

Long-Range Trend in Per Capita Income and Wages

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THE FUTURE COST of the old-age and survivors insurance program will greatly depend on the long-range trend in wages. Usual cost estimates, based on the hypothesis of steady wages, leave the impression that the program is faced with a very heavy load of expenditures in a more or less remote future. However, the situation might appear in a different light if an upward trend in the economic system, with a gradual growth in wages, were considered as an alternative wage hypothesis.

Since the use of a hypothesis of steady wages in discussions of old-age and survivors insurance implies a specific appraisal of prevailing economic trends, its validity should be tested in the light of historical experience and by theoretical considerations. Available data show that, in the past, steady wages and incomes were observed only in periods of economic stagnation which from time to time interrupted the secular upward trend in economic activity. A widely held supposition that this upward trend has been retarded in the past three or four decades is by no means established by available information, and it is entirely possible that the economic system is still in a phase of rapid expansion. A hypothesis of a secular upward trend in wages similar to that which prevailed in the past is therefore—at least for the near future—as defensible as the theory of a level wage. Statistics examined in the following pages suggest that over the last hundred years there has been a more or less steady growth of the per capita wage by 1.0 to 2.0 percent annually.

Wage Assumptions in Long-Range Estimates for Old-Age and Survivors Insurance

Planning for old-age and survivors insurance, in contrast to unemployment compensation, requires long-range estimates of the flow of contributions and benefits and of the growth in reserves. Estimates for periods far in the future are also neces-

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sary to evaluate the financial and economic implications of each specific modification in the existing program. A year like 1980 or 2000 is usually selected for ultimate projections, since it is the approximate date when old-age annuities will be drawn by persons who have been in the insurance system during their entire working life.¹

A numerical projection of current operations into the long future is necessarily based on a set of hypotheses, and its validity is coordinate with the validity of both the explicit and implicit assumptions. While some of them are more or less formal and self-evident, others are more or less conjectural. Taken as a whole they tend to give an internally consistent picture of the existing economic system and its probable evolution in the decades to come.

Generally speaking, assumptions required for a cost estimate in the field of old-age insurance may be segregated into three main groups: (a) legal provisions and administrative practice (including items such as coverage, contribution rates, appropriations, administrative expenses, benefit formula, and the like); (b) population (its growth, age distribution, mortality, participation in gainful work, and age of entry into and of retirement from the labor market); (c) economic conditions. The last group of assumptions is the most uncertain and potentially controversial.

As the contributions and benefits provided in the old-age and survivors insurance system are both related to the wages of workers in covered employment, definite wage assumptions are necessary for estimating future amounts of contributions and benefit payments. Most of the estimates prepared for the President's Committee on Economic Security, the Social Security Board, and the Advisory Council were based on the hypothesis that the per capita wage of covered workers

¹ The year 1985 will be the first in which persons who paid contributions during their whole work life from age 17 on will appear on the list of annuitants. However, most of the annuitants at that time will be older than 65, as some of them would have been 20 or 25 when they began to pay contributions in 1937. During the next 15 years the system will still be paying pensions to workers who entered gainful employment prior to inauguration of the insurance system.

in the years to come will remain at a level of \$1,000 or \$1,200 annually. It is, however, recognized by actuaries and others that this hypothesis is not self-evident. The alternative hypothesis of a steadily expanding economic system should therefore be kept in mind when analyzing the cost of the program.

Lag Between Contributions and Benefits

In an insurance program which relates contributions and benefits to the wage level, the size of benefits at any given time is conditioned by wage levels which prevailed many years before. This lag between contributions and benefits may be measured on the basis of the distribution of covered workers and beneficiaries by age.

Excluding persons 65 or over and of unknown age, the average age of taxed wage earners in 1937 was approximately 35 years for men and 31 for women. These averages will be 37 and 33 years, respectively, if employees under 20 years of age—mostly individuals with irregular employment and insignificant earnings—are excluded and the age classes weighted by the amounts of their earnings. With the changing age structure of the population as time goes on, the average age of taxed wage earners will probably increase. It will rise slowly, however, hardly more than half a year in a decade, and the rise may be halted to some extent if domestic servants and farm laborers are included in the social security programs. All in all, for the purpose of the present analysis, it may be assumed that for the next half century the average age of individuals paying contributions for old-age and survivors insurance will be approximately 40 years for men and 35 years for women.

