 years.

And the combination of these two facts means that the demand for additional capital is no longer growing at the rate at which it was during the first years after the war. When the demand for additional investment tapers off we no longer have that big increase in the total demand for goods which the economy requires if it is to grow enough each year to absorb the growth in the labor supply.

Senator BUSH. You said in your statement, the variety of causes have combined to produce an unbroken period of retardation in growth which has now lasted for some 20 years and whose end cannot yet be determined. And then you promised me that a later statement would explain that. Well, I followed you very closely.

Mr. ABRAMOVITZ. I meant I hoped to have an opportunity at this point to explain to you.

Senator BUSH. Now I would like to give you that opportunity because I was very much interested in that question.

Mr. ABRAMOVITZ. Senator, you may have noticed that in the course of my explanation that I said that upon recovery from a deep depression we usually enjoy a period of very rapid and accelerated growth for a time. We did enjoy that period of rapid and accelerated growth during the period of recovery from the great depression of the 1930's. From a period beginning roughly 1933-34, output shot up very steeply and reached high rates of growth. Toward the end of the 1930's, however, and in the early 1940's, partly under the stimulus of defense preparations, we succeeded in eliminating virtually all our idle capacity. We reemployed the unemployed men and we put all or almost all of our stock of capital equipment back to work. From that point on, output growth could go forward only as fast as our stock of resources grew and only so fast as technological developments were exploited and put to work in improving the quality of capital equipment and the efficiency of industry. Since that process of technological improvement goes on in good times and bad, when we reach a



period in which output growth no longer can take advantage of idle resources but has to depend solely upon technology and upon growth in the stock of resources, the rate of output growth is going to begin to fall.

Although we maintain a satisfactory and steady rate of growth, the rate of output growth is not as high as it was during the period of recovery from the depression. That is what the chairman was referring to a moment ago.

Output also grew, continued to grow, at a satisfactory though falling rate for two other reasons. One is that after World War II the rate of growth of the labor supply began to fall. A large number of people flowed into the labor force during recovery from the depression and during the war years. But after the end of the war the rate of growth of the labor supply fell off and the labor supply, of course, is the most important element in our total stock of resources.

Secondly, there was a shift from war to peace which involved a shift from war industries to the production of peacetime goods. And that shift in the composition of output has a somewhat spurious effect upon our measures of total output because we have been assigning a higher value, so to speak, per unit of output to the output of war industries than we have been assigning to output of civilian goods. To that extent the retardation is spurious.

Senator BUSH. That answers it. Thank you very much, Professor.

Senator SPARKMAN (presiding). Mr. Bolling.

Representative BOLLING. These charts and figures end about 1953. Do you feel that the indications are that we are in a long-term swing that might indicate the threat of potential serious depression?

Mr. ABRAMOVITZ. My feeling is that if our economy were organized, if our economy were now organized, in the way in which it was organized before 1930 we would face the threat of a serious depression.

Representative BOLLING. Now, to follow that up—

Senator BUSH. I do not quite get that.

Representative BOLLING. I am going to follow it up to see if I can clarify the differences he believes exist between the economic organization of the thirties and the economic organization today and then your conclusion on the basis of those differences. If this is not asking too much—

Mr. ABRAMOVITZ. No; I would be glad to say a few words about that.

Representative BOLLING. Fine. I wish you would.

Mr. ABRAMOVITZ. One big difference is that government expenditures now account for a much larger part of total output, absorb a much larger part of total output than they did before 1930, and government expenditures even if they are not made to fluctuate counter-cyclically are at least insensitive to a reduction in income. So here we have a very large part of our total output which will not fall merely because, say, investment expenditures fall. The Government is at least going to maintain its level of demand for goods.

