PART II

Long Term Changes, 1869—1938

National income is the earnings of current effort applied to accumulated assets, tangible and intangible. The skills and facilities employed in producing it are a heritage from the past, improved in the present, and passed on to the future. Long term changes in it indicate how this country reached the levels enjoyed in the immediate past and afford a basis for judging the prospects of a continuation of its growth.

Information needed to trace long term changes in national income and its composition is more scanty than that for recent years; and the estimates for a more distant past are subject to a wider margin of error than those for years beginning with 1919. Nevertheless, estimates of national income by final use categories can be constructed to form a continuous series of decade averages, overlapping by five-year periods, from 1869-78 through 1929-38. From other estimates we can get some notion of long term changes in the distribution by industrial origin and by type of payment. While these series could be continued through 1944, it seemed better to stop with 1938, for the interpretation of war production, the chief influence since 1940, in terms of the secular growth of the economy is difficult. In a few years a better view of the extent to which the prewar trends have continued or were modified can be attained.[7]

1 *Total and Per Capita*

The decade estimates of national income, total and per capita, in Table 10, present a long record of growth in the country's

[7]For a discussion of the problems of measuring national income in wartime and an analysis of the estimates for World Wars I and II see *National Product in Wartime* (National Bureau of Economic Research, 1945).

TABLE 10
National Income, 1929 Prices, Total and Per Capita
Decade Estimates, 1869-1938

	DECADE	AVERAGE PER YEAR: National Income ($ bill.) (1)	Population (mill.) (2)	Per Capita ($) (1)÷(2) (3)	% CHANGE FROM DECADE TO OVERLAPPING DECADE: National Income (4)	Population (5)	Per Capita (6)
1	1869-78	9.3	43.5	215			
2	1874-83	13.6	48.8	278	+45.6	+12.2	+29.3
3	1879-88	17.9	54.8	326	+31.4	+12.1	+17.3
4	1884-93	21.0	61.2	344	+17.7	+11.7	+5.5
5	1889-98	24.2	67.6	357	+14.9	+10.6	+3.8
6	1894-03	29.8	74.3	401	+23.1	+9.8	+12.3
7	1899-08	37.3	81.5	458	+25.5	+9.8	+14.2
8	1904-13	45.0	89.6	502	+20.5	+9.9	+9.6
9	1909-18	50.6	97.7	517	+12.4	+9.0	+3.0
10	1914-23	57.3	105.0	546	+13.3	+7.4	+5.6
11	1919-28	69.0	112.8	612	+20.6	+7.5	+12.1
12	1924-33	73.3	120.6	607	+6.1	+6.9	—0.8
13	1929-38	72.0	126.0	572	—1.7	+4.4	—5.8
	Averages (geometric means)						
14	Lines 2-13				+18.6	+9.3	+8.5
15	2- 5				+26.8	+11.6	+13.5
16	6- 9				+20.3	+9.6	+9.7
17	10-13				+9.3	+6.5	+2.6
18	2- 5				+26.8	+11.6	+13.5
19	5- 8				+20.9	+10.0	+9.9
20	8-11				+16.6	+8.5	+7.5

COLUMN
1 *National Product since 1869,* Table II 16, col. 10.
2 Averages of annual estimates in *Statistical Abstract, 1942,* p. 11.

product. The percentage rates of change from one decade to the next in columns 4-6 reveal clearly the three aspects of long term growth that quantitative records usually exhibit: the average rate of increase; its retardation; and the long swings, variously designated as secondary secular movements, trend-cycles, or long cycles. We discuss below the average rate of growth and the retardation in it, leaving the subject of trend-cycles to the last Section of this Part.

Since 1869, national income has grown at the rate of almost 19 percent per quinquennium; population at over 8 percent; income per capita at 8.5 percent (line 14). The cumulative effect of these rates is evident in the change from the midpoint of the first decade, 1869-78, to that of the last, 1929-

38: national income multiplying almost eightfold; population and income per capita almost tripling. Even if our estimates understate the true level of national income by as much as 10 percent in 1869-78 and 5 percent in 1874-83,[8] national income would still show a rise to seven times its level in the first decade of the period; and income per capita to a level about two and a half times that for 1869-78.

Whether such a rise in six decades is unusual can be judged partly from a comparison with the long term experience of other countries, partly from the experience of this country at other times. By either standard it was among the highest. Of the four countries for which we have rough estimates for an equally long recent period—Great Britain, Sweden, Germany, France—Sweden alone shows approximately the same rate. However, countries that began to industrialize later, notably Japan and the USSR, have higher rates, if over somewhat shorter periods.[9] Nevertheless, a record such as is shown in Table 10 is matched only by the kind of secular growth characteristic of a period of rapid industrialization.

Comparisons with growth in this country's past afford other confirmatory evidence. Estimates for the years preceding the Civil War (back to 1800) can be only of the crudest. But they indicate that with respect to the growth of national income and of income per capita (but not of population), the rates for the recent six decades are distinctly higher than those between 1800 and 1860.[10]

Though the rates of growth of national income, total and per capita, are high, one must not overstress their significance as measures of increase in capacity to produce or in economic welfare. That income per capita rose from less than $250 in 1869-78 to about $600 in 1919-38 (col. 3) does not mean that the average capacity to produce rose by the same ratio; or that on the average the people of this country were over

[8]For a more detailed discussion of this possible understatement see *National Product since 1869* (National Bureau of Economic Research, 1946), Part II, Sec. 1-4.

[9]Colin Clark gives estimates for various countries in *Conditions of Economic Progress,* particularly Ch. IV.

[10]See Robert F. Martin, *National Income in the United States, 1799-1938* (National Industrial Conference Board, 1939), Table 1, pp. 6-7.

twice as well-off in the 1920's as in the 1870's. Between the beginning and end of the period covered in Table 10 basic conditions of work and life changed too greatly for the quantitative differences in dollar value estimates, even at constant prices, to have exact meaning in terms of productive performance or economic welfare. Technological changes in conditions of work have meant not so much increased capacity to produce the same things with less effort as capacity to produce things that could not be made earlier—products that either satisfy already established wants more satisfactorily or cater to new tastes and desires. It is, therefore, difficult to make exact comparisons of productive performance, even between a mule and a tractor—let alone between a horse and an airplane. And it is equally difficult to compare the welfare significance of various goods to an urban dweller in the twentieth century and to a village dweller of the 1870's. Such comparisons are possible only by applying criteria of technical performance or human well-being that are outside the changing short term viewpoints of the market place whence economists derive their yardsticks. One can say only that the record in Table 10 indicates large growth in product per capita, in the country's capacity to produce, even when measured per member of its vastly greater population. Presumably this means a substantial increase in economic welfare or power per capita—but exactly how much cannot be said.

That the rate of growth declined is clearly suggested by the entries in columns 4-6. Fluctuations, to be discussed below, obscure the general downward trend; but the latter is revealed when figures are averaged. The averages in lines 15-17, grouping the decades that are comprised in the distinguishable long swings, reveal the decline in the rate of growth clearly; in total national income from about 27 percent per quinquennium in the first part of the period to about 9 percent in the last part; in population from about 12 to 6.5 percent; in income per capita from 13.5 to less than 3 percent. An adjustment for maximum possible understatement in the first two decades does not change the picture materially: it reduces the geometric mean for total national income in line 15 to 23.5 per-

cent and for income per capita to 10.7 percent. Likewise, if we fit a straight line (by the method of least squares) to the percentage rates of increase in columns 4-6 (converted to logarithms), we find that for the period as a whole the lines slope downward, indicating retardation.[11]

Even if we exclude the last two decades as severely affected by the depression of 1929-32, and regroup the remaining entries in sets of four with one overlapping, the average percentage increase in national income drops to 17 percent per quinquennium in the last period from either 27 or 23.5 in the first, as we discard or accept the maximum adjustment for understatement in population to 8.5 percent from 11.6; and in income per capita to 7.5 percent from either 13.5 or 10.7.

The significance for the future of this retardation in the rate of growth is more easily assessed for total national income and population than for income per capita. It does not seem likely that growth in the former two during the next six decades will be of the same relative magnitude as that from 1869-78 to 1929-38. Statements concerning a country's economic future are always hazardous. But there are no signs that the population of this country will triple during the next sixty years as it did between the early 1870's and early 1930's. Indeed, recent estimates put the total in the 1990's at about 167 million—a rise of only 33 percent from the 1929-38 decade; and assume a rate of growth per quinquennium that will be materially lower in the immediate future (2.5 percent) than it was during 1914-38 (6.5), and will drop gradually to almost zero by 1995.[12] Under such conditions of population growth, even a constant rate of increase in income per capita would mean a declining rate of growth in total national income. Unless income per capita showed a tendency toward

[11]These lines were fitted to the series in Table 10 and to the estimates for components in order to bring out more clearly the timing and amplitude of fluctuations in the rates of growth. For the constants see Tables 19-21.

[12]See *Estimates of Future Population of the United States, 1940-2000* (National Resources Planning Board, Washington, D. C., 1943), Table 8, p. 74. We chose the figures based on the assumption of medium fertility, medium mortality, with no immigration, no war losses.

an accelerated rate of increase sufficient to compensate for the decline in the rate of population growth, total national income would continue to increase at a declining rate. If continued long enough, this would mean reaching a limit beyond which only insignificant growth could take place. In any event, it is unlikely that national income, during the coming sixty years, will multiply eightfold, as it did between the early 1870's and early 1930's: for that would entail a rise in per capita income exceeding that in this country, or probably elsewhere, during an equally long period.

The prospect that neither population nor national income will grow in the future at the high rate of the sixty years preceding World War II; or even that their growth is likely to be at increasingly slower rates as compared with the last part of the sixty years covered in Table 10 is disturbing only if one considers a population and total product much larger than the present an assurance of the country's survival in a hostile world. Disregarding such considerations, whose validity can scarcely be judged here, one may doubt that a high rate of population growth in the future is compatible with the maintenance or desirable increase of income per capita. A population of over 350 million (i.e., three times that of 1929-38) by the early 1990's could be sustained at the present income and hence standard of living per capita only if a technological revolution of a scope wider even than that suggested by such recent events as the atomic bomb occurred. And the maintenance of the rate of increase of even the depressed 1930's (4.4 percent per quinquennium, Table 10, line 13, col. 5) would bring the population to over 210 million by the early 1990's.