After the insured individuals reach the age of 65, they become eligible for old-age benefits,² but their benefit checks begin at this age only if they have terminated employment with covered firms. It seems likely that the effective age of retirement will be somewhat later, possibly 67 or 68.

The life expectancy of beneficiaries at the time they receive their first benefit check is about 12

² It is not supposed that all beneficiaries will have been continuously in covered employment until they retire. According to the 1939 amendments to the Social Security Act, an individual who attains age 65 is "fully insured" if, since January 1, 1937, or since he attained the age of 21 (whichever is later), he has received taxable wages of not less than \$50 in at least half the elapsed calendar quarters or in at least 40 different quarters. The latter provision enables women workers who retire fairly early in life to be fully insured.

years for men and 13 years for women, according to the 1937 Standard Annuity Table (which is appreciably below the "hypothetical" longevity estimated by Dublin and Lotka).³ Therefore, the average age of annuitants in 1985 will probably be about 73 years for men and nearly 74 for women. Consequently, the theoretical lapse of time between the mean point of covered employment and the mean point of drawing benefits is approximately 34 years for men and 39 years for women.

The lag between contributions and benefits will develop gradually as the system matures. In the early phase, the mean point of covered employment will trail by only a few years the date the annuitants retire, so that the lag between contributions and benefits will be insignificant. It will increase by 5 or 6 months each year. In round numbers, it will amount to 5 years in the tenth year of operation, to about 11 years in the twentieth year, to 17 years in the thirtieth year, and so forth. This development will be very significant if an upward trend in earnings persists. If wages increase evenly 1 percent each year, for example, benefit payments in the first decade of operation will be related to an average annual wage approximately 3 percent lower than that on which taxes are being collected currently. The average disparity will be about 10 percent during the second decade and almost 20 percent in the third decade.

It may be objected that a definite benefit formula presumes a definite level of wages and that a scale of benefits which is appropriate to an average wage level of \$1,100 is not applicable to annual earnings averaging \$1,600 or \$2,000. If, however, it is anticipated that an upward trend in wages implies an upward revision of the benefit formula, long-range cost estimates should show at what time a disparity between benefits and the current wage level is likely to develop and how far a revision of the benefit formula might go without impairing the solvency of the program.

Trends in Population and in Economic Conditions

During the first 40 years of this century, steadily declining birth rates slowed the growth of population in the United States, and, in conjunc-

³ Dublin, L. I., and Lotka, A. J., *Length of Life*, New York, 1930, p. 104. See also Metropolitan Life Insurance Company, *Statistical Bulletin*, November 1941, p. 3.

tion with declining mortality rates, caused the proportion of children to decline while that of aged persons increased. Most population experts are inclined to regard the sudden rise in birth rates in 1941 and 1942 as a short-time deviation from the secular trend, rather than an upturn in the long-range tendency, and to expect the proportion of aged persons to increase as time goes on. In round numbers, from 5 percent of the total population in 1930, this proportion increased to 7 percent in 1940 and is expected to rise to 10 percent in the 1950's and 15 percent in the 1980's. From the standpoint of old-age insurance, this trend means that the burden of providing for the aged will increase and that the financing of old-age benefits may become increasingly difficult unless retirements are deferred to later ages.

This unfavorable trend in the population structure may be counterbalanced by an increase in earnings. Since the brief experience with old-age and survivors insurance permits no conclusion on the secular trend in taxable wages, their probable future movement may be estimated by analogy with all wages and incomes in the Nation. The limitations of this method are obvious; there may be an appreciable disparity between trends in per capita income and in industrial wages, or between trends in taxable and nontaxable earnings. This source of error, however, is scarcely larger than that inherent in any projection of a historical series into the future. Generally speaking, the hypothesis of uniform taxable wages postulates that, with prices and cost of living remaining at the present level, the average of all wages or that of all incomes remains constant, while the assumption of increasing taxable wages assumes a steady rise in general well-being.

Nominal and Real Wages

One of the postulates of cost estimates expressed in current dollars is that there will be no sudden major variations in the cost of living during the period under consideration. The price factor is dismissed in these estimates on the theory that a material rise in prices would cause an adjustment of benefits to costs of living, whether or not it is prescribed in advance by law.

