

The Growth of Reproducible Wealth
of the United States of America
from 1805 to 1950

by

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Author's Note

This paper deals with the measurement of national wealth in so far as it provides an indication of a country's economic growth. It is limited to (a) the presentation of a set of estimates of reproducible tangible wealth of the United States at benchmark dates over the past one hundred and fifty years; (b) the calculation of growth rates of total wealth and its main components; and (c) a simple analysis of these growth rates and of changes in the structure of wealth – in so far as these figures are relevant to the measurement of economic growth.

Much of the statistical material used in this paper has been developed in connection with the author's forthcoming Study of Saving in the U.S. from 1897 to 1950, conducted under the auspices of the Life Insurance Association of America.

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by Raymond W. Goldsmith

I. SUMMARY

THE findings of this paper may be summarized in a few paragraphs which, of course, omit all qualifications of the statistical data used.

1. The best single measure of economic growth from the stock (rather than the flow) aspect now available is deflated durable reproducible tangible wealth per head,¹ excluding military tangible assets, subsoil assets, and civilian semi-durable and perishable assets.

2. The average rate of growth of real R.T.W. per head for the entire period from 1805 to 1950 is 2 percent, with a range of about 1.8 to 2.2 percent. These figures should be regarded as minima because they do not make allowance for the probable overstatement of the effective rise in the price level involved in the process of deflation and because of the omission or understatement of some types of durable assets such as soil improvement.

3. The rate of growth increased from approximately 2.2 percent in the first half of the nineteenth century to 2.5 percent in the second half. The highest decadal rate for periods of about ten years was apparently reached in the 'eighties with approximately 3.8 percent. From this peak it declined to approximately 1.6 percent for the period 1890 to 1922, but rallied to 2 percent in the 'twenties. From 1930 to 1945 R.T.W. per head not only failed to grow but declined slightly, an unprecedented phenomenon due to the Great Depression and to World War II.

4. Since World War II the rate of growth of real R.T.W. per head has averaged fully 4 percent. This is higher than any decadal rate known; and probably higher too than that prevailing during any previous period of prosperity. The increase of 22 percent in the five years 1946-50 seems to be as high as that in any previous period of equal length. While part of this

¹ Because of its repeated occurrence throughout the paper, reproducible tangible wealth will be abbreviated to R.T.W. and if not further qualified will refer to durable civilian assets only.

rapid increase may be regarded as making up for deficiencies in the ratio of R.T.W. to national product created in the preceding fifteen years; and while it is uncertain how long the recent rapid rise will continue, even if we disregard restrictions on civilian capital formation under the impact of rearmament, it may be that the downward trend in the rate of growth of R.T.W. per head in evidence since the late nineteenth century has been arrested.

5. During the one hundred and fifty years for which data are available and which encompass virtually the entire economic history of the United States, the structure of R.T.W. has shown considerable changes, but also a degree of stability which may be regarded as astonishing in view of the extraordinary extension of the economic area of the United States and the radical changes in the nature of its economy. In particular, the proportion of R.T.W. represented by reproducible durable assets for consumers' direct use and for use in production has changed but little.

6. Residential buildings and consumers' durable goods accounted for approximately two-fifths of total domestic R.T.W. (in current prices) throughout the period, although the ratio has shown a slight tendency to rise since the middle of the nineteenth century. Within consumers' R.T.W. residential buildings have lost slightly in importance at the expense of movable durable goods. The share of government (including non-profit institutions but excluding military assets) has risen from an insignificant fraction to approximately one-eighth of total R.T.W.¹ The proportion of R.T.W. represented by private enterprise (including farms) has declined moderately. Within total business R.T.W. changes, however, have been very substantial. The two outstanding trends are the relative decline of R.T.W. of agriculture (excluding farmers' residences and consumers' durables), and the increase in the share of non-farm business structures and equipment, particularly prior to 1880. Non-farm business inventories, on the other hand, seem to have maintained approximately the same proportion to total domestic R.T.W. throughout the period.

7. Until World War I part of domestic R.T.W. must be regarded as being the property of foreign owners. The propor-

¹ If gold and silver are regarded as part of government assets and military assets are included in both government and total R.T.W. the share of government is now near to one-fourth.

tion of foreign investments to R.T.W. of the United States, however, declined rapidly throughout the nineteenth century from a proportion of over one-eighth at its start to only a few percent after World War I.

Investments abroad have never been substantial compared to R.T.W. They have been almost insignificant throughout the nineteenth century. Even at their peak in 1929 they represented only 7 percent of domestic R.T.W., a proportion not yet regained by 1950.

II. CONCEPTS

To avoid the fate of many a paper or book whose conceptual introduction is longer and weightier than its body, this section will be limited to a few remarks on the possibilities of using national wealth data for measuring the economic growth of nations, and on the principles actually applied in deriving the figures utilized in this paper.

1. *Use of national wealth data in measuring economic growth*

A satisfactory discussion of this problem presupposes a generally accepted and unequivocal concept of economic growth. As is well known, we are still a good distance from this goal. We shall, therefore, have to be content with a provisional and a rather vague definition of economic growth (or decay), describing it as a sustained increase (or decrease) in the level of economic activity measured in real rather than monetary units. In this connection 'sustained' refers to an average for groups of at least five years, and 'real' is understood in terms of psychic satisfactions, hours of labor, pounds of gold or any relatively invariant unit.

A nation's economic activities have two aspects: The flow of economic values during any period measured, depending on the purpose, by real net national product or consumption; and the stock of economic values at any point of time, measured by real national wealth. Within this framework economic growth (decay) can be measured either as a sustained increase (decrease) in real net national product, or as a sustained increase (decrease) in real national wealth.

If the flow and the stock concepts were developed in perfect parallelism, national wealth would include all stocks that give rise to income flows, i.e. not only reproducible tangible durable

assets used in production, but also short-lived reproducible tangible assets; tangible assets not destined for production but for consumers' direct use; non-reproducible resources such as land and subsoil mineral deposits; and labor. Such a broad definition, however, is not usable if we want to adhere for national wealth to market values which provide the basis of measuring income flow, though with some exceptions and modifications. There is no market value for human beings who represent the stock from which labor services flow, and it is very difficult to determine the market value of some types of natural resources. What is more important, it is doubtful whether changes in national wealth so broadly conceived would be useful measures or indicators of economic growth. The process of economic growth is one we conceive as the result of human activity. Hence, there is no justification for including either natural resources, unless they can be regarded as man-made; or human beings, who are the cause and not the result of economic activity.

The concept of national wealth applicable to the analysis of economic growth must, therefore, be limited by theoretical considerations to the stock of man-made economic assets. It is further restricted in this paper to durable tangible assets, a limitation adopted for practical reasons, and one which will not impair analysis. The reason for excluding intangible assets, except the net balance between investments abroad and foreign investments in this country, is obvious in the case of claims because such debtor-creditor relationships between citizens disappear in a consolidated national balance sheet. Disregard of other intangibles (such as patents, copyrights and goodwill) can be justified in two ways. Theoretically intangible assets of this type may be regarded as offset by equal liabilities on the part of the buyers of the products or the users of the processes who enjoy those rights or less formalized advantages, in the same way as monopoly profits of the sellers can be regarded as offset by monopoly tribute of the buyers.¹ The practical argument for omitting intangible assets of this type is the fact that they are usually not included in the balance sheet of the owners, or if included are carried at values which have no relationship to their possible sales value.

¹ See Goldsmith in *Studies in Income and Wealth, Volume Twelve* (NBER, N.Y., 1950), pp. 37-40; 45-46.

The omission of short-lived tangibles (other than business inventories which, of course, are included) again is motivated primarily by practical considerations. There are no reasonably accurate data for these assets – defined as having an expected life of less than approximately two years; and changes in the stock of them are quite small compared to total R.T.W.¹

We propose, then, to measure economic growth (or decay) from the stock aspect of economic values, as a sustained increase (or decrease) in the volume of man-made durable tangible assets.

2. *Measurement of national wealth for the purpose of measuring economic growth*

Even if the approach to the measurement of economic growth from the point of view of stock which has just been proposed is accepted, there remains the question how to derive a quantitative expression for the volume of the stock of man-made durable tangible assets, an expression which will be comparable as far as possible over time and space and which will be invariant to economically irrelevant institutional changes.

There are basically two possibilities for measuring the stock of reproducible tangible assets, retrospectively as the man-made resources that remain embodied in the stock; and prospectively as the economic services still expected from the stock.² The first of these alternatives evaluates R.T.W. by expenditures on durable tangible assets reduced to a constant price level, cumulated, and depreciated on the basis of the expected life of the different types of assets. The second alternative measures it as the market value of each asset, or the nearest substitute to it. These two values, of course, are not unrelated; but neither are they equal, nor necessarily always near each other.

The main force which tends to equalize the two measures is the fact that original cost adjusted for price changes is very close to cost of reproduction if appropriate indices are used; and that market values are not likely to deviate from cost of reproduction for very long, particularly for those types of durables which exist in numerous and generically similar representatives,

¹ An indication of the order of magnitude involved is given in Table II. (All tables with Roman Numerals will be found in the Appendix.)

² For a general discussion of methods of measuring tangible wealth see Kuznets' 'The Measurement of National Wealth' (*Studies in Income and Wealth, Volume Two*, 1938) and Goldsmith's 'Measuring National Wealth in a System of Social Accounting' (*op. cit.*, *Volume Twelve*).

i.e. homes, consumers' durables, standard types of machinery and equipment and business buildings of small or medium size. Even for 'unique' items, mainly large or special-purpose structures and installations, market value will not deviate radically from adjusted depreciated cost, at least not upwards though sometimes under the influence of obsolescence downwards; and the period of substantial deviation will be the shorter the higher the customary rate of depreciation becomes for the type of asset affected. These theoretical considerations are confirmed by the figures available for the only two types of durable tangible assets for which the relationship between market value and cost of reproduction can be followed in the U.S., even if only inadequately — single family homes and automobiles.¹

The forces which tend to separate the market value of reproducible assets from their cost of reproduction are effective mostly in the short run, although for this purpose the short run must be regarded as extending over at least one and possibly as much as two decades. The most important of these are changes in the rate of capitalization and obsolescence. Obsolescence (which may be defined as the result of a difference between actual and anticipated useful life of a tangible reproducible asset) does not seem to have been sufficiently important in the period under study to introduce a substantial divergence between market value and price-adjusted depreciated original cost, with the exception of a few industries such as the street railways. This is due in part to the fact that the rates of depreciation used in the calculations are generally on the high side, i.e. in many cases imply an average useful life below the probable actual one about which, of course, very little is known. Moreover, even where obsolescence has been of substantial importance, it leads to a discrepancy between market values and price-adjusted depreciated original cost only until the expiration of the expected life of the asset, i.e. in the case of machinery and equipment for only a few years, and even in that of structures rarely for more than approximately twenty years, since the average expected life has been assumed at only twelve years for equipment and at fifty years for structures.²

¹ These figures also indicate that the swings in market values tend to be wider than those in cost of reproduction with the result that substantial discrepancies may arise particularly during periods of deep depression or boom.