If we disregard questions of desirability but grant the prospects of a slower growth of population and possibly of total national income, what is the implication of the record of income per capita? If the population grows more slowly, will income per capita also? Or will the slower growth of population permit a more rapid increase in income per capita than in the past?

The record does not indicate as great a decline in the first

part of the period in the rate of growth of income per capita as in that of population and of total income. An adjustment for maximum understatement in 1869-78 and 1874-83 lowers the average rate of growth in lines 15 and 18 (col. 6) to 10.7 percent, reducing the drop to the average for the middle part of the sixty year span (lines 16 and 19). The rate of increase drops materially in the last part of the period (to 2.6 percent) when we include the decade of the depressed 1930's; not so much (to 7.5 percent) when we exclude that decade. All in all, however, the record suggests a retardation in the rate of growth of income per capita, but at a more moderate pace than in total national income.

Continuation of past trends would thus mean a decline in the rate of growth in national income per capita, moderate, or sizable depending upon our judgment of the secular significance of the 1929-32 depression and of the incomplete recovery from it. But whether we can assume a continuance of the trends shown in Table 10 depends partly upon the validity of taking 1869-1938 as the base, partly upon the continuance of the type of social organization and the drives that have characterized this country. One could argue that the period chosen tends to exaggerate retardation in long term growth because it begins with the intensive reconstruction shortly after the Civil War and ends with the severe depression of the 1930's. Also, changes that would provide new incentives and new possibilities for either accelerated growth or at least for growth at rates not below those of the recent past are not out of the question. The very retardation of the rate of increase in population is, in a country with necessarily limited resources, a factor favorable to higher levels of per capita product; and a combination of a very moderate rate of growth in population with a high rate of growth in income per capita has been observed in the past (e.g., in Sweden). On the other hand, it not difficult to find factors that would brake the rate of growth in income per capita even more than is suggested by Table 10. No conclusive answer can be given here. While summarizing some aspects of our economic experience for a long period and reflecting the continuous operation of institu-

tions that are likely to survive and to exhibit the changing pattern they have during the long term past, the estimates contribute only one datum of importance in evaluating the probable lines of growth of the economy. Before they can yield a reasonable prognosis of the future, they must be supplemented by direct consideration and evaluation of the factors that made for growth and retardation in the past.

One must be particularly wary of interpreting retardation in secular growth observed in the past, or even its extrapolation to the future, as verifying theories of economic maturity or secular stagnation that have become current recently. One may and should grant that data for the past, such as the estimates presented above, indicate a distinct retardation in the rate of growth in population, national income, and income per capita. Given the forecasts of future population characterized by a marked damping of growth, and the failure of experience to show long term acceleration in the rate of growth in income per capita, one may reasonably infer that a retarded rate of growth is likely also in total national income, if not unavoidably in income per capita. But these inferences are not uniquely related to such theses of the theory of secular stagnation as the prospective shortage of private investment opportunities relative to the amount of monetary savings to be generated; the prospect of chronic secular unemployment; or the policy conclusions as to the need for public investment drawn from the theses just stated. One could easily visualize a social framework within which population, income, and even income per capita would grow at decreasing rates, yet there would be no signs of a shortage of private investment opportunities, chronic unemployment, etc. On the contrary, one could just as easily visualize a situation in which these latter phenomena would occur while the rate of increase in population, national income, and income per capita was accelerating. In other words, proof of these particular theses in the theory of secular stagnation requires data quite different from those yielded by estimates of national income; and the association between retardation in the long term growth of national income and the theses concerning

shortages of private investment opportunities and the likelihood of rising levels of secular unemployment can be demonstrated only by an analysis of the factors that brought about growth and retardation in the past and are likely to continue. In this sense, the mere observation of retardation in the rate of growth in the past and its simple extrapolation into the future no more constitutes a proof of the theory of secular stagnation than the observation and extrapolation of constant or accelerating rates of growth would constitute a disproof.

2 *Distribution by Industrial Origin*

The rapid growth in national income and population during the sixty years before World War II was partly a concomitant, partly a result of the process of industrialization. In the early phases of industrialization the relative distribution of resources and product shifted to the secondary industries, such as mining and manufacturing, and to transportation and other utilities. In the later phases, at least in this country, it shifted toward the service industries.

While the estimates of the distribution of national income (or of a closely related total, aggregate payments) by industrial origin back to 1869 in Table 11 suffer from lack of comparability, certain long term trends in the industrial structure of national income stand out. Though the share of agriculture in 1869 and 1879 was moderate, 20.5 percent, it had declined to less than half by 1929-38. The shares of mining and manufacturing rose at first; but in the last two or three decades of the period apparently did not rise further. The share of construction declined during the period as a whole. Transportation and other public utilities, surprisingly enough, account for a slightly declining, rather than a rising, share—owing, perhaps, to a secular decline in prices of transportation and of other utility services greater than that in prices of goods produced by other industries. In view of the crudity of the estimates, the rather small decline in the share of trade cannot be accorded too much significance. The share of service declined somewhat from high levels in the

TABLE 11

National Income and Aggregate Payments
Percentage Distribution by Industry, 1869-1938
(based on values in current prices)

		AGR. (1)	MINING (2)	MFG. (3)	CONSTRUCTION (4)	TRANSP. & OTHER PUBLIC UTILITIES (5)	TRADE (6)	SERVICE (7)	GOV. (8)	FINANCE & MISC. (9)
	Based on Martin's Estimates of Aggregate Payments									
	AVERAGE OF									
1	1869 & 1879	20.5	1.8	13.9	5.3	11.9	15.7	14.7	4.4	11.7
2	1879 & 1889	16.1	2.1	16.6	5.5	11.9	16.6	13.6	4.9	12.6
3	1889 & 1899	17.1	2.5	18.2	4.9	10.7	16.8	11.8	6.0	12.0
	DECADE									
4	1899-08	16.7	3.1	18.4	4.5	10.7	15.3	9.6	5.6	16.0
5	1904-13	17.0	3.3	18.9	4.3	11.0	15.0	8.9	5.4	16.2
6	1909-18	17.7	3.3	20.8	3.2	10.7	14.5	8.2	6.3	15.4
7	1914-23	15.2	3.3	22.2	3.0	11.0	14.0	8.3	7.9	15.0
8	1919-28	12.2	3.1	22.2	3.9	11.3	13.7	9.4	8.6	15.7
	DECADE	*Based on NBER Estimates of National Income*								
9	1919-28	10.5	2.5	21.9	4.4	9.8	13.6	11.6	9.6	16.1
10	1924-33	8.7	1.9	19.6	4.2	10.4	13.3	13.4	11.8	16.7
11	1929-38	8.5	1.7	19.4	2.9	10.0	13.6	13.9	14.4	15.6

LINE

1-8 Based on estimates in R. F. Martin, *National Income in the United States, 1799-1938* (National Industrial Conference Board, 1939), particularly Tables 1, 16, 40, 43, and 46. Mr. Martin's 'total realized income' is most comparable with our total of aggregate payments (excl. entrepreneurial savings). 'Miscellaneous income of private origin' (see Table 43), largely rent, and 'net international transfers of dividends and interest' (Table 46) were included in the 'finance and miscellaneous' category. In lines 1-3 rents are distributed among the various industries; in lines 4-8 they are included under 'finance and miscellaneous'.

9-11 Averages of annual estimates in *National Income and Its Composition,* Vol. One, Table 59.

1870's and 1880's, then remained fairly stable, and rose appreciably in the 1920's and 1930's. The share of government rose consistently throughout the period, but that of finance (including miscellaneous) changed little—the rise in line 4 over line 3 being due, in all probability, to the change in the treatment of rent. The outstanding basic shifts are the decline in the share of agriculture, the rise, then stability of the shares of mining and manufacturing, and the rise of the combined category of the service industries (a total of service, government, and finance).

The distributions in Table 11 are for national income and

aggregate payments in current prices; and differences among the secular movements of prices of the goods produced by the several industries may affect trends in the apportionment by industrial origin. No differential price adjustment that would yield long term changes in the industrial composition of national income in constant prices is possible. But a continuous series of the industrial distribution of the gainfully occupied indicates the shifting importance of various industries, judged not by their contributions to real national product but by their relative shares in the most important productive resource—manpower. Table 12 shows most of the basic

TABLE 12

Gainfully Occupied and Employed
Percentage Distribution by Industry, 1870-1940

		AGR. (1)	MINING (2)	MFG. (3)	CON-STRUC-TION (4)	TRANSP. & OTHER PUBLIC UTILITIES (5)	TRADE (6)	FINANCE (7)	GOV. (8)	SERVICE & MISC. (9)
	YEAR	GAINFULLY OCCUPIED								
1	1870	51.6	1.5	16.4	5.4	4.3	6.3	0.4	1.9	12.4
2	1880	48.8	1.8	18.3	4.9	4.6	7.1	0.4	2.2	11.9
3	1890	42.5	2.0	19.3	5.9	5.9	8.1	0.7	2.5	13.2
4	1900	37.7	2.6	21.3	5.6	6.6	9.0	1.1	2.7	13.3
5	1910	30.7	2.9	21.9	6.2	8.0	9.7	1.5	3.4	15.7
6	1920	26.7	2.9	25.5	5.2	9.2	10.0	1.9	4.3	14.1
7	1930	21.3	2.4	22.3	6.2	9.1	12.7	3.0	4.9	18.1
8	1940	16.9	2.1	22.4	6.6	7.2	13.3	2.9	5.5	23.1
	DECADE	EMPLOYED								
9	1919-28	20.6	2.6	22.8	4.0	8.0	14.0	2.7	7.2	18.1
10	1924-33	20.2	2.3	20.9	3.9	7.2	14.6	3.1	7.6	20.1
11	1929-38	20.6	2.2	20.6	2.9	6.1	14.4	3.2	8.5	21.5

LINE

1-8 Based on estimates made by Daniel Carson for 'Labor Supply and Employment' (WPA, National Research Project, Nov. 1939, mimeo.) and revised in 'Industrial Composition of Manpower in the United States, 1870-1940', a paper prepared for the Conference on Research in Income and Wealth, 1945.