It is recognized that the possibility of variations in the purchasing power of the dollar is the weakest aspect in long-range cost estimates, as well as in all estimates related to the currency unit. How-

ever, the hypothesis of steady prices does not necessarily imply steady wages. Cost estimates in terms of dollars presume only that there will be no material difference between variations in nominal and in real wages (or benefits), a reservation which may be combined with any hypothesis on secular economic trends. In any event, if this reservation is accepted, the future trend in wages should be deduced from past variations in real wages rather than those in nominal earnings.

An analysis of real wages also has the advantage of greater simplicity. From a long-range view, assuming more or less stable social and political conditions, the trend in real wages is determined by technical and economic progress, while in nominal wage variations this development is overlapped and in certain periods obstructed by autonomous, sometimes erratic, factors which affect the price level. Therefore, available series of real wages are smoother than those of nominal wages, their trend is clearer, and their extrapolation less hazardous.

Another important difference between the trends in real and nominal wages is that it is possible to envisage a steady future growth of real earnings, keeping pace with growth in the physical volume of the national output; but the future course of prices, cost of living, and nominal wages is unpredictable.

The extent to which the trend in real wages can be divorced in cost estimates from trends in population is less clear. It may be argued that a growing nation will possess an expanding economy, while a static population may mean a standstill in economic progress. An inverse relationship is also possible, however, inasmuch as a rapid increase in population in periods of insufficient work opportunities could lead to growing unemployment and declining per capita income. It seems advisable, therefore, to make the wage hypothesis independent of specific population assumptions.

Bias in Price Indexes

Although future variations in prices and costs of living are disregarded in long-range cost estimates, the price factor cannot be eliminated from an analysis of economic trends. In fact, the trend of real wages in the past cannot be established without extensive use of price indexes, and, if they are biased, the wage hypothesis is also likely to be biased.

An extended time series for real wages (in dollars with constant purchasing power or in the form of an index) is usually based on a combination of two series, one showing the course of money earnings and the other, price variations. The first series is computed as a weighted average of available wage data for different industries, while the long-range price index is usually obtained by linking together several short-range indexes. In most of the "weighted" price indexes used for this purpose, weights characteristic of the base date are kept steady throughout the period observed. This procedure is defensible in measuring short-term variations in the price level, but misleading conclusions may be drawn when the price index covers a long period in which substantial changes have occurred in consumption patterns.

Two types of changes in consumption may be distinguished. Those due to variations in taste, fashion, usage, and the like have an uncertain effect on the price index, while those associated with the ups and downs of individual commodity prices result necessarily in an upward bias of the price index. If, after considerable variations in individual commodity prices, a price index records no change in the price level, it might be inferred that the average consumer can now get, for the same amount of money, exactly the same set of commodities as at the base date. However, it is a postulate of price theory that consumers distribute their expenditures in the most economical way. As soon as the relationship of prices for individual commodities has varied, the earlier distribution of expenses ceases to be economical and, the theory presumes, consumers will look for another set of commodities which represents the maximum satisfaction they can obtain for a dollar. In this case, a steady price index conceals an increase in the purchasing power of money. Consequently, the deflation of a time series of money earnings by a price index results in an underestimate of the growth of real wages in prosperous years and an overstatement of their decline in periods of economic depression. The magnitude of the bias depends on the extent of price dispersion and the capacity of individual commodities to replace one another.

According to price statistics computed by the National Resources Planning Board and covering 612 commodities, wholesale prices in 1937 were on the average 12 percent under the 1929 level,

However, if the list of commodities arrayed by increasing ratio of the 1937 price to the 1929 price is divided into two equal groups (306 commodities in each), it is found that the median of the first group was 71 percent, and of the second, 105 percent. In a similar way, the dispersion of prices in specific groups of commodities (such as food, textiles, metals) may be computed. It is found that, by adjusting their purchases to changing prices in 1937, consumers had a chance to increase the real purchasing power of their dollar by 2 to 5 percent in comparison with that of the 1929 dollar inflated in accordance with the price index. This finding suggests that, while the price index indicated that \$100 had the same purchasing power in 1937 as \$114 in 1929, actually the amount of goods and services provided might be equivalent to 116-119 "1929 dollars." A more nearly accurate measurement of the effects of divergent price variations requires exact information on the extent to which goods with relatively rising prices are replaced by those with falling prices.