² In the actual calculations different depreciation rates have been applied to the various types of tangible assets.

Changes in the rate of capitalization – which may reflect changes either in the pure rate of interest or in the risk factor attributed to specific types of assets – are likewise unlikely to produce long enduring differences between market value and price-adjusted depreciated original cost of R.T.W. Increases in rates of capitalization will initially reduce market values below cost of reproduction, assuming that all other factors are equal and no difference existed between the two values before the change. But as the representatives of the type of assets affected are worn out, if not before, the two values will tend to come together under the influence of a decline in the supply and an increase in the demand for assets of this type which drive up the market price, or of a reduction in the cost of reproduction. Similarly in the case of a fall in rates of capitalization, provided that the affected asset can be produced freely, an assumption which is justified for the most important separate components of R.T.W. such as houses, consumers' durables and business equipment, even though doubtful for going concerns.

Apart from the theoretically expected discrepancies between market value and price-adjusted depreciated original cost there are others which result simply from imperfections in the statistical material. Probably the most important of these are caused by certain types of outlays which are omitted or understated in the statistics of capital expenditures with the result that adjusted depreciated cost of total R.T.W. remains below market value, and in this case for as long as such expenditures continue at the same level or increase. This apparently has been the case with part of the expenditures on improvements and alterations on residential real estate, part of expenditures on certain types of farm structures such as fences, roads, drainage and tiling installations, and part of business capital expenditures on force account.¹

Because of the theoretical differences and the possible actual discrepancies between the two measures of the value of repro-

¹ If the market value of reproducible tangible wealth of business enterprises is derived not by adding the value of the separate assets of this type but as 'going concern value' of the owners, an additional discrepancy is introduced which theoretically is of a permanent nature, though of fluctuating direction and size. This discrepancy reflects the fact that the value of a going concern, expressed for instance in the market value of all its shares, is bound to differ from the sum of the market values of its separate assets less its liabilities, a situation which I have been presumptuous enough to call the 'indeterminacy principle' of the national balance sheet. (*Studies in Income and Wealth, Volume Twelve*, pp. 40–41.)

ducible wealth, rates of growth should be based, wherever possible, on data obtained by one and the same method. This, however, could not be done as yet for the entire period covered by this paper. Before 1900, calculations must essentially be based on Census figures. These, in fact, represent hybrid valuations. In appearance they are based throughout on market values. Actually, however, there is little doubt that many of the figures represent original cost, sometimes depreciated and sometimes not, and sometimes adjusted to reproduction cost and sometimes not. The only components of R.T.W. for which the Census figures are fairly certain to represent market values, or a near approximation to them, are business inventories (for these, however, the Census figures are extremely rough and unreliable); livestock; and possibly residential real estate. In all other components the influence of original cost, adjusted or unadjusted, is certainly substantial, although the extent of its influence cannot be evaluated quantitatively. From 1900-22 both Census and Perpetual Inventory figures (price-adjusted cumulated depreciated expenditures) are available. A comparison for this period shows that rates of growth calculated by the two methods, though not identical, do not differ too greatly.¹ From 1922 on we must rely exclusively on Perpetual Inventory figures, which are derived by the retrospective method.

III. GROWTH OF TOTAL REPRODUCIBLE TANGIBLE WEALTH

1. *Problems of estimation*

If we want to go back a century or more there is no way around the necessity of piecing a series of estimates together from three segments which differ in method and reliability. From 1897 on we may use the Perpetual Inventory estimates,²

¹ The rate of growth for real civilian reproducible tangible durable wealth, excluding consumers' durables, for the entire period 1900 to 1922 is 3 percent from Census data (using Kuznets' estimates without further adjustment as shown in Table VIII) and 3.5 percent from the Perpetual Inventory. Differences, however, are somewhat larger and tend in different directions for the two sub-periods, for which the figures can be calculated separately. For 1900-12 the rate of 4.6 percent from Census data is considerably above the 3.8 percent from Perpetual Inventory estimates, while for 1912-22 the Perpetual Inventory rate of 3.3 percent is much higher than the Census 1.4 percent.

² For an explanation of method and a brief description of sources used, see Goldsmith, 'A Perpetual Inventory of National Wealth', in *Studies in Income and Wealth, Volume Fourteen* (1951), Section B. This publication contains only estimates at quadrennial benchmark years from 1900 to 1948, and for 1922, 1929 and 1939. Annual figures for 1896 through 1948, incorporating a number of revisions, are intended for publication in a forthcoming study by the author.

and may pick any year we want as a benchmark. For the period 1880 to 1922 there are also six benchmark estimates (1880; 1890; 1900; 1904; 1912; and 1922) made by the Bureau of the Census or based on the Bureau's estimates.¹ Before 1880 we have only two estimates each of which is in need of considerable adjustment and breakdowns before it may be used for our purpose, Blodget's estimate for 1805 and the figures of the Bureau of the Census for 1850.

Four questions immediately arise when one proposes to use a series consisting of these estimates as a basis for measuring the growth of R.T.W. in the United States:

- (a) How large are the errors in the original estimates?
- (b) What additional errors are introduced through reduction of the estimates to a common price level, specifically that of 1929?
- (c) Are the benchmark years sufficiently comparable in their cyclical position to prevent distortion?
- (d) Are the deflated estimates sufficiently comparable in coverage and methods to be welded into one series?

a. *Margin of error of estimates.* In the field of national wealth, as in so many other domains of economic research, a discussion of margins of error is rendered difficult by two obstacles: the uncertainty as to what in theory should be regarded as an error in such estimates; and the scarcity of practical quantitative work on the problem.

The first may possibly be overcome along lines which I should regard as applicable to the measurement of error in the wider field of social accounting, i.e. by treating as the error of an estimate of national wealth the difference between its numerical value and the value which would be obtained if (a) each economic unit kept its books according to principles of social accounting clearly enunciated and universally adhered to; and (b) the figures for all economic units were consistently combined.² This approach at least furnishes us with a theoretical

¹ For a rearrangement and discussion of these estimates see Kuznets, *National Product since 1869* (NBER, 1946), Part IV.

² This definition represents an adaptation of Deming's approach to sampling errors (see W. E. Deming, *Some Theory of Sampling*, New York 1950, pp. 15 and 18), in which they are defined as the difference between the value shown in the sample and 'what would have been the result of applying the same procedure to every member of the universe'.

standard of measurement which has the advantage of being operational in Bridgeman's sense.¹

The second obstacle, the absence of previous work on margins of error in national wealth estimates, however, remains. Practically all available estimates of national wealth have been issued without any indication of the margin of error to which they may be subject, although some of them have been accompanied by a general discussion in non-quantitative terms on their shortcomings and the sources of errors. The only exception noticed is provided by King who was bold enough to indicate what he believed were the errors in the components, though not in the total, of his estimates, which are based partly on Census data and partly on other material.²

Not enough is known about the sources and methods of Blodget's figures to assess the margin of error in the estimates for 1805 even roughly. Blodget himself did not discuss the problem beyond stating that he thought the figures too low, except those for slaves.³

The situation with respect to the Census estimate of 1850 is rather puzzling. This figure was derived, like those for 1860 and 1870, as the aggregate of estimates of the 'true value' of real and personal property in each county made by local residents who served as temporary agents of the Bureau of the Census, the true value being obtained by an addition made by these agents to assessed valuations which they had ascertained.⁴ The Census of 1850 itself made no comments on possible errors in the figures, but apparently thought rather highly of their reliability. The next generation, however, had a very low opinion of the accuracy of the wealth data in the Census of 1850, as well as those of 1860 and 1870.⁵ By 1900, however, the opinion had changed, at

¹ See P. W. Bridgeman, *The Logic of Modern Physics*, New York 1927, Chapter I.

² W. I. King, *The Wealth and Income of the People of the United States*, New York 1915, pp. 256-99. The figures given for the components of reproducible tangible wealth permit the conclusion that King regarded the error in the estimate of total reproducible tangible wealth as somewhere between 15 and 20 percent in 1910, but amounting to at least 30 percent in 1850.

³ *Economica: A Statistical Manual for the U.S.A.* (1806), p. 196.

⁴ For forms used in 1850 Census and instructions to agents, see *Seventh Census*, pp. VI, X, XIV and XXI-XXV.

⁵ In the introduction to the *Tenth Census*, taken in 1880, we find the following statement (Vol. VII, p. 5): 'Comparison of the figures for 1860 with those for 1850 will scarcely allow one to doubt that, if the returns for 1850 were adequate to the facts, those of 1860 were excessive; and that on the other hand if those of 1860 were moderate and just those of 1850 were far too low . . . Not only is so great an increase [126 percent in 10 years] in itself very improbable but there are many other considerations which indicate that the valuation of 1850 was much too small.'

least among the officials then in charge of the Census. After the first reasonably detailed discussion of the problem that has been found, the conclusion was that 'it is deemed probable that the Census estimates for 1850 represent fairly the market value of the tangible property of the nation at that time'.¹ No later appraisal of the reliability of the Census estimates for 1850 appears to have been made.²

In view of the method by which the Census estimates for 1850

David Wells shared this opinion, stating in his *Report of the Special Commissioner for Revenue for 1869* (p. XII): 'Much of this large increase [between the 1850 and 1860 values] is known to have been due to more accurate methods of enumeration and to the inclusion of many elements previously left unnoticed', and that 'careful review of comparison of the material of these two Censuses made . . . in connection with certain of the experts who prepared the Census of 1860' led him to put the true rate of increase between 1850 and 1860 at 65 percent, or at most 80 percent compared to the 126 percent shown in the unadjusted Census figures.

The figures for 1860, in turn, also had been declared to be much too low. Indeed, the gentleman in charge of the *Ninth Census* expressed this opinion in terms which would now hardly be used by one Federal official concerning the work of another: 'Undoubtedly, of the apparent gain of 107 percent in the valuation of the United States between 1860 and 1870, 20 to 30 percent is due simply to heedless and ignorant understatement in 1860', and further '. . . that the estimates of the value of property at the Census of 1860 were made generally without any appreciation of the principle which should govern in the treatment of the subject'.

If these two adjustments are combined and the 1870 wealth estimate is accepted as approximately correct – an assumption for which there is no compelling reason except the optimism of the then head of the Census Bureau – the 1850 value of national wealth should have amounted to 30 to 35 percent of that for 1870, or between \$9 and \$10½ billion, compared to the reported figure of \$7.1 billion, or probably more appropriately of \$6.3 billion if the value of slaves (included in the 1850 but not in the 1870 Census) is eliminated. The Census estimate of 1850 would thus have to be increased by 40 to 70 percent if the 1870 figure is regarded as correct. It would have to be raised still more if the 1870 estimate were found to have been too low compared with later evaluations of national wealth, as is only too likely in view, among other things, of incomplete coverage in the Southern states.