9-11 Averages of annual estimates in *National Income and Its Composition,* Vol. One, Table 69. For definition of 'employed' see note to Table 2.

trends already suggested in Table 11, but much more conspicuously. The share of agriculture in the gainfully occupied drops from over one-half in 1870 to about one-sixth in 1940. The shares of mining and manufacturing rise until about 1920, then become stable or decline slightly—a trend

observable also in the share of construction, if we disregard the depression decade 1929-38. The proportion of transportation and other public utilities rises, sharply and consistently, until the last decade, confirming the suggestion advanced above that the decline in the share of this category in aggregate payments in current prices (in Table 11) may be due largely to the greater secular decline in prices of transportation and of other public utility services. The proportions of trade, finance, government, and the service and miscellaneous industries all show an unmistakable secular rise, the rise in the shares of the industries concerned with rendering services rather than producing or transporting commodities being more pronounced in the second half of the long period than in the first.

By combining the data on the growth of national income in Table 10, the number of the gainfully occupied underlying Table 12, its industrial distribution, and assuming inter-industry differences in income per gainfully occupied, we can spot some factors contributing to the growth of national income in constant prices. We exclude from this analysis the decades after 1919-28: our long series in Table 12 being for the gainfully occupied rather than the employed, the inclusion of the last two decades with their unusually heavy unemployment would distort the result. And we assume that throughout the period inter-industry differences in income per gainfully occupied are of the same relative magnitude as those in income per employed 1919-38 (Table 2, col. 5). This assumption involves possible errors due to: (1) substituting ratios per employed for ratios per gainfully occupied; and (2) assuming constancy over time in inter-industry differences in income per gainfully occupied. The first error is minor, as can be seen by comparing the percentage shares in Table 12, lines 9-11, with those in lines 7-8: the disparities are not of a kind that would materially affect differences in the ratios established in Table 2, column 5. The second error may be more appreciable. Partly as a check upon the underlying assumption, partly for the interest the results might have in and of themselves, we tried to approximate the long term changes in the shares of a few industries in national income, *in constant prices* (Table 13).

TABLE 13

Percentage Shares of Selected Industries in National Income (Constant Prices) and in Gainfully Occupied, 1869-1930

		AGRICULTURE (1)	MINING (2)	MANUFACTURING (3)	CONSTRUCTION (4)	TOTAL COMMODITY PRODUCTION (5)
	DECADE	*% Shares in National Income in Constant Prices*				
1	1869-78	27.5	1.0	17.1	6.0	51.6
2	1879-88	20.5	1.2	16.3	5.7	43.7
3	1889-98	18.4	1.7	18.8	7.2	46.1
4	1899-08	15.4	2.1	19.4	5.9	42.8
5	1909-18	13.0	2.5	22.5	4.8	42.8
6	1919-28	10.5	2.5	21.9	4.4	39.3
	AVERAGE OF	*% Shares in Gainfully Occupied*				
7	1870 & 1880	50.2	1.6	17.3	5.1	74.3
8	1880 & 1890	45.6	1.9	18.8	5.4	71.7
9	1890 & 1900	40.1	2.3	20.3	5.8	68.5
10	1900 & 1910	34.2	2.7	21.6	5.9	64.4
11	1910 & 1920	28.7	2.9	23.7	5.7	61.0
12	1920 & 1930	24.0	2.7	23.9	5.7	56.3
		Ratio of Share in National Income to That in Gainfully Occupied				
13	Line 1 ÷ line 7	0.55	0.62	0.99	1.18	0.69
14	Line 2 ÷ line 8	0.45	0.63	0.87	1.06	0.61
15	Line 3 ÷ line 9	0.46	0.74	0.93	1.24	0.67
16	Line 4 ÷ line 10	0.45	0.78	0.90	1.00	0.66
17	Line 5 ÷ line 11	0.45	0.86	0.95	0.84	0.70
18	Line 6 ÷ line 12	0.44	0.93	0.92	0.77	0.70

COLUMN LINES 1-5

1-3 Line 6 extrapolated by an index of the ratio of the physical output index for the given industry to national income in 1929 prices. The latter is from *National Product since 1869,* Table II 16, col. 10. Decade averages of indexes of output are derived from the annual series indicated below.

Agriculture: For 1897-1928, from *American Agriculture, 1899-1939* by Harold Barger and Hans H. Landsberg (National Bureau of Economic Research, 1942), p. 404, extrapolated back to 1869 by the index in *Gross Farm Income and Indices of Farm Production and Prices in the United States, 1869-1937* by Frederick Strauss and Louis H. Bean (Department of Agriculture, Washington, D. C., 1940), Table 61, p. 126; the two series were spliced by the average ratio for 1897-1901.

Mining: For 1899-1928, from *The Mining Industries, 1899-1939,* by Harold Barger and Sam H. Schurr (National Bureau of Economic Research, 1944), Table A-5, p. 343, extrapolated back to 1869 by the index in *Forecasting Business Cycles* by Warren M. Persons (Wiley, 1931), Table 12, pp. 170-1; the two series were spliced by the average ratio for 1899-1904.

Manufacturing: For 1899-1928, from *The Output of Manufacturing Industries, 1899-1937* and *Employment in Manufacturing, 1899-1939* by Solomon Fabricant (National Bureau of Economic Research, 1940 and 1942), pp. 602 and 331, respectively. Extrapolation back to 1869 is by the index in *Forecasting Business Cycles,* Table 12, pp. 170-1; the two series were spliced by the average ratio for 1899-1904.

4 Line 6 extrapolated by the ratio of gross construction, 1929 prices (*National*

(Notes to Table 13 concluded on page 44)

This approximation is based upon a comparison of the index of physical output for each industry with national income, in 1929 prices. The former measures the gross output of an industry, rather than net income originating in it (i.e., the difference between gross output and payments for goods and services to other industries). The comparison, therefore, yields a good approximation to the share of a given industry in national income in constant prices only if there is no pronounced trend in the proportion of net income originating to gross output (both in constant prices). There is no way of checking upon this assumption, but comparisons of net income originating and gross value of output, in current prices, for the last three decades (1919-28, 1924-33, 1929-38) do not show marked shifts in the ratio, except for mining. Accepting the assumption,[18] we can extrapolate the percentage share of a given industry in national income in 1919-28 by an index based on the ratio of the index of physical output to national income in 1929 prices (Table 13, lines 1-6).

These calculations, which can be made only for the four commodity producing industries, show long term trends in their shares similar to those indicated by the estimates in current prices in Table 11: declines in the shares of agriculture

[18]The estimate for construction, based upon an index of total new construction rather than contract construction alone, involves an additional assumption—the constancy of the relative proportion of force account construction. This particular assumption is probably invalid, since the proportion of force account construction has increased. Yet the broad trends in the share of construction in national income should not be completely obscured by the resulting bias.

Notes to Table 13 concluded

COLUMN

Product since 1869, Table II 5, col. 7), to gross national product, 1929 prices (*ibid.*, Table II 16, col. 9).

5 Sum of col. 1-4.

LINE 6

1-4 Average of annual estimates of the percentage share of the given industry in national income in current prices (*National Income and Its Composition, 1919-1938*, Vol. One, Table 59).

5 Sum of col. 1-4.

LINES 7-12

1-4 Averages of annual data in Table 12.

5 Sum of col. 1-4.

and construction, and rises followed by stabilization in the shares of mining and manufacturing. Even the magnitudes of the trends are not too different. Yet for agriculture the decline in the share in Table 13 is appreciably larger than in Table 11; and for manufacturing the rise of the share in Table 13 is smaller than in Table 11. The comparison does not warrant identifying the trends in the apportionment of national income in current prices with those in the distribution of the total in constant prices.

The important question at the moment is whether a comparison of the shares of industries in national income (in constant prices) with their shares in the gainfully occupied reveals any decided trends in inter-industry differences in income per gainfully occupied. The answer (Table 13, lines 13-18) is that for two large industries—agriculture and manufacturing—the ratio of income per gainfully occupied to the countrywide average is fairly constant (except the drop in agriculture during the first decade). There is a distinct upward trend in this ratio for mining, and a downward trend in the ratio for construction. But these industries are small; much more significant is the near stability of the ratio of income per gainfully occupied to the countrywide average for the large group of commodity producing industries as a whole.

In the light of these findings it is not unreasonable to assume that relative inter-industry differences in income per gainfully occupied have remained fairly stable—at least for industries that loom large in the national total and thus determine its growth. We can then combine the inter-industry differences in income per employed established in Table 2, column 5, with shifts in the industrial distribution of the gainfully occupied measured in Table 12, and with data on the absolute growth of both income and gainfully occupied, distinguish several elements in the long term rise of national income.

How much of the total increase, $59 billion, in national income, 1875-1925, can be associated with the increase in the number of gainfully occupied, if we disregard any rise in income per gainfully occupied? Assigning to the increase in the

number of gainfully occupied, 30.5 million, the 1875 income per gainfully occupied ($701, in 1929 prices), we obtain $21 billion as the income ascribable to this addition to the gainfully occupied. This leaves $38 billion, or well over 60 percent of the total increase in national income, to be associated with the increase in income per gainfully occupied (Table 14).