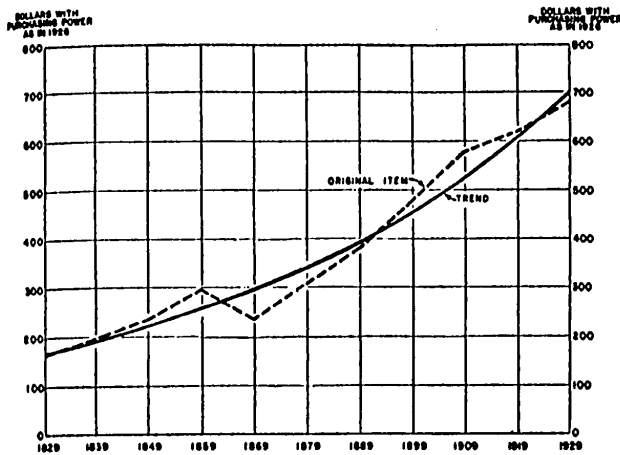
But this is not the whole story. A price index with rigid weights fails to record the appearance of new commodities on the market. In the last two decades many new articles have become indispensable for millions of consumers, and a conventional price index tells nothing of the power of the 1940 dollar to purchase things which did not exist two or three decades before or which existed only for the rich. But it is obvious that new commodities are not accepted unless, in the judgment of consumers, they are preferable to the old commodities, i. e., promise dollar for dollar a greater satisfaction.

To sum up, if price indexes of the usual type are used to deflate a series of money wages or incomes extending over several decades, it is likely that the real wage (or real per capita income) at the end of this period will be understated. The bias develops gradually and may vary between 2 and 5 percent per decade or between 0.2 and 0.5 percent annually if the dispersion of prices is approximately of the same magnitude as it was in the 1930's.

Trend in Per Capita National Income From 1829 to 1929

Only fragmentary information is available on the progress of the national income in the United States in the nineteenth century. Statistics for

Chart 1.—Variation of the per capita real income in the United States, according to Robert F. Martin, 1829-1929



the period prior to the Civil War are particularly thin, and would be totally inadequate for far-reaching estimates except for data on the physical volume of national output included in decennial industrial censuses and early censuses of population. On this basis, Robert F. Martin computed estimates of national income for the 140-year period beginning in 1799.⁴ His principal table shows total and per capita "realized national income" in current dollars and suggests two alternative adjustments of dollar incomes to changes in price level: (a) by an index of cost of living and (b) by an index of wholesale prices. The two indexes differ considerably in their annual variations, but there is no appreciable disparity between their secular trends. In the following discussion, reference is made only to the real-income series adjusted by the cost-of-living index. For the nineteenth century, Martin's estimate is restricted to the decennial census years, and annual figures are computed since 1900. To retain comparability between the two centuries, however, only census years are plotted in chart 1.⁵

Martin points to a distinct decline in the per capita volume of goods and services during the unsettled period between the 1780's and the 1840's. The growth of prosperity began with the 1830's and is reflected in the real-income data from 1829 to 1929. Although the upward swing was inter-

⁴ Martin, Robert F., *National Income in the United States, 1789-1938*, New York, National Industrial Conference Board, 1939.

⁵ The basis data for all the charts used in this article will be carried in the longer report.

rupted in the 1860's and by the first World War, it is fairly well represented by a smooth curve with ordinates increasing by 15 percent per decade or 1.41 percent annually.

Martin believes that the increase in the actual volume of goods and services per individual is somewhat overstated in his figures, because the many services performed and goods produced within the home in the early days did not enter into the exchange economy and appear in the national income accounts. The increase shown would therefore be partly attributable to the transfer to the market of services formerly performed at home.

It seems, however, that the gradual absorption of the home economy by exchange and market economy was only a minor factor in the growth of real per capita income in the 100 years observed.⁶ On the other hand, it is highly probable that the growth in real per capita income is understated by Martin because of the method used to adjust current national income to changes in the purchasing power of the dollar. With a correction of 2 to 4 percent per decade, it appears that real per capita income increased from 1829 to 1929 at an average rate of 17 to 19 percent per decade or 1.6 to 1.8 percent annually.