Assessing the evidence – not all set forth here – it seems most unlikely that the 1850 Census estimate could have been as much below the comparable figures for, say, 1880 and later years as these evaluations would imply. As in other fields, it is very hazardous to speculate upon the mental processes of our predecessors of almost a century ago, particularly since none of the critical evaluations of the Census data is accompanied by detailed reasons. What appears to have happened, however, is that the Census officials and other statisticians did not realize the extent and the pervasiveness of the inflation which affected the American economy in the third quarter of the nineteenth century; and that this blind spot led them to reject apparent rates of increase in national wealth, expressed in current prices, which were obviously in excess of the physical growth of wealth.

¹ Bureau of the Census, *Wealth, Debt and Taxation*, 1900, p. 29.

² Mitchell evidently was very sceptical of all national wealth estimates by the Bureau of the Census, specifically that of 1870 (see Wesley C. Mitchell, *A History of the Greenbacks*, Chicago, 1903, p. 398), but offered no reasons for his attitude.

were obtained, it is evidently impossible at this late date to make any direct check on their accuracy. What has been done in Table V is to build up a total from separate estimates for the components of reproducible tangible wealth. The margin of error in these estimates naturally varies, but can hardly be below 20 percent in any of them and for the total may be above this figure, although the possibility of offsetting errors in some of the components cannot be ruled out. If the aggregate of these components is compared with the figure from the 1850 Census – this can only be approximated because no official separate evaluation was made at that date of the value of land – it appears that the estimate of R.T.W. used in this paper is approximately 25 percent above the Census figure. Such a difference is in the direction and approximately of the size to be expected from what we know about the 1850 Census, accepting the position of the later critics rather than that of the earlier ones. Since the revised estimate admittedly has a margin of error of approximately 20 percent, even the unadjusted Census figure could not be entirely ruled out. King's estimates, on the other hand – which do not include inventories or livestock and for 1850 are mostly of an indirect nature (applying relationships existing around the turn of the century) – are 30 percent above those in Table V and imply a level of nearly 50 percent above Census estimates.¹

The national wealth estimates for 1880, 1890 and 1900A shown in Table I are based, with a few exceptions, on the figures developed by Kuznets, primarily from official censuses of the main branches of industry, e.g. agriculture, manufacturing, mining, transportation and electric utilities, and from the Bureau of the Census estimates of the value of real estate and inventories.² They thus have the advantage, in contrast to the estimates for 1850, of starting generally from comprehensive figures derived from direct replies by the operators of the different types of tangible assets. The basis of valuation, however, is not too well known and, unfortunately, is not uniform as between types of assets and between industries, a shortcoming which the estimates share with the figures for 1805 and 1850. It is therefore

¹ The level of King's estimates of the value of structures and equipment continues to be well above Census figures until near the end of the century; in 1880 the excess still amounts to nearly 30 percent compared to Kuznets' adjustment of the Census figures.

² *National Product since 1869*, pp. 202-15.

very difficult to be certain to what extent the figures approximate current market values, and how far they tend to deviate from them in the direction of original cost, depreciated or undepreciated, or some hybrid basis of valuation. Not enough is known about the original sources of these estimates to evaluate the margin of error in quantitative terms, assuming that current market values are regarded as the 'true' values deviations from which are to be treated as errors. It is not likely, however, that the errors so conceived should amount to more than approximately 20 percent in the aggregate for national wealth. The figures for individual components, of course, are certain to be farther off the mark in some cases.

Kuznets' figures have been accepted as they stand with one exception, the estimates for the value of non-farm residential structures, which in effect allocate a little less than one-half of total market values to structures and the other half to land.¹ There is what seems to be convincing evidence, too extensive to review here,² that a land ratio of 50 percent is excessive, and that the highest ratio that can be defended for homes is approximately 25 percent. Kuznets' figures have, therefore, been modified by allocating to structures 75 percent of his aggregate for the value of residential real estate. This has been done as there seems to be no reason to assume that Kuznets' aggregate figures, which are derived from the Bureau of the Census total for all non-farm real estate, deviated substantially from the market value of residential real estate.

The Perpetual Inventory figures used from 1900 on have at least the advantage that we know exactly how the estimates were derived; have an idea of the defects in the approach; and can judge the possible errors in the various steps involved in the calculation. The most important source of error, of course, resides in the estimates of expenditures on construction which constitute the first item in the calculation. From the changes in the official estimates of construction expenditures during the

¹ This is the proportion obtained by comparing Table IV-1, line 5 and Table IV-2, line 5 (*National Product since 1869*, pp. 201-2). In Kuznets' actual calculations, each of these figures was obtained as a residual of broader starting figures given by the Bureau of the Census. The land-to-structure ratio commented upon in the text, therefore, was not used as such in the derivation of Kuznets' figures, but it is a necessary result of them.

² For a brief review of the evidence, see Goldsmith, 'A Perpetual Inventory of National Wealth', pp. 30-31.

last one or two decades¹ which have been, and still are being made, it is obvious that the margin of error in any set of figures which can now be contrived for the early part of the twentieth or the latter half of the nineteenth century must be substantial. It may well be put at not below 10 percent and probably even as high as 20 percent. The figures are likely to err in understating total expenditures rather than in overstating them. It is not at all certain, however, that the relative margin of error has substantially changed over the period, and it is rather unlikely that it has changed its direction. The obvious serious shortcomings in all the estimates of construction expenditures now available, therefore, do not necessarily imply equally serious errors in the comparison of cumulations, at separate points of time, derived from them.

As the Perpetual Inventory estimates are obtained by depreciating cumulated expenditures on construction and durables, the choice of the rates of depreciation necessarily introduces a second source of error. In this case, however, it is even doubtful just what should be regarded as a 'true' value, whether the rate actually applied in the books of the owners of the assets or the rate indicated by their demolition, scrappage or physical decay. The first of these rates is not well known, even for those owners, primarily corporations, who make depreciation allowances in their books; it is not more than a fiction in the case of individual owners of homes or consumers' durables. Opinions about physical rates of deterioration vary widely and the rates obviously depend on the extent to which expenditures on maintenance, repair, alterations and additions are treated as capitalizable expenditures.

Another advantage of the Perpetual Inventory estimates is that they can in many cases be checked against benchmark estimates of the Census type. This is the case primarily for residential real estate, farm structures, inventories and international assets which together account for about one-half of reproducible tangible wealth. Checks are less satisfactory for non-farm business structures and equipment which represent another quarter of reproducible tangible wealth, but the information provided in corporate balance sheets submitted to the Bureau of Internal

¹ For latest figures, at date these estimates were made, see U.S. Department of Commerce, *Construction and Construction Materials, Statistical Supplement*, May 1950, Washington 1950.

Revenue assures us that the Perpetual Inventory estimates are not too far off the mark for the last twenty years.¹ The only sectors of reproducible tangible wealth in which the Perpetual Inventory estimates can be subject to no checks, or to only very unsatisfactory ones, are consumers' durables and government fixed assets which together account for the last fourth of reproducible tangible assets, if military assets are excluded.

These considerations as well as comparison with other relevant data such as estimates of saving and investment, estate tax returns and samples of individuals' assets and liabilities, lead to the conclusion that the estimates of total reproducible tangible wealth (excluding military assets) shown in Table I are not likely to be off by more than approximately 20 percent after 1900, and that the margin of error is probably a good deal smaller for purposes of comparison over substantial periods of time.

b. *Errors introduced through deflation.* The additional errors which may be introduced by reducing the estimates to the price level of 1929 are of different character and seriousness for the three segments from which the series has been built up. The figures from 1900 onwards, derived by the Perpetual Inventory method, have been deflated by fairly narrow sectors; cumulated depreciated expenditures on one-to-four family homes, e.g., have been reduced to the 1929 price level by an index of the cost of construction referring specifically to this type of building. In the case of expenditures on producers' and consumers' durables, the process has been applied on a more detailed basis, approximately a dozen types of durables having been deflated separately in both instances. Even so the method of deflation used and the indices available are far from all that can be desired, but most of the deflators are at least based on cost of construction or price indices which refer specifically to the different types of reproducible tangible assets to which they are applied.

The results, nevertheless, remain subject to the tendency common in virtually all deflation procedures of understating improvements in the quality of durable assets. An example is provided by livestock, the deflated estimates for which were obtained by multiplying the number of animals of the different species by their 1929 price. Thus a milch cow of 1948 is regarded

¹ For a comparison of the Perpetual Inventory estimates and the Bureau of Internal Revenue figures on fixed assets of corporations, see Goldsmith, 'A Perpetual Inventory of National Wealth', pp. 52-7.

as the equivalent to one of 1900, notwithstanding the fact that by all available tests it is a considerably more effective milk-producing agent. In this case, as well as for other types of livestock, it might have been possible, given sufficient time and specialized technological knowledge, to make adjustments for changes in efficiency. In most other instances this would have been out of the question. The deflators, therefore, have a tendency to rise more over time than they should. Consequently, rates of growth calculated from the deflated figures are likely to represent minima. It is hoped that the selection of the year 1929 as the basis of deflation has avoided the additional bias which would have been introduced by using a year near one end of the period as a basis.

The estimates for 1880 and 1890 (as well as the first of the estimates for 1900) taken from Kuznets' studies, are the result of a more summary deflation,¹ as only three separate deflators have been used for construction (residential; other private; farm) and all equipment has been reduced to the 1929 price level by one deflator. It so happens, however, that at least for the year 1900 the figures resulting from Kuznets' more summary deflation and the more detailed deflation of the Perpetual Inventory are approximately the same, as can be seen from the closeness of the deflators in columns 2 and 3 of Table VIII. The difference is somewhat larger for 1912 and 1922, but it does not exceed 8 percent for either of these years. It would therefore seem permissible to regard the deflated figures for 1880 to 1900 as comparable to those for 1900 to 1948, at least in so far as the effects of the process of deflation are involved.