This secular rise in income per gainfully occupied can be further analyzed into the rise due to the increase in income

TABLE 14

Analysis of Rise in National Income, 1875-1925
(based on values in 1929 prices)

	ABSOLUTE VALUES			CHANGE OVER PERIOD		
	1875 (1)	1900 (2)	1925 (3)	1875-1925 (4)	1875-1900 (5)	1900-25 (6)
1 National income ($ billions)	10.6	32.0	69.5	+58.9	+21.4	+37.5
2 Gainfully occupied (millions)	15.16	29.07	45.63	+30.47	+13.91	+16.56
3 Income per gainfully occupied ($)	701	1,102	1,523	+822	+401	+421
Increase in National Income due to Increase in Gainfully Occupied and That due to Increase in Income per Gainfully Occupied						
4 Increase in total due to increase in gainfully occupied ($ billions)				+21.4	+9.8	+18.2
5 Line 4 as % of line 1				36.3	45.8	48.5
6 Increase in total due to increase in income per gainfully occupied ($ billions) (line 1 — line 4)				+37.5	+11.6	+19.3
Increase in National Income due to Increase in Income per Gainfully Occupied						
7 Total increase in income per gainfully occupied ($) (line 3)				+822	+401	+421
8 Intra-industry increase ($)				+486	+283	+228
9 Line 8 as % of line 7				59	71	54
10 Inter-industry increase (incl. shift in inter-industry relative differentials from those in 1919-38) ($) (line 7 — line 8)				+336	+118	+193
11 Line 10 as % of line 7				41	29	46

COLUMN LINE 1

1-3 By straight line interpolation from Table 10.

LINE 2

1-3 By straight line interpolation of data underlying Table 12.

LINE 3

1-3 Line 1 ÷ line 2.

LINE 4

4 Line 2, col. 4, × line 3, col. 1.
5 Line 2, col. 5, × line 3, col. 1.
6 Line 2, col. 6, × line 3, col. 2.

LINE 8

4 Computed as follows:

COLUMN		1925
1	National income per gainfully occupied[a]	1,523
	AGRICULTURE	
2	% share in total gainfully occupied[b]	24.0
3	Preliminary estimate of income per gainfully occupied (0.5[c] × line 1)	762
4	Line 2 × line 3	18,288.0
	MINING	
5	% share in total gainfully occupied[b]	2.7
6	Preliminary estimate of income per gainfully occupied (0.9[c] × line 1)	1,371
7	Line 5 × line 6	3,701.7
8-28	MFG., CONSTRUCTION, ETC. (7 major industrial divisions)	
29	Total gainfully occupied, 9 major industrial divisions (line 2 + line 5, etc.), %	100.0
30	Total product, 9 major industrial divisions (line 4 + line 7, etc.)	149,393.3
31	Weighted av., income per gainfully occupied, 9 major industrial divisions (line 30 ÷ line 29)	1,492
32	Adjustment factor (line 1 ÷ line 31)	1.0208
	Final Estimate of Income per Gainfully Occupied for Each of the 9 Major Industrial Divisions	
33	Agriculture (line 3 × line 32)	778
34	Mining (line 6 × line 32)	1,400
35-41	Mfg., Construction, etc. (7 major industrial divisions)	

Calculation of 1925 on 1875 Base and Estimated Intra-industry Increase from 1875 to 1925

		% SHARE OF GAINFULLY OCCUPIED, 1875[b] (1)	ESTIMATED INCOME PER GAINFULLY OCCUPIED, 1925[d] (2)	(1) × (2) (3)
42	Agriculture	50.2	778	39,055.6
43	Mining	1.6	1,400	2,240.0
44-50	Mfg., Construction, etc. (7 major industrial divisions)			
51	Total, 9 major industrial divisions, (lines 42-50)	100.0		118,696.9
52	Weighted av., income per gainfully occupied, 9 major industrial divisions (line 51, col. 3 ÷ col. 1)			1,187
53	National income per gainfully occupied, 1875[e]			701
54	Intra-industry increase (line 52 — line 53)			486

[a]Line 3, col. 3 of Table 14.
[b]By straight line interpolation from Table 12.
[c]Table 2, col. 5.
[d]Lines 33-41.
[e]Line 3, col. 1 of Table 14.

5 & 6 Computed by a procedure paralleling that for col. 4.

per gainfully occupied within each of the nine major industrial categories in Table 12 (intra-industry rise); and the rise due to the shift in the distribution of the gainfully occupied from industries in which income per gainfully occupied is below the countrywide average (e.g., in agriculture) to those in which it is above (e.g., transportation and other public utilities). Of the total rise in income per gainfully occupied, $822 (in 1929 prices), $486, or 59 percent, was due to the intra-industry rise in income per gainfully occupied, and $336, or 41 percent, to the shifts from industries with lower to industries with higher income per gainfully occupied.[14]

In columns 5 and 6 a similar analysis is carried through separately for each half of the fifty years. In general, the increase in national income, in the gainfully occupied, and in income per gainfully occupied is, in absolute terms, larger from 1900 to 1925. But in percentage terms, it is distinctly smaller: in national income it is 117 percent of the 1900 base as compared with 202 percent of the 1875 base; in the gainfully occupied, 57 percent as compared with 92 percent; in income per gainfully occupied, 38 percent as compared with 57 percent. Thus crudely halving the full period brings out the retardation in the percentage secular rise in national income, population, and per capita income, shown in somewhat greater detail in Table 10.

For each of the two quarter centuries, somewhat less than half of the total rise in national income may be associated with the growth in the gainfully occupied and the remaining portion with the increase in the income per gainfully occupied. Of the latter, 71 percent during the first twenty-five years and 54 percent during the second is due to the intra-industry rise; and 29 and 46 percent respectively to the shifts from industries with lower levels of income per gainfully occupied to industries with higher levels (inter-industry shift). That the

[14]Because of the assumed constancy of relative differences among industries in income per gainfully occupied and because effects of inter-industry shifts are calculated as residuals, the measures in Table 14, line 10, include the effects of shifts not only in the *shares* of industries in the total gainfully occupied but also in relative inter-industry differences in income per gainfully occupied. The latter element can be assumed to be minor.

relative effect of inter-industry shifts is greater during 1900-25 than during 1875-1900 may be due to the greater shift (shown in Table 12) during this later period away from agriculture toward the higher income per gainfully occupied industries (public utilities, finance, government).

The crude division into two periods reveals a distinct retardation in the rate of rise in income per gainfully occupied due to the intra- but not to the inter-industry component (lines 8 and 10). The increase in income per gainfully occupied due to intra-industry rises amounted in 1875-1900 to 40 percent of the 1875 base, and in 1900-25 to 21 percent of the 1900 base. Similar percentage rises associated with inter-industry shifts were 17 percent, 1875-1900, and 18 percent, 1900-25. While no retardation in the increase of income per gainfully occupied associated with the inter-industry component is observed, it is likely to appear as the shift toward the higher income per gainfully occupied industries slows down and approaches a limit.

3 *Distribution by Type and Size*

Long term changes in the distribution of income by type can be established for aggregate payments alone. And even in them, it is difficult to find marked trends, partly because the estimates that can be brought together for a sufficiently long period are none too comparable.

Bearing in mind the connection between the distribution of income by type and the character of business organization, one would expect that the secular decline in the relative weight of individual firms and the rise in the relative weight of corporations and of public institutions would mean a decline in the share of entrepreneurial income and possibly of rent, and a rise in the shares of employee compensation, dividends, and perhaps interest. One would be at a loss to form a similar hypothesis concerning the secular movement of the share of service income, on the one hand, i.e., of the sum of employee compensation and entrepreneurial income, and of property income, on the other.

The estimates confirm the hypothesis that can be formulated but with some qualifications (Table 15). The share of em-

TABLE 15

Aggregate Payments (Current Prices)
Percentage Distribution by Type, 1870-1938

		EMPLOYEE COMPENSATION (1)	ENTREP. NET INCOME (2)	SERVICE INCOME (3)	DIVIDENDS (4)	INTEREST (5)	RENT (6)	PROPERTY INCOME INCL. RENT (7)
	Based on King's Estimates of Value of Product							
	AVERAGE OF							
1	1870 & 1880	50.0	26.4	76.5		15.8	7.8	23.6
2	1880 & 1890	52.5	23.0	75.4		16.5	8.2	24.6
3	1890 & 1900	50.4	27.3	77.7		14.7	7.7	22.4
4	1900 & 1910	47.1	28.8	75.8		15.9	8.3	24.2
	Based on Martin's Estimates of Aggregate Payments excl. Entrepreneurial Savings							
	DECADE							
5	1899-08	59.5	23.8	83.3	5.3	5.1	6.4	16.7
6	1904-13	59.6	23.3	82.9	5.7	5.1	6.3	17.1
7	1909-18	59.7	23.3	83.0	6.5	4.9	5.7	17.0
8	1914-23	63.0	20.8	83.8	5.6	5.3	5.3	16.2
9	1919-28	65.1	18.3	83.4	5.4	6.0	5.2	16.6
	Based on NBER Estimates of Aggregate Payments incl. Entrepreneurial Savings							
	DECADE							
10	1919-28	61.7	19.5	81.2	5.6	6.1	7.1	18.8
11	1924-33	63.1	16.6	79.7	6.5	7.8	5.9	20.3
12	1929-38	64.9	15.9	80.8	6.6	8.4	4.3	19.2

LINE

1-4 W. I. King, *The Wealth and Income of the People of the United States* (Macmillan, 1919), Table XXXI, p. 160.

5-9 Based on estimates in *National Income in the United States, 1799-1938,* Tables 4, 41-4, and 46.

10-12 Based on estimates in *National Income and Its Composition,* Vol. One, Table 22.

ployee compensation does rise during the period as a whole: taking into consideration the differences among the various estimates, we may set it at below 60 percent of aggregate payments in the last quarter of the nineteenth century and well above it in the 1920's and the 1930's. But this rise is distinct only after World War I. The share of entrepreneurial income declined, but also not distinctly until after 1918. The two trends together leave the share of service income at a fairly constant level during the long period.

While the estimates for 1870-1910 combine dividends and interest, the relatively small role of industrial corporations around 1870 and their growth to importance by 1919 lead one to infer that the share of dividends must have risen appreciably. But since 1919 it seems to have risen little. The

much greater rise in the share of interest is partly due to the relative inflexibility of interest during the severe depression of the 1930's. Yet it began immediately after World War I, reflecting the growth of government debt, which promises to produce a further rise in the future. The proportion accounted for by rent shows a downtrend, particularly marked in the recent depression decades.