Trends in Real Wages

The upward trend in real wages, which began in the late 1830's, has been interrupted time and again by set-backs and periods of stagnation, so that the course may be represented by a series of terraces towering one over another, with rugged slopes from one level to the next. The most destructive set-backs occurred in the late 1830's, the 1860's, the early 1900's, and early in the first World War. If, instead of surveying the progress achieved during the last 100 years or more, one examines only a period which happens to include a severe set-back, the conclusion may be reached that workers have been deprived of their share of the growing wealth of the Nation. The more inclusive of the studies examined in the following pages, however, evidence a very clear upward trend in real earnings.

Real-wage index of Hansen.—The first index of

⁶ The home economy rested in the early days of this period on the activity of family members not working for pay or gain, and the progress of the exchange economy was marked by their entry into gainful pursuits. It is likely, however, that the productivity of home workers was considerably lower than that of gainful workers in the same families. It is not very probable that shifts from home to exchange economy were responsible for the increase of estimated income by more than 10 percent in 100 years.

real wages covering more than a hundred years was constructed by Alvin Hansen.⁷ He began with two series of money wages, one based on several wage indexes computed by his predecessors and the other established as an average of the index numbers of weekly wages of laborers and artisans, compiled by the Russel Sage Foundation. These two series, independently derived and based on different data, agree remarkably with each other.

The difficult task of transforming the index of money wages deduced from the two series into one showing variations in real earnings was accomplished with the aid of a cost-of-living index which he constructed. After plotting his index of real wages on a semilogarithmic chart, Hansen determined, by the freehand method, the straight linear trend of the curve (discounting its decline in the 1860's) and found an average growth in real wages of 1.04 percent annually. He warned, however, that the trend might be considerably altered by future events.

Hansen's real-wage index is presented in chart 2 on an arithmetic scale. Its annual variations appear excessive in comparison with the variance of his index of money wages, and it seems that the price index which he used to deflate money wages was too sensitive. The long-range trend of the original index is represented on the chart by an

⁷ Hansen, Alvin, "Factors Affecting the Trend of Real Wages," *American Economic Review*, March 1925, pp. 27-42.

Chart 2.—Index of average real wages in the United States, according to Alvin Hansen, 1820-1923

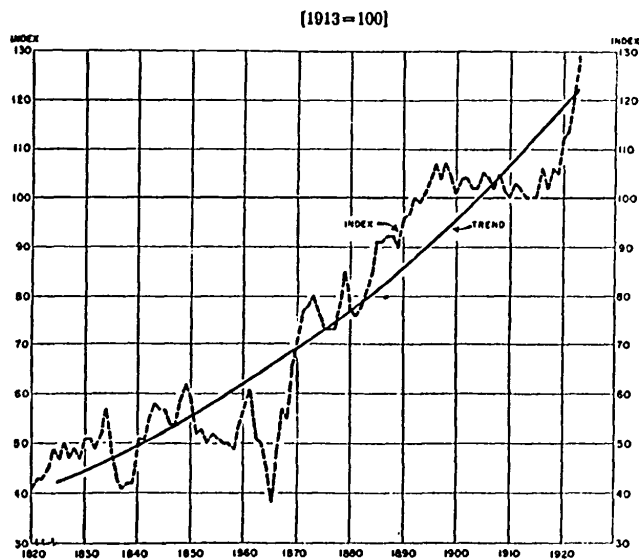
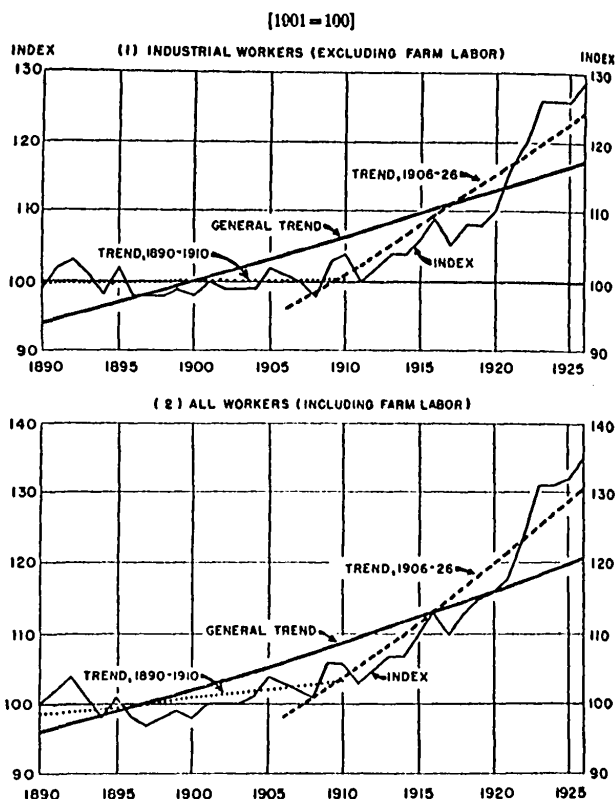