Kuznets' deflators, as well as those of the Perpetual Inventory, are quite close to Snyder's index of the general price level for the period 1900 to 1929. For the years 1900, 1890 and 1880 Kuznets' deflator and the index are virtually identical. This correspondence has been one of the main reasons for using Snyder's index as the deflator for 1850 and 1805. For these two years, of course, one and the same deflator had to be applied to all types of structures and equipment. For the deflation of inventories, on the other hand, an alternative deflator was available in the index of wholesale prices, and was given preference to the index of the general price level. This summary procedure is far from satisfactory, but it is not evident how

¹ *National Product since 1869*, pp. 216-17.

it can be substantially improved with the material now at hand.¹

There is no doubt that the process of deflation produces additional errors in the estimates. These, however, are unavoidable since rates of growth cannot be calculated from estimates expressed in current values.² The crucial question, of course, is whether these errors are likely to affect significantly the rates of growth of either total reproducible tangible wealth or of the major components over the entire period or for long sub-periods. One hesitates to make a definite statement on a subject which needs so much more theoretical and practical study. Even in the present stage of our ignorance it may, however, fairly be said (1) that any error is likely to lead towards an overstatement of the price rise over the period and hence an understatement of growth rates; and (2) that there is no evidence that the error is larger for one part of the period than for another, although the possibilities of error are certainly greater in the nineteenth century than the twentieth.

c. *Cyclical position of benchmark years.* Ideally one would wish all benchmark years to occupy the same position in the business cycle or in relation to long-term trend. Unfortunately, there is no choice among benchmark years before 1900. Even though we now possess annual data from 1897 three facts virtually remove the possibility of choice for the twentieth century too, viz. (a) the limitation of checks through census type data to certain years, particularly 1912 and 1922; (b) the concentration of independent and collateral estimates for most of the important components of reproducible tangible wealth on the years 1929, 1939 and 1946, particularly the papers assembled in Volume Fourteen of *Studies in Income and Wealth*; and (c) the fact that a few years, in particular again 1929 and to a somewhat lesser degree 1939, are generally regarded as marking the end of an era in American economic history.

¹ One possible alternative to the use of Snyder's index as deflator for structures and equipment would be cost of construction indices such as the one shown in Column 7 of Table VIII. Such indices, however, could not be carried back to 1805; even for 1850 they are nothing more than a combination of indices, not too satisfactory by themselves, of wage rates and the cost of building materials. While the use of such indices would not have produced substantially different results for any benchmark year after 1880, it would have led to an increase of the 1850 figures, in 1929 prices, by approximately 20 percent above the values obtained by the application of Snyder's index.

² When changes in the structure of wealth rather than growth in aggregate wealth are the object of study it may be preferable to use the undeflated original figures, as will be done in Section IV.

Table IX assembles the data available for judging the trend in cyclical position of the dozen benchmark years used in this paper. It appears that most of these years, particularly the crucial ones, were periods of prosperity or near prosperity, viz. 1805, 1850, 1880, 1900, 1912, 1929 and 1948. The only benchmark years whose cyclical position is substantially below the trend are 1922, 1939 and 1946. In all three cases, however, the deviation from the trend was apparently not large enough to invalidate rates of growth calculated over substantial periods of time, i.e. twenty years or more, beginning or ending with these years.¹

The distribution over time and the deviation from trend of the benchmark years with which we actually must work in this paper are such that caution, or adjustment for difference in cyclical position, are necessary only for comparisons over some shorter periods. For comparisons over longer intervals, particularly those from 1805 to 1850; 1850 to 1880; 1880 to 1900; 1900 to 1929; and 1929 to 1950, or any combination of these periods, such a correction is fortunately not required, and the rates of growth calculated for any of them can be used without further adjustment.

d. *Comparability of estimates.* It would thus seem that the benchmark estimates are sufficiently comparable in their cyclical position as not to distort the calculation of growth rates over longer periods of time; that the deflation of the original estimates is likely to lead to a slight understatement of the increase in reproducible tangible wealth over the period under investigation; that the margin of error in the estimates is substantial, amounting to hardly less than 10 to 20 percent at any date; that this relative margin increases as we go back in time; but that it is not at all certain that comparability is impaired by as much as the size of the margin may imply because the error probably tends in the same direction for most if not all benchmarks, although it is likely that the understatement is more pronounced in the early part of the period than in the latter. This leaves the

¹ If we assume a first benchmark 5 percent above and another one 5 percent below the trend – and that is about the maximum difference which we are likely to encounter – and a trend increase of 2.5 percent per year, the unadjusted rate of increase over 20 years would be 2 percent, a substantial deviation from the rate obtained if the comparison had been based on trend values rather than actual values. Over a period of 50 years, however, the difference in the rates of growth would become of much less importance; the unadjusted rate of 2.3 percent would then compare with an adjusted rate of 2.5 percent.

question whether the estimates are comparable in scope, and whether it is permissible to combine the Census type estimates for the period before 1900 with the Perpetual Inventory estimates for the last fifty years.

Regarding scope, considerable effort has been made to ensure comparability. As a result the figures shown in Table I include all types of R.T.W. with an expected (normal) useful life of more than approximately two years, but exclude subsoil wealth and military assets.¹ Also omitted throughout the period, but probably more completely after 1900 than before, is R.T.W. which originates in expenditures on soil improvement. As this form of wealth has been relatively more important before than after 1900 its omission leads to a small understatement of the decline in the rate of growth between the nineteenth and twentieth centuries,² one which is certainly quite small in comparison to total R.T.W.

Conceptually the Census type estimates used for the nineteenth century differ sharply from the Perpetual Inventory figures utilized for the more recent period. The Census type figures represent, in principle at least, prospective values, if it can be assumed that market values of R.T.W. reflect primarily capitalized expected net yields. The Perpetual Inventory figures, on the other hand, are retrospective being derived from a cumulation of past expenditures on reproducible tangible assets. In practice the difference is considerably less clear-cut. On the one hand, many of the figures included in Census type estimates reflect, or at least are based on, original cost rather than the capitalization of expected future earnings. On the other hand, some of the Perpetual Inventory estimates, e.g. those for residential structures, are adjusted to Census type benchmarks. As a result, the actual difference between the Census type and the Perpetual Inventory estimate for the overlapping year 1900 is moderate. Kuznets' unrevised estimate for that year is \$49.5 billion,³ which compares with one of \$50.9 billion by the Perpetual

¹ Rough estimates for some items omitted from Table I and from most of the discussion are given in Table II.

² A minor difference in scope, it is true, arises from the fact that the Perpetual Inventory estimates include the remaining value of development expenditures in mining, a good part of which may not be covered in the Census type estimates. In comparison to total R.T.W. this difference is negligible.

³ This figure is derived by combining Kuznets' estimates for structures, equipment and net foreign balance (*National Product since 1869*, pp. 202, 213, 228) with an estimate for inventories derived from his figure in 1929 prices (*op. cit.*, p. 228).

Inventory method. The close coincidence is partly fortuitous, but even if Kuznets' very low estimate for residential structures is adjusted,¹ his total exceeds the Perpetual Inventory estimate by only \$4.1 billion.² It has, therefore, been deemed permissible to link Kuznets' estimates for 1890 and 1880 to the Perpetual Inventory estimates for the period beginning with 1900 by reducing the former by 7 percent, after they have been adjusted for the apparent understatement in the value of residential structures.³ No similar adjustment has been made in the estimates for 1850 and 1805 because they were not known sufficiently well to justify such a minor correction; because the application of a correction factor derived from a relationship existing in 1900 would become more and more doubtful as the interval increased; and because the correction even if warranted would make little difference in the calculation of rates of growth between 1850 and 1880, the only period affected.⁴

2. The rate of growth of total reproducible tangible wealth

In the preceding pages we have dwelt in some detail on the limitations of the available estimates of R.T.W. and their use as measures of economic growth. We shall now forget these warnings and proceed as though we were possessed of a sufficient number of reasonably accurate estimates of R.T.W. of the United States, both in current and in constant prices, spaced at not too distant and fairly regular intervals over the period from 1805 to 1950, and thus could measure the rate of growth of wealth over these one hundred and fifty years.

In order not to complicate the discussion unnecessarily we shall deal in general with only one of the possible concepts of R.T.W., that which includes consumers' durables and net foreign assets, but excludes military assets, consumers' semi-durables and perishables and subsoil wealth. Estimates based on definitions of R.T.W. of different scope will be discussed only when there are significant differences between rates calcu-

¹ See page 259 above.

² The difference is due, almost exclusively, to the higher valuation of non-agricultural business structures and equipment in Kuznets' estimates. (The difference in these two items amounts to \$3.9 billion or 20 percent.) The discrepancies in other components are rather small and tend to cancel out.

³ This means that the final figures for 1880 and 1890 are about 3 percent above Kuznets' unadjusted estimates.

⁴ Since both sets of estimates are given in Table I, the reader who prefers to absorb the difference in the calculation of growth rates for the period 1890 to 1900 or 1900 to 1912 will be able to do so.

lated on the basis of the one or the other definition. For the rate of growth over the period as a whole, it makes very little difference, if we may anticipate later findings, which of the definitions is adopted, but it is another matter for shorter periods, in particular the last thirty years.

a. *The period 1805-1950 as a whole.* Beginning with aggregate R.T.W. in current prices we find a rate of growth for the entire period of one hundred and forty-five years of just over 5 percent.¹ This rate is not very meaningful; it is compounded of three elements, the price level of durable tangible assets, the number of inhabitants of the United States, and R.T.W. per head.

One of these, the price level, must certainly be eliminated if rates of increase are to provide information about economic growth or welfare, though aggregate figures in current prices may be important for other problems, particularly those in the field of money or finance. For the period as a whole the price level of reproducible tangible assets has grown at an annual rate of nearly 1 percent, reducing the rate of growth of aggregate reproducible real tangible wealth to a little over 4 percent per year.

The second element, the increase in the number of people living in the United States - which amounts to 2.2 percent a year for the entire period - likewise is not directly relevant for our purpose, even though it is of the greatest significance in

¹ In general all rates of growth have been calculated from the values for the beginning and the end of the period. In a few cases, however, the rates have also been calculated by fitting a logarithmic straight line to all the benchmarks. As shown below the results in these cases differ but little from the figures obtained by the cruder procedures, partly because both the 1805 and 1950 values happen to lie about equally far below the trend line.

	Rates of Growth 1805-1950	
	Calculated from initial and terminal values only	Calculated from all available benchmark values
	Percent	Percent
Total Civilian R.T.W., Current prices .	5.13	5.08
Total Civilian R.T.W., 1929 prices .	4.27	4.21
Civilian R.T.W. per head, 1929 prices .	2.04	2.00

explaining the pattern of growth of R.T.W., and in particular its geographical distribution. Elimination of the population component, if carried to its logical conclusion, implies the assumption that the rate of growth of reproducible real tangible wealth per head as the figures now show it might have been obtained within the boundaries of 1805 and with a population only as large as that of 1805.¹ Such an assumption is, of course, unrealistic because it entirely ignores not only the external economies created by the increase in the size of the American economy, but also disregards internal economies within enterprises to the extent that they are due to growth of population rather than to an increase in demand per head or to a decline in the number of suppliers. A study of the inter-relations between intensive and extensive growth of R.T.W., i.e. the growth which reflects the increase in R.T.W. per head and that which is due simply to increase in the economic area or the density of population, is beyond the scope of this paper. Such isolation is, however, permissible as an analytical device, but we should not make the mistake of imagining that an analysis of the figures for reproducible wealth per head alone will give us an answer to the problem of the aggregate growth of an economy's real wealth.