One cannot feel too much confidence in the reliability and comparability of the estimates assembled in Table 15, particularly those for the earlier part of the period. The decade averages (lines 5-12), however, show consonance of whatever trends are observable—rise in the share of employee compensation, declines in those of entrepreneurial income and rent, recent rise in the interest share—with whatever expectations can be formed on the basis of other knowledge of changes in the type of business organization, growth in public debt, and the like. And it seems reasonable to conclude that there could hardly have been very great secular shifts in the relative distribution between service and property income, for if there had, they would probably find some reflection in the estimates, crude though the latter are.

We have not data adequate to establish the existence or absence of long term changes in the distribution of income payments among recipients grouped by size of their income. So far as the distribution by type has any effect on the distribution by size, one would infer from Table 15 that the relative inequality in the size distribution should show no marked secular changes. But the intra-type distribution of income by size is important in determining the characteristics of the distribution of income payments by size. The inequality in the distribution of employee compensation may have increased with the growth in the number of employees and with the inclusion of highly paid corporation executives and professional employees. The inequality in the distribution of entrepreneurial income may have increased also with the growth in the number of professional and other highly paid urban entrepreneurs. The only safe inference is that, given the relative secular constancy in the distribution of income pay-

ments by type, relative inequality in the size distribution of income, *so far as it was affected by shifts in the distribution by type,* cannot have undergone marked long term changes.

4 *Distribution by Type of Use*

One tends to assume that in earlier times, with greater pressure to build up the capital structure of the country, the share of current income devoted to capital formation was probably greater than it now is. In other words, one expects to find an uptrend in the share of the flow of goods to consumers and a downtrend in the share of net capital formation.

The estimates since 1869-78 confirm this expectation, but with significant qualifications (Table 16). First, the share of the flow of goods to consumers is consistently high: in no decade is it less than 80 percent of national income, and with two exceptions (in values in constant prices), not less than 85 percent. The predominance of ultimate consumption as the channel into which current product flows, noted for recent decades in Part I, is a characteristic of long standing in this country.[15]

Second, while the trend in the share of the flow of goods to consumers is upward and in the share of net capital formation downward, neither is pronounced unless we include the last two decades, which were affected by the 1929-32 depression and its aftermath. During the full period including the

[15]This moderate rate of capital formation may, at first glance, raise questions as to how the rapid growth of total product and of per capita, characterizing the period under study, was attained. In this connection, the importance of a high level of consumption as a base for increasing productivity, already mentioned in Part I, Section 5, should be borne in mind. In addition, two important factors, not directly reflected in the percentages net capital formation constitutes of national income, should be noted. First, through most of the period the country profited from large immigration. The capitalized value of this addition to the country's productive population was estimated to be more than $10 billion per year in the periods of largest immigration (1881-90 and 1901-14), and through the period 1860-1930 at roughly $6 to $7 billion per year, at prices of the 1920's (see calculation by Dr. Agostino de Vita, supplementing the article by Corrado Gini, Europa und Amerika: Zwei Welten, *Weltwirtschaftliches Archiv,* July 1940, v. 52, pp. 31-35). Second, through a substantial part of the period the country profited from availability of land for extensive expansion within its own boundaries.

TABLE 16

National Income, Percentage Distribution between Flow of Goods to Consumers and Net Capital Formation, 1869-1938

	DECADE	CURRENT PRICES		1929 PRICES	
		Flow of Goods to Consumers	Net Capital Formation	Flow of Goods to Consumers	Net Capital Formation
		(1)	(2)	(3)	(4)
1	1869-78	87.9	12.1	86.3	13.7
2	1874-83	87.0	13.0	85.6	14.4
3	1879-88	86.8	13.2	85.4	14.6
4	1884-93	85.9	14.1	83.9	16.1
5	1889-98	85.9	14.1	83.8	16.2
6	1894-03	86.4	13.6	85.2	14.8
7	1899-08	87.4	12.6	86.4	13.6
8	1904-13	87.9	12.1	86.9	13.1
9	1909-18	87.5	12.5	87.0	13.0
10	1914-23	87.6	12.4	88.6	11.4
11	1919-28	89.1	10.9	89.8	10.2
12	1924-33	93.3	6.7	94.0	6.0
13	1929-38	98.0	2.0	98.6	1.4
	Averages				
14	Lines 1-5	86.7	13.3	85.0	15.0
15	5-9	87.0	13.0	85.9	14.1
16	9-13	91.1	8.9	91.6	8.4
17	1-5	86.7	13.3	85.0	15.0
18	4-8	86.7	13.3	85.3	14.7
19	7-11	87.9	12.1	87.8	12.2

Calculated from estimates in *National Product since 1869*, Table II 16, col. 1, 3, 6, and 8.

latter, when the decades are grouped into three sets, each including five (with one overlapping), the share of the flow of goods to consumers (in constant prices) rises from 85 to 86 to 92 percent; the share of net capital formation declines from 15 to 14 to 8 percent, i.e., it is almost cut in half. If we exclude the last two decades, the decline in the share of capital formation is much less—from 15 percent in the early part of the period to somewhat over 12 percent in the last part. Also, this drop is rather minor, and the underlying estimates are not sufficiently precise to warrant confidence in such small changes. The decade estimates indicate that the decline was especially sharp after World War I, which suggests a connection with the upsurge in the flow of certain types of consumer goods whose supply was restricted during the war years. Setting aside the secular significance of the depression of the 1930's, we can say that if a long term decline in the propor-

tion of net capital formation has occurred, it has been quite moderate so far.

The composition of the flow of goods to consumers and of net capital formation also shifted (Table 17). In the former, the main long term trend is the rise in the share of services not embodied in new commodities. In both groupings of decades, this share rose from 28 percent to one-third or more—an effect of both urbanization and the shift in demand toward services as the standard of living rose. There was also some tendency toward a rise in the share of consumer durable commodities—as part of the total flow of goods to consumers, and still more, of course, as part of the total flow of commodities to consumers. The shares of perishable and of semidurable commodities declined.

These secular changes in the composition of the flow of goods to consumers are not unexpected; indeed, they are a matter of common observation. That despite the length of the period covered, the rapid succession of technological changes, the sustained and cumulative growth of the supply of goods per consumer, the conspicuous shifts in consumers' tastes and modes of living, these secular changes, particularly in the percentage apportionment of commodity flow, were not greater is due largely to the fact that the various innovations tended to affect the several broad categories of commodities rather than only one. For example, the introduction and spread of passenger cars meant additions not only to consumer durable commodities but also to perishable (gasoline, oil), semidurable (tires), and services (repairs, garage service, etc.). Much greater shifts in the composition of consumer commodities could perhaps be observed if we had narrower categories. In the broad classification by durability in Table 17, the only marked secular change is in the apportionment between commodities and services.

The secular shifts in the composition of net capital formation are more pronounced (Table 17, lines 5-8). From 1869-78 to 1929-38 the shares of construction and of net additions to inventories declined: the former from over 70 percent in the first set of five decades to about 50 percent in the last set;

TABLE 17

Flow of Goods to Consumers and Net Capital Formation
Percentage Distribution by Type of Use, 1869-1938
(based on values in 1929 prices)

	AVERAGES OF DECADES Through 1938			Through 1928		
	1-5 (1)	5-9 (2)	9-13 (3)	1-5 (4)	4-8 (5)	7-11 (6)
FLOW OF GOODS TO CONSUMERS (AVERAGES OF PERCENTAGES)						
1 Perishable	44.3	43.5	40.2	44.3	43.8	41.4
2 Semidurable	18.4	17.2	15.2	18.4	17.6	16.2
3 Durable	9.1	9.1	9.4	9.1	9.3	9.2
4 Services	28.2	30.3	35.2	28.2	29.3	33.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
NET CAPITAL FORMATION (PERCENTAGES OF AVERAGE VALUES)						
5 Producer durable	13.9	17.5	22.0	13.9	15.9	21.4
6 Construction	70.6	65.4	49.3	70.6	72.3	51.9
7 Net addition to inventories	18.3	13.7	12.1	18.3	13.4	15.6
8 Net changes in claims against foreign countries	—2.8	3.4	16.6	—2.8	—1.5	11.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Calculated from estimates in *National Product since 1869*, Table II 8, col. 6-10, and Table II 15, col. 6-10. The decade numbers are those used in Table 16.

the latter, from 18 to 12 percent. The shares of producer durable equipment and net additions to claims against foreign countries rose: the former from 14 to 22 percent and the latter from a minus quantity to 17 percent of the total. Even if we exclude the last two decades as distorted by the depression of 1929-32, the secular trends in the composition of net capital formation away from construction and inventory accumulation and toward producer durable equipment and additions to claims against foreign countries are evident.

While the range of error in the estimates of various components of net capital formation is fairly wide, especially for the smaller items such as flow to inventories and additions to claims against foreign countries, the existence of these trends, if not their exact magnitude, can be asserted with confidence. As a country is industrialized, builds up its basic capital structure, and the growth in population retards, the share of construction in net capital formation (which includes all residential construction) declines. Likewise, as its distribution and transportation systems improve, and the proportion of seasonal industries (e.g., agriculture) declines, the share of

net additions to inventories also declines. As a country becomes an international creditor rather than a debtor, the relative importance in net capital formation of additions to claims against foreign countries rises; and as a large share of capital investment goes into equipment and residential construction plays a smaller role, the proportion of producer durable equipment increases.

For the major components of net capital formation, construction, and producers' equipment, apportionment by broad industrial categories of users can be estimated back to 1880. The data for the years prior to the 1920's are the successive wealth estimates, which have to be adjusted for both changes in valuation and the inclusion of nonreproducible wealth, such as land. They check only very roughly and over twenty-year spans with cumulated totals of net capital formation derived from data on commodity flow. Nevertheless, the orders of magnitude indicated by the combination of these wealth and capital formation data are sufficiently reliable to paint a broad picture of changes in the industrial destination of net additions to construction and equipment (Table 18).