Chart 3.—Index of average real wages in the United States, according to Paul H. Douglas, 1890-1926



exponential curve analogous to the straight line plotted by Hansen on a semilogarithmic chart. It indicates an average increase of real wages by 1.1 percent annually, slightly more than Hansen suggested.

Real-wage indexes of Douglas.—From variations in money wages and retail prices, Paul H. Douglas established the probable trend in average real earnings of employed industrial workers from 1890 to 1926.⁸ In a paper presented in 1925 before the American Economic Association, he estimated the annual real earnings of all employed workers in 1924 at 128 percent of the average for 1890-99 but found that all gains were made after 1914.⁹ He gave an affirmative answer to his question whether a continued increase in real

⁸ In an earlier study prepared jointly with France Lamberson, Douglas continued Rubirow's series up to 1918 ("The Movement of Real Wages, 1890-1918," *American Economic Review*, September 1921, pp. 410-426). He found a striking decline in real wages during the World War, with the low mark in 1917. The conclusion Douglas drew was reversed in a later study in which he used a larger statistical base and improved methods of analysis (*Real Wages in the United States, 1880-1926*, Boston, 1930).

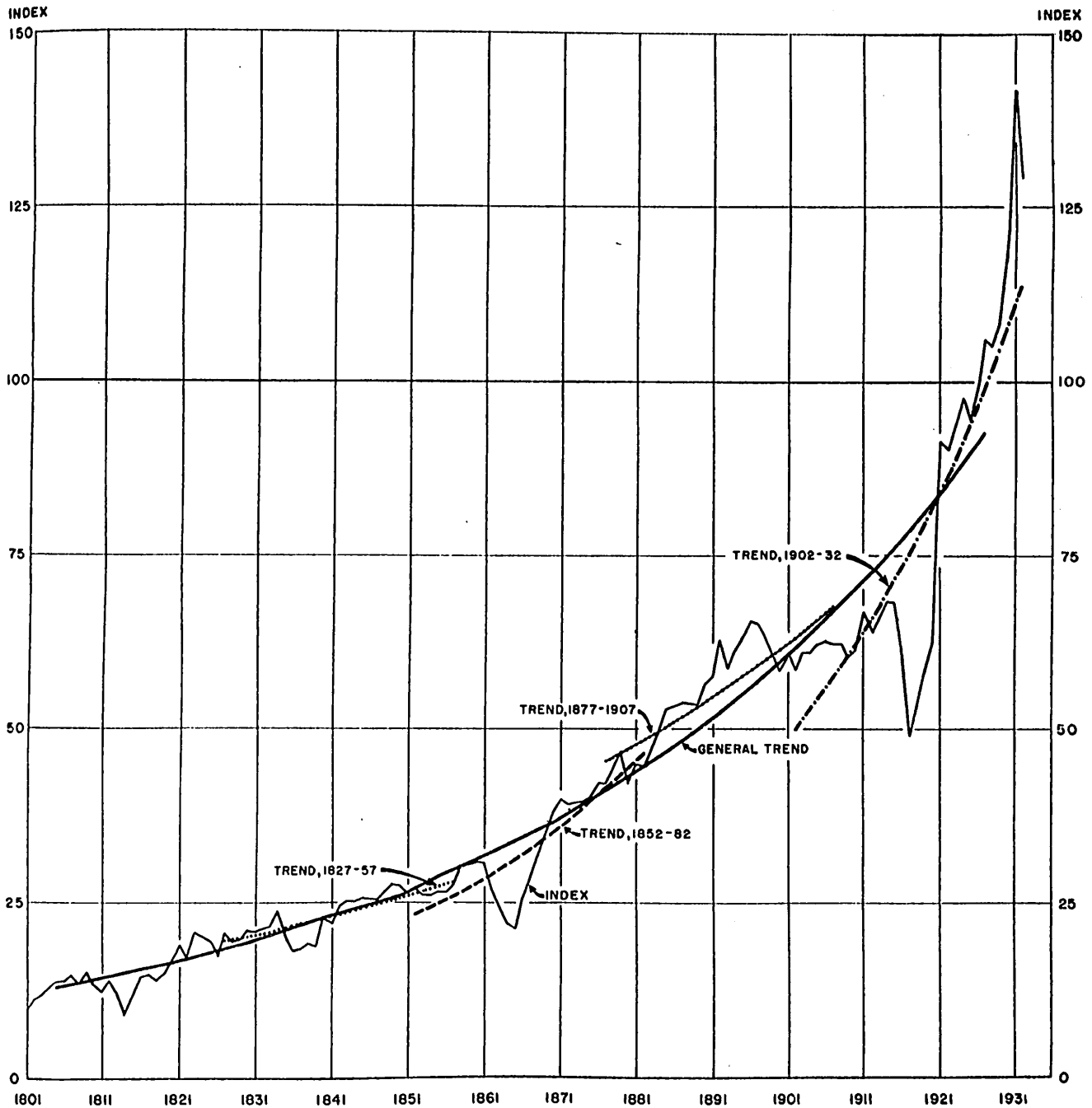
⁹ Douglas, Paul H., "The Movement of Real Wages and Its Economic Significance," *American Economic Review*, March 1926, supplement, pp. 17-68.