Secondly, personal income and, therefore, personal consumption is much less sensitive to a change in the level of unemployment than it used to be. Partly this is true because our tax structure is more progressive than it used to be. When income falls, therefore, the effect of this on what people have to spend is less severe because a portion of it so to speak is cushioned by the fact that their taxes are

reduced. And, secondly, personal income is protected from drops in output by unemployment insurance and by the fact that many people enjoy old-age pensions. These are people whose incomes might have declined severely in the absence of pensions when their relatives supporting them suffered a decline in their income. We have seen during the course of the last few recessions how well personal income and consumption have held up despite the fact the total output has been going down.

Thirdly, of course, we now enjoy, I think, a more sensitive monetary and fiscal policy on the part of the Government to the threat of recession. The Government acts more promptly now to make money easier than it used to do and acts more promptly than it used to do to re-adjust its own budget to the threat of recession and so to protect total output and people's incomes from the threat of unemployment.

Fourth, and I think this is extremely important, we have had a major reform in our banking system. I think here particularly of the Federal Deposit Insurance Corporation, which protects the deposits of people from the threat of bank failure which used to be a serious disturbance which accompanied virtually every serious depression in the past.

Fifthly, I think there has been a great growth in confidence of industry generally in the ability of government to take such action as would avoid serious depression. This encourages businessmen to keep up their capital expenditures, not to permit their capital expenditures to fall by as much as they otherwise would, when the business picture changes because they now feel that they are not threatened with catastrophe or the possibility of catastrophe as they used to be when the employment picture and the demand picture became less favorable. The result is that they are willing to maintain at least to some extent their program of capital investment in a way in which they were not willing to do in olden days. Though I think therefore, that many of the conditions which now exist would threaten us with serious depression, I think we are unlikely to experience, happily unlikely to experience, that depression. But this does not mean that we may not have a number of years in which unemployment rates are not higher than we would like to see them because our rate of growth is not as rapid as it needs to be in order to absorb the growth in the labor supply.

Representative BOLLING. Now, finally, the points that you make are that there are certain so-called built-in stabilizers, and this includes everything from social security to a more progressive tax rate. As a result of these built-in stabilizers there is a more optimistic psychology in the elements of the community that must have that relative optimism to maintain certain activities. This, in effect, means that we work within a narrower range in making economic decisions at both private and the governmental level, that while it is unlikely that we will have a catastrophic great depression, that even that in one range of mismanagement would be a possibility and that at the other range or in the middle range there is a possibility of doing a better job of cleaning out the trough, but in effect the range of decision making, in error or correctness is narrower.

Mr. ABRAMOVITZ. I think that is right.

Representative BOLLING. Does that make sense?

Mr. ABRAMOVITZ. Yes, it does.

Representative BOLLING. Thank you very much.

Senator SPARKMAN. Mr. Reuss.

Representative REUSS. I would like to ask Dr. Abramovitz about the material in his prepared statement. You referred to Dr. Friedman's analysis of the growth of money supply.

Is it your point that whatever else may be necessary to assure continued growth, it is a good thing, if not a prerequisite, to have a roughly parallel growth in the money supply?

Mr. ABRAMOVITZ. I think it eases the process, the very complicated process of adjustment through which the economy has to go in order to provide for a growing demand, real demand.

Representative REUSS. To some extent this is a chicken and egg proposition, is it not? If we get growth, the monetary supply expands, but it is also true that the monetary supply is affected by factors other than the rate of growth.

Mr. ABRAMOVITZ. In the economy in which we now live the money supply is essentially under the control of our own Government, the Federal Reserve Board, and of the Treasury.

Representative REUSS. You list other possible causes changing the supply of money on pages 26 and 27. You refer to technology in gold extraction and the accident of gold discoveries. Isn't it true that as a practical matter, in the last 20 years at least, there have been no Klondikes and there have been no radical technological innovations in extraction processes?

Mr. ABRAMOVITZ. Nor would it be important if there were nowadays because we no longer have a free gold standard.

Representative REUSS. So therefore we are talking about the history.

Mr. ABRAMOVITZ. This is historical matter.

Representative REUSS. At the top of page 27, you make a number of statements which I should like to have you explain further. You say:

When we take into full account the impact of income growth on our trade balances.