In general, the share of private industries (agriculture, mining, manufacturing, etc., excluding public utilities and residential construction), which was well over one-third during the first twenty years, rose to 46 percent in the second twenty, then declined to one-eighth of the total in the last twenty. The share of public utilities remained fairly constant for the first two periods—at about 30 and 26 percent—then rose to 37 percent in the third. That of residential construction declined consistently, from 25 percent in the first twenty years to 17 percent in the last. The share of net construction and flow of equipment under all private auspices has always been large, but declined from 92 percent in the first twenty years to 91 percent in the second, and to 67 percent in the third. The share of the tax exempt category, which includes government and other activities under public auspices but is dominated by the former, rose in the last twenty years to 33 percent of the total, from below 10 percent during the preceding forty years, indicating a definite upsurge in the share of public

TABLE 18

Industrial Distribution of Increase in Value of Real Estate Improvements and Equipment, 1880-1939 (based on values in 1929 prices)

	JUNE 1, 1880 TO JUNE 1, 1900 (1)	JUNE 1, 1900 TO JAN. 1, 1919 (2)	JAN. 1, 1919 TO JAN. 1, 1939 (3)	JUNE 1, 1880 TO JAN. 1, 1939 (4)
% Share of Various Industrial Categories				
1 Private industry, excl. public utilities	36.1	46.1	12.5	34.0
2 Public utilities	30.4	26.0	37.2	30.4
3 Residential	25.4	19.1	16.9	20.8
4 Total private	91.9	91.3	66.6	85.2
5 Tax exempt	8.1	8.7	33.4	14.8
6 Total of above	100.0	100.0	100.0	100.0
% Share of Each Period within Industrial Category				
7 Private industry, excl. public utilities	37.7	53.0	9.3	100.0
8 Public utilities	35.5	33.5	31.0	100.0
9 Residential	43.4	36.0	20.6	100.0
10 Total private	38.3	41.9	19.8	100.0
11 Tax exempt	19.4	23.1	57.4	100.0
12 Total of above	35.5	39.1	25.4	100.0
% Rise in Durable Reproducible Wealth				
13 Private industry, excl. public utilities	166.2	97.2	8.2	441.4
14 Public utilities	172.2	65.4	34.6	484.7
15 Residential	183.5	58.9	20.0	422.9
16 Total private	172.7	76.3	19.3	451.0
17 Tax exempt	259.7	95.0	114.7	1,336.6
18 Total of above	177.5	77.6	26.8	499.9
19 Total wealth (line 18 + business inventories & claims against foreign countries)	169.8	92.9	32.4	557.6

LINE COLUMN 1

1-12 Based on absolute totals in *National Product since 1869,* Table IV 13, Part B, col. 1.

13-18 Based on absolute totals in *ibid.,* Table IV 12, Part 8, col. 1 and 3.

19 Based on absolute totals in *ibid.,* Table IV 10, col. 6, lines 1 and 3.

COLUMN 2

1-12 Derived from *ibid.,* Table IV 13, Part B, col. 2.

13-18 Derived from *ibid.,* Table IV 12, Part B, col. 3, and Table IV 7, col. 3 and 6. The rates were adjusted to a 20-year basis to establish comparability with those in col. 1 and 3.

19 Derived from the totals underlying line 18 plus *ibid.,* Table IV 10, line 3, col. 3 and 4, for 1900, and line 10, col. 3 and 4, for 1919. The rate was adjusted to a 20-year basis.

COLUMN 3

1-12 Derived from *ibid.,* Table IV 13, Part B, col. 4.

13-18 Derived from *ibid.* and Table IV 12, Part B, col. 6.

19 Additions to totals underlying line 18 from *ibid.,* Table IV 10, lines 10 and 12.

COLUMN 4

See notes to col. 1-3.

construction and equipment during the two decades following World War I. The total increase in value for all sixty years (col. 4) is distributed about one-third to private industry (excluding public utilities and residential construction); about three-tenths to public utilities; about one-fifth to residential construction; and about one-seventh to activities under public auspices.

These differences in the shares of the broad industrial categories of users among the three periods mean differences also in the shares contributed during each period to the total for the sixty years. Of total net construction and equipment added to private industry (excluding public utilities and residential construction) the first period contributed 38 percent; the second, though somewhat shorter, 53 percent; and the third, only slightly over 9 percent. For public utilities, there was a consistent though moderate decline in the contribution of each period. Of the total added to residential construction, the share of the first period was about 43 percent; of the second, 36 percent; of the third, only 21 percent. Of the total added to construction and equipment under public auspices, on the contrary, considerably less than one-half was added during the first forty years, and 57 percent during the last twenty, 1919-38.

The minor secular decline in the share of net capital formation in national income, indicated by Table 16, would be bigger were we to measure only the share of net capital formation under *private* auspices. While the estimates in Table 18 do not cover net additions to inventories and to claims against foreign countries, they do cover the two components that account on the average for more than three-quarters of net capital formation—construction and producers' equipment—and they show a marked decline in the share of private construction and equipment.

The fact that of the total sixty years' accumulation more than one-third was added during the first twenty and much less than one-third during the last twenty (Table 18, line 12) suggests a retardation in the rate of growth of *durable reproducible* wealth (i.e., net stock of construction and equip-

ment). Such retardation can be measured, since the total stock in 1880 was calculated for the purpose of estimating net additions between 1880 and 1919 (Table 18, lines 13-19).

For both total durable reproducible wealth and every category distinguished, the stock increased at a sharply declining rate. While that in private industry (excluding public utilities and residential construction) more than quintupled during the sixty years, the percentage increase in the first twenty was 166 and in the last twenty 8. The declines in the percentage rate of growth are equally drastic in other categories; and even in the tax exempt group, the large addition in the last twenty years, 115 percent, is smaller than in the first twenty, 260 percent. For the total of the categories distinguished (line 18), which sextuples, the percentage rate of increase drops from 178 in the first twenty years to 27 in the last twenty.

The estimates may well exaggerate the degree of retardation in the rate of increase in the stock of durable reproducible capital, largely because the initial estimate for 1880 may be too low and the last twenty years include the unusually severe depression of the 1930's. Yet, the decline in the percentage rate of accumulation is shown even if we exclude the last twenty years. Also, even if we add the two missing components of total reproducible wealth which can be estimated (although not by industrial affiliation of holder or user)—business inventories and the balance of claims against foreign countries—the total (line 19) still exhibits a declining percentage rate of growth, even though the retardation is not as marked as in the narrower total limited to real estate improvements and durable equipment.

A decline in the rate of relative additions to durable reproducible capital does not necessarily mean a decline in the rate of increase in the productive services such capital can contribute. The price and value indexes available to translate construction and equipment in changing values to a constant price or value base do not take adequate account of the improved efficiency of capital. Yet it cannot be assumed that such unreflected improvement in efficiency was enough greater

during the last part of the sixty years to offset the retardation in the rate of relative additions to the stock. Indeed, one might argue that it may well have been relatively greater between 1880 and 1900 than between 1919 and 1939. But we do not have definite evidence on the subject; all one can say about the figures in Table 18 is that the total stock of capital in the country available for the production process grew at a high rate during the sixty years and the rate declined sharply from the early to the later part of the period.

This conclusion, together with the retardation in the rate of increase in the other important productive factor, viz., labor supply as represented by the gainfully occupied, noted in Section 2, helps to explain the retardation in the rate of growth of national income. Furthermore, the reduction in the average rate of utilization of the labor supply, as represented by fewer working hours, and the greater retardation in the rate of growth of reproducible capital than in the labor supply[16] at least suggest why the rate of increase in income per gainfully occupied (disregarding unemployment) should also have declined. The subject, obviously of telling importance, awaits further exploration—not only in this but also in countries that entered the phase of modern industrialization earlier or later.

5 *Fluctuations in Rates of Growth*

The percentage changes from decade to decade in Table 10 (col. 4-6) show marked fluctuations which in their recurrence have the appearance of cycles. Thus, the entries for national income (col. 4) drop from the large increase in the average for 1874-83 over that for 1869-78 to a much smaller increase in the average for 1889-98 over that for 1884-93; then the rates of change rise again, only to decline after one or two intervals. Inspection of Table 10 reveals the existence of at least three such swings in the rate of growth with a

[16]Compare the movement of rates in Table 18, lines 18 and 19, with that of total population (Table 10, col. 5, lines 15-20) or the gainfully occupied (Table 14, line 2).

span from trough to trough of four to five entries, representing periods of twenty to twenty-five years.

While the causes of such fluctuations in the rate of secular growth are still obscure and their recurrence not too widely known, sufficient study has been made to affirm their existence.[17] It may be of interest to establish here their characteristics as revealed by the comprehensive decade estimates at our disposal. The fact that these estimates are decade averages makes it impossible to study the fluctuations with as much precision as might be desired. Yet, for swings so long in duration, even decade estimates, overlapping by five years, suffice to establish the broad characteristics of timing and amplitude.

In order to bring out these characteristics clearly, the longer term trend—the downward drift—of the rates of change from decade to decade must be eliminated. Two procedures were employed for this purpose. First, a straight line was fitted to all the series, by the method of least squares, to the logarithms of the rates of change between overlapping

[17]In *Measuring Business Cycles* (National Bureau of Economic Research, 1946, Ch. 11), Burns and Mitchell analyze the various hypotheses of long cycles, testing their validity in terms of differences in characteristics of specific short cycles between those in the rising and in the declining long phases of the presumptive long swings. With few exceptions, no significant differences are revealed; so that one may question whether the observed long cycles are not due merely to the averaging out of some of the more conspicuous, irregular peculiarities of the shorter term fluctuations observed in various aspects of economic activity.