earnings might be anticipated, with the reservation that a rise in agricultural prices, especially for foodstuffs, might cut the gains in the real earnings of city workers. He thought that this danger would be checked by an increase in the produc-

tivity of manufactures on the one hand and trade-union activity on the other.

Later, in his book on real wages, Douglas elaborated his estimate of the progress of wages with allowance for variations in employment.

Chart 4.—Index of average real wages in the United States, according to Harold C. Moulton, 1801–1932
[1926=100]



The indexes he established are presented in chart 3. The general trend of each index is shown on this diagram in terms of a steady percentage rate of annual growth during the whole observed period.

Douglas found the average rate of increase in real wages to be 0.62 percent per annum for industrial workers and 0.67 percent for all workers, including farm labor. Although these rates are appreciably lower than those computed by Hansen for a much longer period, the two authors agree fairly closely in their estimates of the increase in earnings from 1890 to 1923. The years covered by Douglas' series include, indeed, a period of stagnation in real wages which was one of the longest in the history of the United States.

A better understanding of the movement of real wages as described by Douglas is obtained if the trend is computed for two 21-year periods separately (1890-1910 and 1906-26), as indicated by the dotted lines on chart 3. The average annual rate of growth in real wages from 1890 to 1910 was only 0.24 percent for all workers, including farm labor, and was still lower for industrial workers alone. On the contrary, in 1906-26, real wages increased at an average annual rate of 1.31 percent for industrial workers and of 1.43 percent for all workers, including farm labor.

Real-wage index of Tucker.—The index of real wages computed by Rufus S. Tucker covers the period 1791-1932 and is based on a compilation of several well-known wage and price indexes.¹⁰ Tucker's method of reducing money wages to currency units with constant purchasing power rests on the observation that wholesale prices are less stable than retail prices and that disparity in the magnitude of variation is particularly obvious in food prices. He therefore suggested that the wholesale-price index used to deflate money wages of the nineteenth century be replaced by a "composite index of cost of living" constructed as an average of the wholesale-price index and the index of money wages.¹¹ This suggestion was supported by the statement that retail prices are merely a combination of wholesale prices and wages with a small amount of interest, rentals, and profits.

The real-wage index computed with the help of

¹⁰ Tucker, Rufus S., "Real Wages Under Laissez Faire," *Barron's National Financial Weekly*, Oct. 23, 1933.

¹¹ For the period prior to 1890, two alternative cost-of-living indexes are suggested—one with wages and wholesale prices equally weighted, the other with wages weighted 2 and wholesale prices 1. Only the first "composite index" is used here.

this composite price index is much smoother than that constructed by Hansen, and its trend suggests an average growth in real wages from 1832 to 1932 of 0.93 percent annually. It is, however, open to criticism, since it disregards the fundamental difference between short-term and long-range variations in prices. Although retail prices (and costs of living) are less sensitive to sudden business changes than wholesale prices, there is no evidence that a similar or inverse correlation exists between long-range changes in wholesale and in retail prices. The continuous disparity between the retail and wholesale price trends postulated by Tucker would mean substantially that, from 1830 to 1930, retail prices increased nearly 200 percent (from 59 to 172, with 1913=100), while wholesale prices did not rise more than 40 percent (from 88 to 123). Thus, the "composite index of cost of living" indicates that, if the margin between retail and wholesale prices were 25 percent in 1830 (in terms of wholesale prices), it would amount to 261 percent in 1930.