Table I shows that the increase in real reproducible tangible wealth per head accounted for slightly less than 40 percent of the rate of growth of aggregate R.T.W. in current prices, and for a little less than 50 percent of the rate of growth of aggregate real R.T.W. for the entire century and a half. The proportion, of course, has varied considerably within the period. In the nineteenth century, in the absence of a pronounced trend of prices, the increase in real wealth per head shared about equally with the increase of the population in the growth of aggregate wealth. In the first half of the twentieth century, on the other hand, the growth of real wealth per head accounted for less than one-fourth of the rate of growth of aggregate wealth in current prices, about half of the rate of increase was attributable to the rise in prices, the remaining one-fourth to the increase in population. The discussion, therefore, deals with approximately one-half of the rate of growth of total R.T.W. in the United

¹ This obstacle might possibly be overcome by regarding the rate of growth over the entire period as a combination obtained by linking of growth rates over shorter periods for which the artificiality of the assumption is less evident.

States, but it is the half which differentiates American experience most clearly from that of other countries during the nineteenth and twentieth centuries, and from that in earlier periods in economic history.

If the years 1805 to 1950 are treated as a single period the average rate of growth of real R.T.W. per head is almost exactly 2 percent. In a period of such length, even substantial relative errors in the estimates of either the starting or the terminal values do not affect the rate of growth very much, and in this case such an error is likely to have occurred only in the initial estimates. We may, therefore, be reasonably confident that within the definitions adopted here the average rate of growth of real R.T.W. per head since 1805 has been between 1.8 and 2.2 percent, and we may even restrict the probable range from 1.9 to 2.1 percent.

TABLE 1

*Distribution of Rate of Growth of Reproducible Tangible Wealth¹
among Increase of Population, Change in Price Level and
Growth of Real Wealth per Head*

	1805 to 1950	1805 to 1850	1850 to 1900	1900 to 1950	1945 to 1950
	A. ANNUAL RATE OF GROWTH (PERCENT) ²				
Total Wealth	5.1	4.4	5.2	5.5	12.4
Population ³	2.2	3.0	2.4	1.4	1.8
Wealth per head	2.9	1.4	2.8	4.1	10.6
Price level . . . . .	.9	-.8	.3	2.8	6.4
Real Wealth per head	2.0	2.2	2.5	1.3	4.1
	B. PERCENT OF TOTAL GROWTH RATE				
Total Wealth	100	100	100	100	100
Population	43	68	46	25	15
Wealth per head	57	32	54	75	85
Price level	18	-18	6	51	52
Real Wealth per head	39	50	48	24	33

¹ Reproducible tangible durable civilian assets after allowances for net foreign balance.

² All growth rates calculated from ratio between value at beginning and end of period.

³ The rates of growth of the population over 15 years, which may be regarded by some as a more appropriate measure of the population component, are only slightly higher, viz.: 2.5 percent for 1805-1950; 3.2 percent for 1805-50; 2.6 percent for 1850-1900; and 1.7 percent for 1900-50.

b. *Semi-centennial and decadal rates of growth.* This period of one hundred and fifty years which from an economic point of view constitutes almost the entire history of the United States is, of course, too long and not sufficiently uniform to be characterized by a single rate of growth. If we wish to compromise between periods of time extended enough to show basic forces at work and yet not long enough to combine periods that are too different in character, we may divide the whole span into three segments of approximately fifty years each. This leads to the interesting result that the semi-centennial rate of growth of R.T.W. per head has risen, as Table 2 shows, from 2.2 percent in the first half of the nineteenth century to 2.5 percent in the second half, but that it has fallen sharply to 1.3 percent in the first half of the twentieth century.¹

It has already been intimated that the estimates of R.T.W. for 1805 and 1850 may be somewhat low in comparison with later figures. Even if we make allowance for the possible additional margin of error in the earlier figures it is unlikely that the rate would be above 2.5 percent in the first half and 2.75 percent in the second half of the century.

For many purposes, fifty years is too long a unit and a period of twenty to thirty years more appropriate. Such a division into shorter periods is not possible for 1805-50, but there is no evidence that the rates of growth would differ much from the semi-centennial rate of 2.2 percent. Within the second half of the century the rate of nearly 2.5 percent for the period 1850-80 is but slightly lower than the rate for 1880-1900 of fully 2.6 percent.^{2 3}

¹ Inclusion of military assets makes no difference for the nineteenth century, but increases the rate for the first half of the twentieth century to nearly 1.5 percent.

² Exclusion of consumers' durables increases the difference; in that case the rates for the two periods would be 2.2 and 2.7 percent respectively. If Kuznets' estimates are used for the period 1880 to 1900 - these also exclude consumers' durables - the absolute rate of growth would be slightly higher for both periods (namely, 2.6 percent for 1850-80 and 2.8 percent for 1880-1900), but the difference between them would be narrower.

³ The rate of increase of real R.T.W., of 3.9 percent, excluding consumers' durables and international assets between 1880 and 1912 - which can be derived from Table I, Section A - may be compared with Stuvél's estimate of a 3.5 percent annual increase in the physical stock of capital goods for the period 1870-1913 (*Development of Stock of Capital Goods in Six Countries*; unpublished paper prepared for the 1949 meeting of the International Association for Research in Income and Wealth, p. 23). The difference may be due to the inclusion in Stuvél's figure of the decade 1870-79; to the fact that Stuvél had no data for some types of durable goods; to shortcomings in the deflation procedure; or to

That the rate of 1.3 percent is entirely unrepresentative for the first half of the twentieth century becomes evident when the rates for sub-periods are calculated. For the first thirty years the rate of 2 percent, while below that for any equally extended part of the nineteenth century for which separate figures are available, is nevertheless not low enough to indicate a break in trend. From 1930 through 1945, however, not only is the substantial rate of increase which could be observed since 1805 absent, but there is actually a decrease of 0.8 percent per year in R.T.W. per head, a consequence of the great depression and World War II. This interruption of growth for a period of fifteen years is quite without precedent in the nineteenth century. Sufficient time has not elapsed since the end of World War II to permit estimation of a long-term growth rate.

The figures finally permit calculation of decadal growth rates from 1880 on, although a few of these are too much influenced by the cyclical position of the benchmark years or by possible errors in the estimates for the initial or terminal year to constitute measures of long-term trend.

Kuznets' estimates have indicated a substantial difference in the rate of growth of R.T.W. per head between the 'eighties and 'nineties – about 4 percent for 1881–90 compared with 1.5 percent for 1891–1900. This difference, however, is clearly influenced by two facts, viz.: that while 1880 and 1890 were years of prosperity, 1900 marked a cyclical trough, and that measures of economic activity eliminating trend are considerably higher for the 'eighties than for the 'nineties.¹ Whether a downward trend in the rate of growth – in addition to the effects of the cyclical movement – was operative during these two decades is

any number of statistical shortcomings in Stuvell's or in the present estimates. By and large, however, the two sets of figures are entirely compatible.

The comparison is less satisfactory for the period 1919–39 for which Stuvell calculates a rate of increase of 2.5 percent while a conceptually roughly comparable rate of 1.6 percent is obtained from Table X. The reason for the substantial difference is not clear, but appears to be due in part to the very heavy weight assigned by Stuvell to road transport (automobiles), his rate for all other capital goods being only 1.1 percent. Hence, his overall rate of 2.5 percent may preferably be compared with our rate of 1.9 percent including consumers' durables.

¹ The index of business activity of the Cleveland Trust Company averages 103 percent for 1881–90 against 99 percent for 1891–1900. (L. P. Ayres, *Turning Points in Business Cycles*, New York 1939, pp. 186/91.) Frickey's index of manufacturing production adjusted for trend stands at 103.5 percent for the 'eighties against 97 percent for the 'nineties (*Production in the United States, 1860–1914*, Harvard University Press, 1947, p. 128). Similar indicators for the three years 1880, 1890 and 1900 will be found in Table IX.

TABLE 2

Growth of Real Reproducible Tangible Durable Wealth per Head, U.S.A., 1805-1950

Line No.	Year	Reproducible Wealth per Head (\$ of 1929)			Annual Rate of Growth (percent)								
		Total	Civilian		Total			Civilian					
			Consumers' Durables		Decadal	Quarto-centennial	Semi-centennial	Including Consumers' Durables			Excluding Consumers' Durables		
			Incl.	Excl.				Decadal	Quarto-centennial	Semi-centennial	Decadal	Quarto-centennial	Semi-centennial
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
1	1805	166	166	153									
2	1850	441	441	407			2.19 (1, 2)			2.19 (1, 2)			2.20 (1, 2)
3	1880	913	913	784									
4	1890	1,325	1,324	1,124	3.79 (3, 4)		2.46 (2, 3)			2.46 (2, 3)			2.21 (2, 3)
5	1900	1,540	1,537	1,321	1.51 (4, 5)		2.53 (2, 5)			2.53 (2, 5)			2.86 (2, 5)
6	1912	1,910	1,907	1,647	1.82 (5, 6)		2.64 (3, 5)			2.64 (3, 5)			2.65 (3, 5)
					1.75 (6, 7)					1.50 (4, 5)			1.63 (4, 5)
										1.81 (5, 6)			1.86 (5, 6)
										1.55 (6, 7)			1.78 (6, 7)
										1.99 (5, 8)			2.02 (5, 8)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
7	1922	2,270	2,225	1,965		2.01 (5, 8)							
8	1929	2,736	2,719	2,361	2.70 (7, 8)		1.44 (5, 11)	2.91 (7, 8)		1.28 (5, 11)	2.66 (7, 8)		1.18 (5, 11)
9	1939	2,458	2,442	2,107	-1.08 (8, 9)	0.66 (8, 11)		-1.08 (8, 9)			-1.15 (8, 9)	0.02 (8, 11)	
10	1945	2,773	2,381	2,047	2.03 (9, 10)			-0.42 (9, 10)			-0.48 (9, 10)		
11	1950	3,143	2,910	2,370	2.54 (10, 11)			4.09 (10, 11)			2.97 (10, 11)		

Note.—Figures in brackets indicate years (line number) that delimit the interval over which the given rate of growth is calculated.

not certain. If so, it was considerably less pronounced than the visible decadal rates of growth would indicate.

During the twentieth century the decadal rates thus far have oscillated between high values in the first, third, and as may be expected also the fifth decades, and low rates in the second and fourth decades – provided we do not limit ourselves to exact calendar decades but use periods of approximately ten years' duration and of a sufficient degree of economic unity such as 1900–13, 1914–22, 1923–29, 1930–45 and 1945–1950. We do not, however, wish to attribute undue significance to these oscillations which continue the pattern of the last two decades of the nineteenth century. Even if this pattern were more than fortuitous it could not be regarded as a long-term movement.