This, however, does not justify the dismissal of these changes in the rate of secular growth from study. That these long term swings may be nought but averages of short term cycles, in which some of the larger, irregular peculiarities of the latter are 'stretched out' over longer periods is no more reason to dismiss them than we can dismiss the shorter cycles themselves because they can be interpreted as results of averaging of changes essentially random in character. (See the author's article on Random Events and Cyclical Oscillations, *Journal of the American Statistical Association,* Sept. 1929, pp. 258-75.) These swings in rate of secular movement represent a component of the time series that is omitted from view if we confine our attention to the average rate of growth and the average retardation in it, on the one hand; and to changes in the series within the short term cycles (either specific or reference), on the other. Analysis of this component seems definitely worth while, so long as we do not assign to these fluctuations in the secular rate of growth the character of cycles, since their periodic recurrence has not yet been demonstrated or explained.

decades. This line was found to provide a good fit in most series. But the few exceptions forced the adoption of a second procedure—marking off the troughs of the successive long swings; assembling the single rates of change into three groups in accordance with the dates of the long swings; calculating means of the logarithms of these groups of rates; and using these means as three points to calculate the constants and ordinates of a second degree potential curve fitted to the logarithms. In most series, this procedure yielded results not much different from the straight line; and the latter was retained. In a few, the three point curve provided a significantly better fit; and hence served to establish more reliably the characteristics of the long swings.

Deviations from the straight line or from the three point curve provide then a description of the alterations in the rate of growth, free from the effect of both the average level of such rates and from the downward trend in them. They are shown for national income, population, and per capita income in Table 19. In addition, the table provides certain over-all measures—the average rate of growth and of its retardation,[18] as well as the average deviation—a rough measure of the amplitude of swings in the rates of growth.

The measures of retardation in Tables 19-21 reflect the common tendency of the rates of growth to decline—a tendency already discussed in Section 1. They indicate the percentage by which the underlying rate of increase declines with the passage of each quinquennium. Thus, for national income the average rate of retardation is 2.2 percent; that is, in every quinquennium the trend rate of increase is reduced by that percentage (e.g., for the interval between 1874-83 and 1869-78 the trend rate of increase; i.e., the ordinate of the straight line, is 34.3 percent; for the next interval, 1879-88 to 1874-

[18]These measures are antilogs of the two constants of the equation of the straight line fitted to rates of change between overlapping decades. The average rate of change is the antilog of the constant a and the average rate of retardation is the antilog of the constant b, in the equation $\log y = a + bx$, in which y is the rate of change and x is in units of quinquennia. Throughout, the origin of x was taken as the midpoint of the full period covered by the series.

TABLE 19

Fluctuations in Rates of Growth, National Income Total and Per Capita (1929 Prices), 1869-1938

	CENTRAL YEAR OF PERIOD	PERCENTAGE DEVIATIONS FROM STRAIGHT LINE OR 3 POINT CURVE FITTED TO RATES OF PERCENTAGE CHANGE BETWEEN OVERLAPPING DECADES			STANDARD TREND-CYCLE	
		National Income	Population*	Per Capita	Central Year of Period	Trend-cycle of Quinquennial Rates
	(1)	(2)	(3)	(4)	(5)	(6)
1	1876	+8.5	+0.5	+8.7	1875	—2.0
2	1881	+0.1	+0.5	+0.3	1880	+7.2
3	1886	—8.3	+0.3	—8.3	1885	—3.0
4	1891	—8.4	—0.4	—8.3	1890	—7.7
5	1896	+0.4	—0.7	+1.0	1895	—5.4
6	1901	+4.6	—0.3	+4.4	1900	+12.6
7	1906	+2.8	+0.4	+1.9	1905	+1.0
8	1911	—1.9	+0.2	—2.7	1910	—0.5
9	1916	+1.1	—0.6	+1.5	1915	+3.0
10	1921	+10.1	+0.3	+9.5	1920	—7.7
11	1926	—0.9	+0.6	—1.4	1925	+1.5
12	1931	—6.1	—0.7	—4.8		
	Summary Measures, 1869-1938					
13	Av. % rate of growth per quinquennium	+18.6	+9.3	+8.5		
14	Av. % rate of retardation per quinquennium	—2.2	—0.6	—1.7		
15	Av. % deviation (geometric mean)	4.5	0.5	4.5		4.8

*Deviations from a 3 point curve; columns 2, 4, and 6, deviations from a straight line.

COLUMN

2-4 Calculated from estimates in Table 10 by methods described in the text.

5 & 6 From Arthur F. Burns, *Production Trends in the United States since 1870* (National Bureau of Economic Research, 1934), Ch. V and Table 53, p. 324: Burns' trend-cycles for annual rates of growth have been recalculated to quinquennial rates by raising them to the fifth power.

83, it is 31.3 percent. The decline is 3.0 percent or 2.2 percent of 134.3.)

The main interest of Table 19 is, however, in the characteristics of the long swings in rates of growth. Centering the intervals for which these rates are measured, we can observe the approximate timing of the swings. National income, population, and income per capita each have about three swings, although the first and the last may be incompletely covered. From an apparent peak in the interval

centering on 1876, the rate of change in national income and in income per capita declines to a trough in the interval centering on 1891; rises to another peak in the interval centering on 1901; declines to another trough in the interval centering on 1911; rises to the last observable peak in the interval centering on 1921; and drops to the last observable trough in the interval centering on 1931. The average period between troughs is twenty years; that between peaks, 22.5 years.

The average duration of these swings indicates similarity to the secondary secular movements established in the author's *Secular Movements in Production and Prices* (Houghton Mifflin, 1930, Ch. IV) and to the trend-cycles as measured by Arthur F. Burns in his *Production Trends in the United States since 1870* (National Bureau of Economic Research, 1934, Ch. V). Because the procedures used here are similar to Burns', it is of interest to compare the deviations in columns 2 and 4 with the trend-cycles as established by Burns on the basis of various production series for a large number of industries. The entries in column 6 constitute Burns' 'standard trend-cycle', i.e., medians of the deviations of rates of growth within successive decades from a straight line fitted to such rates over the full period he covers. The only modification was to recalculate these deviations so that they applied to quinquennial rather than to annual rates of change.

The comparison shows fair conformity of fluctuations derived for national income, total and per capita (col. 2 and 4), with those derived from a variety of indexes of physical volume of output (col. 6). There is a minor disparity in the first swing, Burns' series showing a low entry about 1875 and our series a high entry about 1876. The agreement then persists up to the last two entries that can be compared in the two series. There is some reason to suppose that the entry for the interval centering on 1925 is too high in the Burns series, based as it was upon incomplete coverage of the 1929-32 depression (most series used by Burns ended in 1930). Also, the differences for the two postwar intervals, those centering on 1875-76 and 1920-21, may be due partly

to different timing of the periods covered; partly to the more comprehensive coverage of national income, with its fuller reflection of the wartime decline in civilian production and its greater postwar recovery. In any collection of annual production series, even as comprehensive as that assembled and analyzed by Burns, highly fabricated consumer products and services not embodied in commodities tend to be neglected.[19]

But even taking the discrepancies as they stand, the agreement between the two series is close enough to warrant the conclusion that they support each other in affirming the existence of long swings in the rates of growth, and of their rough duration and timing for the period covered by both studies. Another indirect but significant indication that such swings are not a figment of statistical imagination is their presence in the population series (Table 19, col. 3). In view of the substantial independence of population and national income estimates,[20] it is significant that population also reveals swings in the rate of growth of duration and timing not too dissimilar to those in national income.

[19]The present series and those used by Burns are not completely independent. In deriving the annual estimates for 1869-88 (converted later to overlapping decade averages), we used, for interpolation between the Census year values, many of the series analyzed by Burns (see *National Product since 1869,* Part II). Shaw's annual series, which begin with 1889, are interpolations between Census dates based largely upon state data; but even they are dependent in part upon annual production series used as supplementary bases of interpolation—particularly for 1889-99 (see W. H. Shaw, *Value of Commodity Output since 1869,* National Bureau of Economic Research, in press, particularly Table II 6). Nevertheless, the use of Census data for the base years, and of state data for annual interpolation for the period since 1889, as well as the wider coverage of our series, mean that the latter are largely independent of the data Burns used. Conformity, or lack of conformity, between the fluctuations in the rate of change shown by our estimates and Burns' standard trend-cycle can, therefore, be deemed significant.

[20]Population and related figures on the gainfully occupied are used in the annual estimates of national income since 1919 to check the coverage of the industry by industry subtotals; and for the decade series for the period before 1919 primarily to estimate construction, for decades before 1870 (as the basis for the allowance for depreciation in the period since 1869). In both uses, the quantitative effect of population data on national income estimates is so minor that the two series may be treated as virtually independent.

However, these fluctuations in the rate of growth of population are much narrower in amplitude than those in the rate of growth of national income, total or per capita. Part of the difference may be due to defects of annual population estimates, which, for lack of basic data, do not reflect true annual change sensitively. But part of the difference is undoubtedly genuine, population not responding as readily to whatever factors produce these swings in the rate of growth of both it and national income. Another significant difference is in the timing of the long swings: while the timing pattern in national income and population is fairly similar, the swings in the latter lag behind those in the former. The troughs and peaks in the population rates of growth lag fairly consistently by one interval behind those in the rates of growth of national income. This suggests that whatever the contribution of fluctuations in the rate of change of population to those in the rate of change of national income, the former are more in the nature of a delayed effect of whatever factors produce the swings in the rate of change of national income.

We now turn to fluctuations in the rate of change in the flow of goods to consumers and its components (Table 20). With respect to the timing of these fluctuations, there is substantial similarity between the flow of goods to consumers and national income (col. 6 and 7)—not surprising in view of the preponderant proportion the former constitutes of the latter. Nor is it surprising to find the swings in the rate of change in the volume of services similar to those in the flow of goods to consumers—since the decade estimates for services were derived by applying gradually rising sample ratios to total consumer commodities. But it is significant that the swings in the rates of change in the three groups of consumer commodities are similar—since the estimates for perishable, semidurable, and durable commodities were each derived independently. Apparently whatever factors tend to produce these swings affect the flow of the major categories of consumer commodities at roughly the same time.