Real-wage index of Moulton.—From Tucker's index of money wages, Harold G. Moulton deduced an index of real wages for the period 1801-1932, adjusting it to changes in dollar purchasing power by a wholesale-price index of the usual type.¹² Although this deflation factor tends to overrate the magnitude of annual fluctuations in real wages, it gives a more realistic picture of their long-range trend than the "composite index of cost of living."

On chart 4 the trend of real wages estimated by Moulton is represented by an exponential curve rising 17.6 percent per decade or 1.63 percent annually. By dividing the observed period into four overlapping 30-year sections and fitting the trend curve to each section separately, the sectional curves show the following rates of growth in real wages (in percent):

	1827-57	1852-82	1877-1907	1902-32
Average increase per decade.....	13.7	26.1	14.1	31.6
Average annual increase.....	1.29	2.35	1.33	2.79

Since Moulton's index refers to earnings of employed workers and does not reflect wage losses due to unemployment, it should be pointed out that the depression of the 1930's wiped out a

¹² Moulton, Harold G., *Income and Economic Progress*, Washington, Brookings Institution, 1935.

considerable part of the gains in real earnings in the two preceding decades. Although per capita earnings are now at a high point, probably the average rate of increase in per capita real wages in 1902-42, adjusted to average duration of employment in each year, would be appreciably lower than the 2.79 percent shown for the three decades 1902-32. Therefore, no particular significance may be attributed to the average annual growth of real wages in this period, but in the whole period of more than a hundred years there was a consistent upward trend in real wages and no evidence of a slackening in the rate of increase.

Probable Future Trend in Wages

It is recognized that the statistical series examined in the preceding pages are not equally reliable, and it may be argued that none possesses qualities which permit its extrapolation and projection into the future. If conclusions can be drawn from the examined data, they are based not on extrapolation of any single series but on the fact that all the series, in spite of the many differences in their origins and methods, tell the same story. An upward trend prevailed in real per capita incomes and wages during the last century, and their long-range trend as seen by several independent observers may be conveniently represented by curves with a steady rate of growth. Consequently, it seems defensible to envisage the future course of real wages in the same form, i. e., as a series increasing according to the rule of compound interest. The question of the probable rate of future growth, however, is less clear, in view of the contradictory testimony on this rate in the past.

The average increment seems to be 1.41 percent annually, according to Martin's estimates of national income from 1829 to 1929, and as low as 1.1 percent annually, according to Hansen's

estimates of real wages from 1820 to 1923. Real weekly wages increased 0.93 percent annually from 1832 to 1932 according to Tucker, and 1.63 percent annually according to the series constructed by Moulton for the same period. While all the observers agree that the rate of increase after 1900 was larger than in the 1880's or 1890's, the very swift growth in the 1920's, followed by a set-back in the 1930's, would make an extrapolation of the 1917-42 trend as misleading as a projection of the 1907-32 trend curve.

On the basis of the foregoing analysis, however, limits for what may seem to be the probable trend may be established. The series which show a real-wage increase of less than 1 percent annually appear either to overweight a period of stagnation (Douglas) or to use an erroneous price index (Tucker). Likewise, the series carried up to the beginning of the 1920's understated the average annual rate of rise in real wages. Of all the series examined, therefore, those of Martin and Moulton seem to be the most instructive. The former suggests an average growth in real per capita income of 1.41 percent annually; the latter indicates an annual rise in real wages of 1.63 percent.

If it were not for the fundamental bias in the price indexes used to adjust long-term series, the mean of the two rates, 1.5 percent, might represent the probable average rate of annual growth in real wages. Assuming that there was an average downward bias of 2 to 5 percent per decade in price indexes, due to the dispersion of prices and unreported improvement in the range and quality of commodities, the actual rate of increase in real wages is nearer 2.0 than 1.5 percent per annum. For practical purposes, however, an annual increment in the per capita real wage by 1 percent may be regarded as the minimum and 2 percent as the maximum, with 1.5 percent as the median assumption.