It will be seen from Table 2 that the semi-centennial rate of growth fluctuates most when based on wealth per head in current prices and least when calculated from aggregate wealth in current prices, and that the rates based on wealth per head in 1929 prices, with which most of the discussion deals, and on total wealth in 1929 prices occupy an intermediate position. It should also be noted that the rates of growth in current prices have exhibited acceleration, more pronounced for per head than aggregate values; while the rates in 1929 prices have shown deceleration, though for per head values in an irregular fashion. These differences, of course, reflect primarily fluctuations in the rate of change in prices of durable tangible assets, and secondarily fluctuations in the rate of population growth.

Since the turn of the century we are also in a position to follow fluctuations in the rates of growth of R.T.W. on an annual basis (Table X). The results do not vary much from what we have already learned from the benchmark dates. The fluctuations are, of course, wider, viz. as shown in Table 3, from an annual rate of growth of nearly 5 percent (1946) to a shrinkage of 4 percent (1933). The annual fluctuations of the rate are, of course, closely connected with (a) business cycles and (b) wars. The long-term movement – measured, for example, by nine-year moving averages – is almost level at slightly below 2 percent, disregarding minor fluctuations, until the late 'twenties. There follows a deep trough with its low in the early 'thirties, and it is only in the late 'forties that the level of the first quarter of the century is reached once again.

TABLE 3

Frequency Distribution of Annual Rate of Growth per Head of R.T.W., in 1929 Prices, 1897-1950¹

Rate (percent)	Including Consumers' Durables			Excluding Consumers' Durables		
	1897 to 1929	1930 to 1950	Total	1897 to 1929	1930 to 1950	Total
+4.00 to 4.99 . . .		4	4			
+3.00 to 3.99 . . .	6	1	7	4	4	8
+2.00 to 2.99 . . .	10	2	12	14	1	15
+1.00 to 1.99 . . .	9	1	10	8	3	11
+0.00 to 0.99 . . .	7	3	10	6	2	8
-0.00 to 0.99 . . .	1	2	3	1	3	4
-1.00 to 1.99 . . .		2	2		2	2
-2.00 to 2.99 . . .		4	4		4	4
-3.00 to 3.99 . . .		1	1		2	2
-4.00 to 4.99 . . .		1	1			
	33	21	54	33	21	54

¹ From Table X.

IV. STRUCTURE OF REPRODUCIBLE TANGIBLE WEALTH

1. Approach and data

It is probably in problems of structure that an analysis of wealth data can contribute most to the understanding of the process of economic growth in addition to what can be learned from the figures on national income. What is desired for this purpose are consistent estimates for the different forms of tangible assets which extend over a long period of time. These estimates are wanted in such detail that a number of economically meaningful breakdowns can be obtained. Among these the first is the comparison of reproducible with non-reproducible wealth. For reproducible tangible wealth the following breakdowns are essential or desirable:

- (a) By original length of useful life (perishable; semi-durable; durable).
- (b) By age at time of estimation.
- (c) By purpose (for production or for consumers' use; civilian or military).
- (d) By industry (agriculture; manufacturing; mining; transportation; trade, etc.).

- (e) By location (in large cities; in small cities; in open country).
- (f) By origin (imported; home produced).
- (g) By ownership (by individuals; corporations; non-profit organizations; governments; foreigners).
- (h) By management (direct, indirect; local, absentee).

Ideally, of course, what is wanted is a cross-classification by as many of these criteria as possible. However, hardly any cross-classification exists which covers all types of tangible reproducible assets, and only few one-way breakdowns are available. In the United States the breakdown that can be constructed for the longest period is that by purpose, which fortunately is the one of greatest economic interest. It is possible, too, to obtain rough classifications by original length of life. Distribution by age is limited to a few important types of assets – residences; machine tools; railroad equipment – and to the last few decades. A breakdown by major industries is available, or can be obtained, for approximately one hundred years; and may even be extended to the beginning of the nineteenth century for the basic separation of agriculture and other industries. Reasonably detailed cross-classifications by industry and type of tangible assets, however, still remain to be calculated, although materials are probably available to push such calculations back to the nineteen twenties. A good deal of data are at hand on the location of reproducible tangible assets, but they do not seem to have been worked up systematically. A breakdown by origin is probably of no significance in the United States. No systematic classification of reproducible tangible assets by ownership or management has yet been made which would satisfy reasonable requirements regarding completeness, consistency and extension over a sufficiently long period, although we do, of course, know the distribution of ownership and operation in broad terms and at a few benchmark dates for many classes of reproducible durable assets. Considerable progress probably could be made in this field by systematic utilization of the scattered material already available, particularly in estate tax statistics, samples of asset holdings by individuals, and balance sheets of corporations and other organizations.

This paper is limited to those breakdowns which can be carried back, even if roughly, for at least a century. Almost the

only breakdown which can be prepared with a reasonable degree of consistency for this period is a hybrid one, combining the criteria of purpose and industry and distinguishing approximately a dozen types of durable tangible assets, viz. business structures, equipment and inventories; farm structures, equipment, crop inventories and livestock; non-farm residences; farm and non-farm durable consumer goods; government (civilian and military) reproducible tangible assets; and foreign assets. This classification, however, permits derivation of some of the economically most significant breakdowns, particularly those into reproducible tangible goods for production and for consumers' use; civilian and military wealth; and non-agricultural and agricultural R.T.W.

The preparation of detailed and reliable figures on national wealth will probably elude us for ever for most of the nineteenth century. From approximately 1880, however, full exploration of the material available, though often badly scattered and in need of a good deal of reworking, and requiring in many cases the preparation of new figures from primary data, could provide the basis for a detailed analysis.¹ This is not attempted in this paper, but the figures that could be assembled are regarded as sufficient for its more limited purpose.

The basic figures used in this discussion of the changes in structure of R.T.W. are shown in Table I both in current and 1929 prices. It is hardly necessary to stress the fact that the estimates of individual components of R.T.W. are often affected by a relatively larger error than the total with which Section III has dealt. For this reason, as well as in order to save space and reader's time, comments will hereafter be limited to fairly clear trends, because minor variations are too liable to reflect imperfections in the statistics rather than genuine changes of significance.

¹ Probably the main bodies of organized material from which a more thorough analysis could start are the benchmark estimates for 1880, 1890, 1900, 1912 and 1922 prepared by Kuznets on the basis of census data (*National Product since 1869*, Part IV); the author's annual estimates for 1897 to 1949, which will be published in Vol. III of the Saving Study (preliminary figures at four-year intervals will be found in 'A Perpetual Inventory of National Wealth' in *Studies in Income and Wealth, Volume Fourteen*); and E. A. Keller's estimates for 1922-33 (*A Study of Physical Assets . . . in the United States, Notre Dame 1939*). A good deal of material will also be found in R. R. Doane's *Measurement of American Wealth* (New York 1933) and his *The Anatomy of American Wealth* (New York 1940), although the derivation of many of the figures and, hence, their reliability, cannot easily be evaluated due to insufficient description of methods. Of the earlier literature, apart from primary material, King's *The Wealth and Income of the People of the United States* (1915) is probably the only study which may still be of use.

Changes in the structure of wealth may be regarded in two ways, as differences between rates of growth of individual components, and as changes in their share of total R.T.W. Here, too, the discussion may be based on current or 1929 values; and if expressed in percentages of total wealth may proceed from definitions of varying breadth, for instance including or excluding military, foreign and semi-durable assets. In the case of rates of growth, the figures will differ considerably depending on whether they are based on aggregate or per head values.

Of the numerous alternative modes of presentation we shall choose the share of the different types of R.T.W. in current prices, excluding military, semi-durable and subsoil assets. The tables, however, permit readers to cast the story in terms of practically any of the alternative approaches.

2. *The share of R.T.W. in total national wealth*

Before entering on a discussion of changes in the structure of reproducible tangible wealth it may be advisable to take a brief look at the comparison of R.T.W. with the element of national wealth not used in the evaluation of economic growth, i.e. primarily the value of land and subsoil assets; and to ascertain the relative importance of military R.T.W. which is not included in the main tabulations.

The movement of the share of R.T.W. in total wealth – essentially the mirror image of the share of land – constitutes one of the most consistent trends observable in this field. In 1805 R.T.W. accounted for less than one-half of the national wealth of the United States.¹ By 1850 its share has risen to nearly 60 percent.² By the end of the century it approached 70 percent, and at the present time R.T.W. accounts for approximately 85 percent of total civilian national wealth.³ This movement, of

¹ It is almost impossible to obtain an estimate of the value of land for 1805 in which a reasonable amount of confidence can be placed. Using Blodget's figures (*Economica*, p. 196) for cultivated land (39 million acres at \$6) and for land near cultivated areas (150 million acres at \$3½), the value of reproducible tangible assets accounts for a little under one-half of total national wealth excluding slaves, viz. nearly \$700 million out of \$1,460 million. If following Blodget the 451 million acres of residual land are included and valued at \$2 per acre the share of R.T.W. declines to 30 percent. It would seem that for economic analysis the land well beyond the reach of cultivation should be disregarded or given a much lower value than Blodget gives; and that the ratio of reproducible tangible assets to total wealth, comparable to later figures, may be somewhere between 40 and 45 percent.

² See Table I.

³ Goldsmith, 'A Perpetual Inventory of National Wealth' (*Studies in Income and Wealth, Volume Fourteen*), Table 1.

course, is mainly a reflection of the declining importance of agriculture in the national economy. However, it is due, too, in part, to the increasing importance of elements which, in contrast to structures, contain no land value element, i.e. producers' and consumers' durable equipment and international assets.

In contrast to the steady decline of the share of land in total national wealth the share of military assets has moved very erratically. Until 1917 military assets were of negligible size, with the possible exception of the civil war period, and seem to have accounted for less than one-half percent of civilian R.T.W. Even the sharp increase during World War I raised the share to only approximately 4 percent. Depreciation on the stock accumulated at the end of the war, together with growth of civilian wealth, reduced the proportion to about 1 percent from the late 'twenties to the early 'forties. It is only since World War II that the inclusion or exclusion of military assets makes a substantial difference in the analysis of national wealth data. At the end of 1945 reproducible tangible military assets, if valued in the same way as civilian assets, i.e. on the basis of cumulated depreciated expenditures adjusted for price changes, were equal to approximately 15 percent of civilian R.T.W. By 1950 their share had fallen to approximately 10 percent under the combined influences of depreciation in excess of additions to stock and of a substantial increase in civilian wealth. However, even at that level, military assets accounted for as large a share of total R.T.W. as some of the most important civilian categories such as inventories and government non-military assets; and were not much smaller than components such as producers' or consumers' durable equipment.¹ Since the relative importance of military durable assets is likely to increase rather than decrease over the next few years, their treatment in an analysis of national wealth will remain an important problem; and much more reliable data than the rough guesses, which are all that can be contrived at the present time, are urgently needed.