While the timing is similar, the amplitude of the swings is not. That in the rates of change in perishable and semi-

TABLE 20

Fluctuations in Rates of Growth, Flow of Goods to Consumers and Its Components (1929 Prices), 1869-1938

	CENTRAL YEAR OF PERIOD (1)	PERCENTAGE DEVIATIONS FROM STRAIGHT LINE OR 3 POINT CURVE FITTED TO RATES OF PERCENTAGE CHANGE BETWEEN OVERLAPPING DECADES					
		Perishable* (2)	Semidurable (3)	Durable (4)	Services (5)	Flow of Goods to Consumers (6)	National Income (7)
1	1876	+10.5	+5.4	+3.2	+6.1	+9.2	+8.5
2	1881	—0.2	+1.3	+5.6	—1.3	+0.7	+0.1
3	1886	—11.1	—6.1	—2.8	—10.0	—9.4	—8.3
4	1891	—6.1	—7.9	—11.1	—9.3	—8.6	—8.4
5	1896	+5.3	—0.1	—4.1	+3.4	+1.7	+0.4
6	1901	+6.0	+5.7	+0.3	+9.9	+5.2	+4.6
7	1906	+2.2	+3.3	—0.8	+5.8	+2.0	+2.8
8	1911	—2.4	—1.7	—1.7	—4.3	—3.7	—1.9
9	1916	—1.8	—2.6	+7.1	+4.7	+0.7	+1.1
10	1921	+3.4	+6.8	+28.2	+9.4	+8.7	+10.1
11	1926	—1.9	+4.7	—0.8	—1.5	+0.5	—0.9
12	1931	—2.1	—7.2	—16.9	—9.9	—5.1	—6.1
Summary Measures, 1869-1938							
13	Av. % rate of growth per quinquennium	+19.5	+16.8	+19.9	+22.0	+19.9	+18.6
14	Av. % rate of retardation per quinquennium	—1.9	—2.0	—2.4	—1.4	—1.8	—2.2
15	Av. % deviation (geometric mean)	4.5	4.5	7.0	6.6	4.7	4.5

*Deviations from a 3 point curve; all other columns, deviations from a straight line.

COLUMN

2-6 Calculated from estimates in *National Product since 1869,* Table II 8, col. 6-10.
7 Table 19, col. 2.

durable commodities is distinctly narrower than in durable or in services (line 15).[21] The reasons are not easily suggested. But it is interesting to note that the wider amplitude in durable commodities is due largely to the difference for the last observable swing (lines 8-12) comprising the intervals centered on 1911, 1916, 1921, 1926, and 1931; whereas the wider amplitude for services is observable in the last two swings. The general sensitiveness of consumer durable goods to fluctuations in economic conditions, particularly during

[21]The use of the three point curve for the perishable group does not affect the comparison, since the average deviation from the straight line is only slightly larger (4.7 instead of 4.5).

recent decades when they comprised more semi-luxuries than in earlier times, is readily admitted. And perhaps there is a similar element of semi-luxury demand in the services category, especially since the extension and intensification of the urban style of living.

While the long swings in the rate of change in the flow of goods to consumers and in its components are similar with respect to timing and not too different in amplitude from those in national income, distinctly different characteristics emerge for net capital formation and the two of its components for which analysis in terms of percentage changes is possible (Table 21). For the producer durable category, the timing of the swings in the rate of change is closely similar to that in national income and in the flow of goods to consumers. But the amplitude is much wider, the geometric mean deviation being over 25 percent as compared with less than 5 percent for national income and the flow of goods to consumers; and this despite the use of the three point curve which in this case, unlike others, yields a much smaller average deviation than a straight line. To a considerable extent, however, this wider amplitude is due to the fact that the flow of producer durables is measured *net*, and fluctuations in its rate of change compared with the *gross* flow of goods to consumers. Yet even for gross producer durables, the average deviation from the three point curve is 7.5 percent—greater than for any component analyzed so far.[22]

Fluctuations in the rate of change of construction are of still wider amplitude; and even when taken gross, the volume of construction is subject to rates of change whose fluctuations average more than 12 percent. Equally significant is the different timing of swings in the rate of change in construction:

[22]Arthur F. Burns has found a related difference in the amplitude of 'trend-cycles' between consumer goods ("products destined for human consumption") and producer goods ("products which find final realization in industrial equipment"). For 29 consumer goods series both the median and arithmetic mean of trend-cycle amplitudes were 1.6 percent (in terms of *annual* rates of growth); for 14 producer goods series the median of trend-cycle amplitudes was 2.4 percent, the arithmetic mean, 2.6 percent (see *Production Trends in the United States since 1870*, note 44, p. 229).

TABLE 21

Fluctuations in Rates of Growth

Net Capital Formation and Its Components (1929 Prices), 1869-1938

	CENTRAL YEAR OF PERIOD (1)	PERCENTAGE DEVIATIONS FROM STRAIGHT LINE OR 3 POINT CURVE FITTED TO RATES OF PERCENTAGE CHANGE BETWEEN OVERLAPPING DECADES: Net Producer Durable* (2)	Net Construction (3)	Net Capital Formation* (4)	National Income (5)	Building Permits (6)	Population* (7)
1	1876	+60.1	—20.6	+30.9	+8.5	—13.2	+0.5
2	1881	+4.9	—1.9	+6.4	+0.1	+14.3	+0.5
3	1886	—27.7	+11.1	—2.0	—8.3	+10.6	+0.3
4	1891	—33.4	—6.1	—13.4	—8.4	—11.5	—0.4
5	1896	+7.4	—15.2	—14.7	+0.4	—18.3	—0.7
6	1901	+29.7	+12.5	—7.6	+4.6	+6.8	—0.3
7	1906	—12.8	+23.9	+1.6	+2.8	+8.5	+0.4
8	1911	+6.7	—5.3	+10.4	—1.9	—16.8	+0.2
9	1916	+17.1	—16.2	+14.0	+1.1	+12.0	—0.6
10	1921	+31.7	+159.1	+48.0	+10.1	+88.3	+0.3
11	1926	—17.1	+66.0	+7.0	—0.9	+3.5	+0.6
12	1931	—25.5	—69.5	—47.0	—6.1	—40.1	—0.7
Summary Measures, 1869-1938							
13	Av. % rate of growth per quinquennium	+3.3	—2.5	—1.7	+18.6	+11.7	+9.3
14	Av. % rate of retardation per quinquennium	—8.3	—10.1	—9.7	—2.2	—5.4	—0.6
15	Av. % deviation (geometric mean)	25.2	37.1	18.9	4.5	21.4	0.5

*Deviations from a 3 point curve; columns 3, 5, and 6, deviations from a straight line.

COLUMN

2-4 Calculated from estimates in *National Product since 1869,* Table II 15, col. 6-10.

5 & 7 Table 19, col. 2 and 3.

6 Calculated from estimates given for 1874-1929 in Arthur F. Burns, *Production Trends in the United States since 1870,* pp. 302-303, and extrapolated from 1929 on the basis of an index derived by dividing the permit valuation of building operations (*Statistical Abstract, 1942,* Table 960, p. 990) by a cost of construction index calculated from estimates in *National Product since 1869,* Tables I 7 and I 8, col. 8. The 1869-78 decade was extrapolated on the basis of changes in gross construction, with a rough allowance for the wider amplitude of decade to decade changes in the building permits series.

the first two swings lag substantially behind those in national income or the flow of producer durables, the third alone is synchronous with that in national income and its other major components. That both the wider amplitude and different timing are characteristic of long term swings in the rate of

change in construction is confirmed by the series on building permits (col. 6). The latter, reflecting the *gross* volume of construction, shows an average deviation of more than 21 percent, and swings of a timing closely similar to that for net construction in column 3.[23]

The coincidence between the swings in the rate of change in construction and those in population (col. 3 and 7) is of interest: in the last two swings, the peaks and troughs in the rate of change in construction and in population are synchronous except for the peak in the last, and even in the first swing construction, like population, reaches a peak later than the rate of change in national income and its other components. There is thus a definite suggestion that changes in the rate of growth of population affect those in the rate of growth of construction, presumably through the influence of the former primarily on residential construction and types closely related to it (commercial, some of the public utility, educational, etc.).

Because of the lack of synchronism between the swings in the rates of change in producer durable commodities and in construction, and the importance of these two components in net capital formation, the swings in the rate of change in the latter are a hybrid dissimilar to those in either component or in national income (col. 4). Indeed, as a result of the cancellation of divergent fluctuations in the components, two rather than three distinct swings are observed in the rate of change in net capital formation. The amplitude of the swings, though narrower than in either producer durables or

[23]The lack of synchronism in timing between the long swings in construction and those in comprehensive measures of production at large is also confirmed by Burns' findings. His measures of conformity to the standard trend-cycle pattern, which measure the degree of similarity in timing between the trend-cycles of any given series and that of the general pattern of all industries, are fairly low for construction. Of nine series classified as relating to construction (see *ibid.*, Chart 18, p. 222, and Tables 35 and 36, pp. 216-19), the most important—building permits—has an index of conformity of —0.11; two others (gypsum and white lead) have indexes below 0; one (flaxseed consumption), an index of 0; of the remaining series the two relating to rails each have indexes of 0.60; two (nails and total cement), indexes of 0.50; and one (roofing slate), an index of 0.37. The low conformity, particularly of series closely related to residential construction, is conspicuous.

construction, remains wide; and even on a gross basis it averages 6.0 percent, wider than in the flow of goods to consumers or in national income.

The analysis of fluctuations in the rates of growth must perforce be confined here to national product and its major components by type of use; and has to be pursued much further before sufficient light is shed upon this particular type of change in the rate of growth of the economy. They have been discussed here at some length because of their importance in using the long term trends of the past as a basis for judging the future. Obviously, the existence of these long swings in the rate of secular movement must always be borne in mind in trying to interpret economic changes observed over a few decades; and they render particularly difficult judgments of prospective secular levels based upon observations confined to two or three decades of an immediate past.

In addition, the analysis suggests conclusions relevant to a proper interpretation of the fluctuations of the 1920's and 1930's. Tables 19-21 indicate that these recent decades witnessed a coincidence of the long swings in the rates of secular change in all the components of national income, including construction, whereas during the earlier decades swings in the rate of change in construction followed a timing pattern different from that in the flow of goods to consumers and in producer durable commodities. Whether this circumstance serves to explain the special severity of economic fluctuations in the recent two decades is a question that cannot be answered definitively here. But this conclusion from the analysis just presented may help in understanding the events of the last two decades, and in forming a proper judgment of their secular significance.