Then you also say:

on the character of the assets necessarily absorbed by the banks, and thirdly, on the volume of liquid assets demanded by business and households and supplied by finance and Government.

Could you spell those out a little more? I am not sure what you mean.

Mr. ABRAMOVITZ. Yes. In order to enjoy growth in output we have to have growth in demand. One big source in growth demand is growth of investment expenditures. Those investment expenditures are made, of course, by business firms and by households, the latter in particular insofar as they are purchasing homes. Residential construction is, of course, a great source of investment expenditure. Those investment expenditures by both business and households have to be financed. In the course of arranging for the finance of those investment expenditures, businesses and households, so to speak, generate securities. They offer for financing a variety of kinds of financial assets, notes, bonds, stocks, mortgages, and so on.

Growth therefore requires that those financial assets should be absorbed by our financial institutions and ultimately by the general

public, if not directly then in some form which reflects the transformation of those assets by the intermediate financial institutions. For example, as a pension fund may absorb the bonds issued by corporations and offer to its own clients an annuity. The process of investment therefore, if it is to proceed smoothly, requires that there should be attractive costs of finance offered to the potential investors. The assets which they issue, therefore, must be absorbed by the intermediate financial institutions at attractive terms and the general public in turn must be prepared to accept the kinds of assets which the intermediate financial institutions are offering to them in return for the funds which they use to finance business or households.

Now, in the course of one of these long swings that I have been describing, the character of the financial assets offered by business and by households changes because in the early stages of one of these long swings a large portion of total investment takes the form of inventory investment. The kinds of financing which must be done in short-term financing and the kinds of assets which are produced by business and offered to the banks are short-term notes of various kinds. Later on, in a long swing, investment comes to depend more and more heavily on long-term investment and upon residential construction and the kinds of assets which then must be absorbed by the market are stocks, bonds, and mortgages.

The willingness of our intermediate financial institutions to absorb those particular kinds of assets, as contrasted with short-term notes, helps to determine the cost of finance to business and to households and therefore the volume of real investment which is made. And the efficiency therefore of our financial organizations can, so to speak, be judged by its capacity to absorb this changing flow of assets, changing in volume and changing in composition and continuing to offer financing at what seems to the investing public to be reasonable rates.

Representative REUSS. This is obviously an important factor of growth. If you have inefficient financial institutions that do not offer the kind of credit needed, you do not get adequate growth. But I am not quite clear what this has to do with the money supply. It seems to me a different factor.

Mr. ABRAMOVITZ. When a bank accepts the note or other kind of asset issued by a business firm, it is at the same time creating money because it places at the disposal of the investing firm a sum of money equal to the value of the asset which it has accepted and this is in addition to the stock of money balances. These money balances are then expended, distributed to the public, and flow in to the balances of private individuals.

At the same time, when the Government borrows money from the public it is offering to them a form of financial asset which many members of the public regard as equivalent or nearly the equivalent of cash and which therefore stands in their minds as a substitute for a money balance itself and permits them to act, because of the liquidity of these securities, as if they had cash in the bank.

The willingness, therefore, of our financial institutions to transform the unliquid types of assets offered by business into the liquid types of assets demanded by the public and the financial operations of the Government help to determine the total amount of liquid assets to the public. They are liquid either because they are actually in the form of cash or liquid because they substitute for cash.

Representative REUSS. Thank you very much.

Senator SPARKMAN. Doctor, we certainly appreciate your appearance before us and giving us this very thorough, enlightening study you have given us.

I think it is something that really requires a study.

There are a good many questions that I should like to ask you but I was not here to hear all of your statement. I should like to read it more fully and more carefully. Therefore, I will waive any questions at this time.

Thank you very much.

And the committee will stand in recess until—

Mr. ABRAMOVITZ. Thank you. I was very glad to be here.

Senator SPARKMAN. The committee will stand adjourned subject to call.

(Whereupon, at 12:10 p.m., Friday, April 10, 1959, the committee adjourned subject to call.)

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