3. *Structural changes within R.T.W.*

Returning to the changes in the structure of civilian reproducible tangible wealth, discussion will be limited to a few

¹ If depreciation is calculated at the average rate of about 15 percent, which may be regarded as taking a more realistic account of obsolescence in items like aircraft, instead of the rate of about 10 percent used in Table III, the share of military R.T.W. would be reduced by about one-third to something like 7 percent of total R.T.W.

striking trends, or their absence, which are fairly certain to survive the statistical corrections which further research will undoubtedly make in the material on which we now must base our analysis.

1. The most obvious trend, of course, is the decline in the share of agriculture. In 1805 agriculture accounted for approximately 60 percent of the country's R.T.W., even though the proportion excludes two elements of total national wealth which were predominantly used in agriculture, land and slaves.¹ By 1850 the share of agriculture in R.T.W. was still near 40 percent. By 1900 it had fallen well below 20 percent, and in 1948 it had declined to not much more than 10 percent. This trend, one of the most characteristic accompaniments of the process of economic growth in any country, obviously has now almost run its course in the United States. Indeed, mechanization in agriculture may prevent any further substantial decline in its share in R.T.W.

These figures are based on total reproducible tangible assets in agriculture and in the rest of the economy. The picture, however, is not much different if the comparison is limited to productive or business assets, i.e. if it excludes residences and consumers' durables. In that case the decline extends from a little under 60 percent in 1805 to about 25 percent in 1900 and a little over 15 percent in 1948. Thus, agriculture has held its own somewhat better within the business economy than within the entire economy, and the difference reflects chiefly the increasing importance in terms of R.T.W. of non-farm consumers' holdings and of the government.

Two movements within agriculture are worth mentioning. The first is the increase in the importance of livestock in the nineteenth century, rising from approximately one-seventh of all reproducible business assets of agriculture in 1805 to about one-third in 1850 and 1900, but falling back to approximately one-quarter by 1948; the second, the mechanization during the twentieth century reflected in the increase of the share of equipment in total reproducible business assets from approximately one-tenth in 1900 to over one-quarter in 1948.

2. In contrast to the declining share of agriculture, non-farm business structures and equipment (i.e. buildings, machinery and rolling stock of industry, trade, railroads and utilities) have

¹ The percentages used in this section are from Table I, Section B.

gained considerably in importance within R.T.W. at least over the period as a whole. From a share of one-seventh in 1805 they rose to over one-fourth in 1850, and by 1900 had come to represent approximately one-third of total R.T.W. The interesting point is that the share of business structures and equipment did not continue to increase after 1900 – indeed the peak may already have been reached by about 1880 – but declined slowly during the twentieth century, falling back to a share of not over one-fourth by 1948. It is in this field more than anywhere else that further breakdowns by type of asset and by industry are needed for an understanding of trends. The first step in this direction, the separation of structures from equipment, can be made rather easily, but what is more essential is a breakdown of all the figures by industry.

A look at Table I will show that the decline in the combined share of business structures and equipment since 1900 has been limited to business structures, i.e. commercial and factory buildings. The proportion of producers' durable fixed and movable equipment appears to have remained stable since the turn of the century, which is less than one might have expected in an age of mechanization. Two possible explanations suggest themselves. The first is that the building of the railroads – all in all the most prodigious non-military user of capital in concentrated doses in economic history – was mainly completed by 1900. The second explanation is that the price of machinery and equipment rose less than that of the other main components of R.T.W. A reflection of this change in price relationships is visible in part D of Table I, calculated in 1929 prices, where the share of equipment rises from 1900 to 1948 by 2.3 percentage points or by one-quarter, compared to an increase of only 1.4 percentage points or by one-seventh in part B, based on current prices. This, moreover, is only a continuation of the trend which is visible during the period from 1880 to 1900 if Kuznets' estimates are used. During that period the share of producers' durable equipment rises by 5.4 percentage points, or over two-thirds, if the calculations are made in 1929 prices; against an increase of only 3.1 percentage points, or less than one-third, in current prices. The deflators used in deriving these figures probably understate the relative drop in the cost of equipment. If we had indices making full allowance for the improvement in the efficiency of machinery per dollar of outlay, the increase in the

share of business equipment would probably be even more pronounced than it now appears in Section D of Table I.

During the nineteenth century the rise in the proportion of producers' durable structures and equipment is, of course, spectacular, though it is not yet possible to separate the two components. It is fairly certain that non-agricultural producers' equipment accounted for considerably less than 10 percent of R.T.W. in 1805, and for not much more than 10 percent in 1850. Moreover, a large part of the total at that time was represented by sailing ships which alone represented about 6 percent of all R.T.W. in 1805 and 3.5 percent in 1850, while they had become almost insignificant by 1880. Other producers' durable equipment, therefore, can have accounted only for a few percent of R.T.W. in 1805. Even in 1850 it probably represented not more than 5 percent, although no direct evidence is available. By 1880 the share had reached 10 percent, approximately the level it has maintained since.

3. Inventories, the third main component of reproducible tangible non-farm business assets, present a rather puzzling picture, possibly due to statistical shortcomings in the estimates now available. That the figures show inventories to have fallen during the nineteenth century compared to other fixed assets, viz. from about equality with business structures and equipment to a level of approximately one-third of them in 1900, is, of course, only what one would expect in a period of change from handicraft and small trade to large-scale manufacturing, transportation and distribution. Beginning with 1900, however, there apparently has been no substantial change in the relationship, particularly no decline in the value of inventories compared to that of business structures and equipment, as one might have expected if the tendencies toward 'hand-to-mouth' buying, so much discussed in the twenties, had been operating during the entire period. Apparently, however, there were sufficient counteracting forces at work to prevent a substantial decline in the size of non-farm inventories compared to fixed reproducible business assets.¹

In proportion to total R.T.W. non-agricultural inventories have not changed much in size during the entire period of one

¹ Any test of the extent and duration of the 'hand-to-mouth' buying movement would, of course, have to be based on a comparison between inventories and sales rather than between inventories and fixed assets to which the text is necessarily limited.

hundred and forty-five years, with the exception of the bulge observable in the figures from 1880 to 1900 which may well be due, in whole or in part, to differences in the method of estimation.¹ A slight downward trend is evident, but more adequate estimates and closer examination is required before we will be in a position to attribute economic significance to this apparent movement in the figures.

4. A clear and obvious trend again is shown by the share of government (including non-profit institutions). During the nineteenth century, for which the estimates are extremely rough, the increase appears to have been slow. Within the total, the share of the government alone probably increased more rapidly, since that of non-profit institutions – particularly churches – is likely to have declined rather than to have risen. However, during the twentieth century, the trend has been sharply upward, even if military assets are excluded. In the civilian sphere alone the share of government (and non-profit institutions) increased from 6 percent in 1900 to 11 percent in 1948. Again the increase in the share of government alone, and particularly in that of the Federal government, was somewhat sharper than the overall ratios indicate because the share of non-profit institutions may be assumed to have continued a slow decline.² Even if allowance is made for this shift the inroads made by government ownership appear much less striking in the statistics than may be expected. The picture changes, at least for the last few years, if account is taken of the durable military assets of the government. If these are included, the government's share in R.T.W. now amounts to approximately one-quarter, four times as high as it was at the turn of the century.

¹ Kuznets' figures for 1880 to 1900 were derived on the assumption that inventories equalled six-months' output, a ratio obtained by reducing – by what criteria it is not quite evident – the similar assumption of nine-months' output made by the Bureau of the Census, which indeed has not much to recommend itself and apparently produces much too high figures for inventories (*National Product since 1869*, p. 228). The estimates for 1900 B and later years, on the other hand, are derived by less summary methods, and may be assumed to bear a somewhat closer relationship to the values at which inventories were actually carried in the balance sheets of business enterprises. The figures used for 1805 to 1850 are, of course, of the roughest, as a look at their methods of derivation explained in the notes to Table IV, line 6, and Table V, line 16, will show.

² On the Government's share, see Fabricant, 'Government-owned Non-military Capital Assets since 1900' (*Studies in Income and Wealth, Volume Twelve*, p. 535). Fabricant's ratios are quite close to those shown in Table I, Section B, up to 1939; that his figure for 1946 is considerably higher seems to be partly due to inclusion of war plants and wartime merchant vessels which in this Study have been classified with military assets.

5. We now turn to the last of the main groups of economic units, the consumers. Since the turn of the century, when reasonably satisfactory data are available, the share of consumers' durable reproducible assets, i.e. residences and consumers' durables, appears to have remained, with only little change, at slightly above two-fifths of total R.T.W. In the course of the nineteenth century their share declined during the first half, but recovered the loss during the second half. Both movements have not been very sharp, though substantial if the figures of Table I, Section A, can be trusted. Within the total, of course, the share of non-farm consumers has risen throughout the entire period and that of farmers has declined.¹

Perhaps more significant than the stability in the total is the fact that the share of residential structures has shown a slight decline since the beginning of the century while the share of consumers' durables has shown a substantial increase. This movement, which occurred mainly during the first thirty years of the century, is primarily due to the introduction of the automobile. The share of other consumers' durables taken as a whole has not risen between 1900 and World War II. Increases in mechanical equipment, such as refrigerators, washing machines and radios, apparently have been offset by declines in furniture and house furnishings: During the nineteenth century the share of consumers' durables very likely increased somewhat, but the rise seems to have been neither spectacular nor consistent, and there are not enough reliable data to say much about the dating and the size of the movement.

6. Another clear and well-known trend appears in the movement of the share in net international assets, i.e. the excess of investments abroad over and above foreign investments in the United States.

Until World War I foreigners on balance had a claim to part of the wealth of the United States. Their share, however, declined rapidly from one-seventh of R.T.W. in 1805² to 7 percent in

¹ These statements are based in part on a very rough division of total farm structures, as shown in Table I, into farm residences and farm service buildings. For the period as a whole each of these two categories appears to have accounted for about one-half of the total, but the proportion of farm residences seems to have increased slightly – possibly from about 40 percent in the beginning of the period (King's estimates, *op. cit.*, p. 256) to 60 percent at its end (Census of 1930, the only one in which the two types of structures are separated) – and that of farm service buildings to have declined correspondingly.

² These ratios are somewhat too high, particularly in the early part of the period, because a part, though a declining one, of foreign investments in the United States consisted of land which is not included in the denominator (R.T.W.).

1850 and to only 2 percent in 1912. The upheaval of World War I reversed the balance even if all loans made by the United States government to its allies are disregarded. By 1922 net international assets added approximately 3.5 percent to R.T.W. of the United States. Thus there was a shift in the net balance of international assets of nearly 20 percent of total R.T.W. within a little more than one century.

If the United States had been limited to domestic saving, the growth of national wealth would certainly have been slower until near the end of the nineteenth century. To what extent unavailability of foreign capital would have retarded that growth it is impossible to say. It is reasonable to assume, however, that the effects would have been larger than might be inferred from the fact that on balance less than 5 percent of the total increase in durable tangible wealth of the United States during the nineteenth century was provided by capital imports from abroad (whether taken on a gross or net basis) because these imports were concentrated in crucial areas of growth, and particularly because without them the development of the American railroad system, probably the main economic achievement of the second half of the nineteenth century, would have been slowed down considerably.¹

Net foreign assets reached their highest level, both absolutely and relatively, in 1929 when they accounted for approximately 4 percent of total national wealth. Declines in American investments abroad and increases in foreign claims, chiefly of a short-term nature, reduced the balance to almost the vanishing point in the 'thirties. Capital exports after World War II have not been insignificant, but they have been unable to restore net foreign investments, in 1929 prices, to their peak level reached twenty years ago and in proportion to total reproducible wealth have left them still at a substantial distance from the peak of 1929. International capital movements thus seem to have been but a very minor factor in the economic growth of the United

¹ In evaluating the contribution of the rest of the world to the economic growth of the United States account must, of course, be taken not only of capital imports but also of immigration and of the effects of international trade, even to the extent that imports are balanced by exports. Indeed, it is likely that the international exchange of goods and the supply of a large number of immigrants, a good part of the cost of raising whom until productive age being borne by their native countries, made a greater contribution to this country's economic development in the nineteenth century than was made by foreign investments in the United States.

States during the last twenty years. This does not mean that they have not been, at certain times and for certain countries, of prime importance for economic growth abroad.

V. SOME INTERPRETATIONS¹

1. *Contribution of R.T.W. estimates to analysis of economic growth*

What specific contribution to the analysis of economic growth can the estimates of R.T.W. make? In particular, what can they tell us that we cannot learn equally well from estimates of gross or net national product²

(a) It is a basic advantage of R.T.W. figures that they reflect not only what happens currently, but also what happened in the past that is still economically relevant.³ While national income statistics distinguish at best between non-durable, semi-durable and durable goods, they say nothing about the length of life of durables, the average of which may vary greatly either because of changes in the durable product mix or of changes in the useful life of the same types of durables. Yet it makes a good deal of difference in the character of economic growth whether gross investment over longer period takes the form chiefly of relatively short-lived assets (inventories and equipment), or long-lived ones (structures). Estimates of R.T.W. automatically take account of length of life of durables and changes therein. They thus provide, in themselves, when expressed in constant prices, a summary of economic growth.

(b) Economic growth is determined to a good extent by the production function of the economy as a whole and of its main sectors. These functions can be determined only by a combination of output data and of data on invested capital. The latter

¹ Apologies are in order for the rough nature of this section, its somewhat unsystematic presentation, and the obvious fact that not all problems calling for discussion are covered. Caught between the two disagreeable alternatives of including only a very rough and imperfect version of this section or omitting it altogether, I have chosen the first one. I have done so not only in order to complete the paper, at least formally; but also because some of the problems raised in this section are of a rather difficult nature, have been relatively neglected, and apply almost equally to countries other than the United States. It is hoped that the present preliminary version will at least provide a starting point for further discussion.

² This problem is very similar to the broader question of the contribution of national wealth estimates when national income figures are available, on which see Goldsmith in *Studies in Income and Wealth, Volume Twelve*, pp. 73-79.

³ That is, after all, essentially what remaining original cost adjusted for price changes measures.

are identical for the entire nation with R.T.W. used in production. Even for individual sectors they are largely dependent upon the estimates from which R.T.W. is built up.

(c) One of the most important aspects of economic growth is the distribution of economic benefits and of economic potential created by the process of growth among the members of the community. While the distribution of benefits can often be adequately studied from income data of different groups, economic potential or economic power is generally much more adequately described by the distribution of wealth, both tangible and intangible. However, even benefits may not be adequately reflected in national income statistics due to the difficulties of imputing the use-value of durable goods used directly by consumers. Here a more adequate picture is obtained from data on changes in the stock of durable goods held by consumers.

(d) If economic growth were a smooth process we would have much less need or use for R.T.W. figures provided good data were available on national income and product. But estimates of R.T.W. become very valuable and sometimes indispensable in the evaluation of interruptions in economic growth.

The most important examples of this function of R.T.W. figures are provided, on the one hand, by sudden changes in the foundations of economic growth caused by war, and on the other hand by the slow erosion through failure to 'keep capital intact'. If figures only on real national income were available, we probably would over-estimate the influence of wartime dislocations not accompanied by widespread physical destruction.¹ On the other hand, we might under-estimate the effect of destruction if offset by a deficiency of replacement compared to capital consumption. Similarly we would probably under-estimate the adverse effects of depressions or periods of long drawn-out economic decline, particularly to the extent that there is failure to make good current consumption of durable consumer goods on which no depreciation is figured in the national income accounts.

(e) A significant characteristic of economic growth – though one less clear-cut than is often imagined – is the relative importance of durables to be employed in further production or to be used directly by consumers. This relationship is best studied

¹ I have in mind here the experience of some occupied countries during and immediately after World War II.

by an examination of R.T.W. data on the stock of these two categories of durable assets and the changes in them.

(f) The position of government in the economy is for many purposes better reflected in the share of total R.T.W. and main components which it owns than in the proportion of national income which the government absorbs through taxes and borrowing.

(g) Estimates of R.T.W., particularly if expressed in constant prices, are much less affected by short-term fluctuations than are national income figures. Hence, there is much less danger in the use of benchmark estimates of R.T.W. in measuring economic growth during the interval than in basing similar calculations on national income for selected years.

(h) Use of R.T.W. has considerable advantages over national product or income in comparing economic growth between countries where difference in the scope of market and non-market activities are of importance. In such cases, particularly relevant in the comparison between industrial and pre-industrial communities, it is very difficult to adjust national income figures either by elimination in the country with the more developed market economy or by imputation in the less developed country. A comparison of estimates of R.T.W., on the other hand, is not affected by these difficulties. For this comparison it does not matter whether the baking oven or the laundry equipment is owned and operated by the family, the village community or by a separate business enterprise. These tangible goods enter R.T.W. at the same amount, provided we follow the principle of calculating R.T.W. by means of the cumulation and the depreciation of expenditures on durable assets, irrespective of forms of ownership and methods of operation. Such estimates of R.T.W., in other words, are much more invariant to differences and changes in social organization than the usual national income figures.

(i) Finally, it sometimes is possible to measure economic growth by comparing R.T.W. at benchmark dates for periods where no estimates of national income exist or where those that do exist are unreliable.

An interesting example of this situation is provided by the U.S. before 1869. The only estimate of national income now available¹ indicates the virtual absence of any increase in real

¹ R. F. Martin, *National Income in the U.S., 1799-1938*, New York 1939, p. 14. See critical discussion of these estimates by Professor Kuznets on pp. 221-239 of this volume.

income per head between 1799 and 1849. The fact that, according to Table 2, R.T.W. per head in constant prices increased by 175 percent between 1805 and 1850 strongly suggests that something is seriously wrong with this estimate of national income. The difference between the two rates of growth – 0.2 percent for real national income and 2.2 percent for real R.T.W. per head – cannot be attributed to more than a small extent to possible errors in the estimates of R.T.W., and it is difficult to visualize how R.T.W. per head could have all but trebled while real income remained virtually stable for half a century.¹

2. *The labour equivalent of R.T.W.*

To this point we have limited the discussion to the current values of R.T.W. or to their equivalent in 1929 prices obtained by reduction by means of indices of the price level. There is, however, another important aspect of the estimates, viz. their equivalent in hours of labor. R.T.W. existing at any one time may be regarded as the stock of labor which has gone into its production allowing, of course, for that proportion of the original labor input which has been offset by depreciation. From this point of view the contribution of reproducible structures and equipment to R.T.W. is regarded as an indirect contribution of labor; and labor is also credited with non-reproducible resources embodied in the stock of R.T.W. Such an approach is familiar not only from Marxist economics (values as ‘congealed labor’); but is also quite in line with classical as well as modern theory, exemplified by the work of Pigou, Keynes and their followers, wherever the analysis is cast in real rather than in monetary terms.

In a closed economy R.T.W. per head in constant prices at any one point of time depends on the following seven factors:²

- (a) The proportion of total population which is in the labor force.

¹ Martin's figures were still used quite recently by Clark, even though with obvious misgivings, in his evaluation of the long-term trend in productivity in the U.S. (*Review of Economic Progress*, March 1951, p. 4), an example of the almost irresistible urge to utilize whatever figures are available on a significant economic quantity. The opinion may be ventured that the rate of increase in real national income per head during the first half of the nineteenth century will be found, if and when reasonably reliable figures are developed, to be closer to the level of 2.2 percent indicated by the comparison of R.T.W. at the beginning and the end of the period than to the 0.2 percent of Martin's estimates.

² The selection and description of the factors has been made with an eye on statistical verification.

- (b) The average number of hours of work.
- (c) The ratio of average hours in the economy at large and in the industries which produce durable assets.
- (d) The proportion of the work day of the average member of the labor force devoted to the production of durable assets, i.e. the gross capital formation ratio in terms of labor input.
- (e) The average output per hour of labor in terms of the basic price level underlying the calculations.
- (f) The ratio of productivity in the economy at large and in the industries producing durable assets.
- (g) The average life of durables.

Under static conditions R.T.W. will be equal to total output (gross national product) multiplied by one half the average life of total output; or, what comes to the same thing, to the output of durable assets multiplied by one-half their average life. When some or all the factors which determine R.T.W. per head change over time the relationships become more complicated. In that situation a rough estimate of the movement of each of the factors is necessary to derive the changes in R.T.W. per head in constant prices and to understand the relationship between the factors which influence it.

For the one hundred and fifty years covered in this paper the movements of the factors are accurately known in not a single case. For a few of the factors fairly reliable information, however, is available for part of the period, and for most of the other factors rough estimates can be made, at least as to the direction and order of magnitude of the movement. We know, for instance, that the proportion of the population in the labor force has increased, but only very slowly; that hours of labor have fallen considerably, the rate of decline over the period as a whole amounting to about 0.3 percent per year, concentrated mostly during the last one hundred years; and that output per man-hour has increased considerably, and probably over the entire period, the average rate of growth being in the neighbourhood of 1.5 to 2 percent.¹ We may also assume that hours of work in the industries which produce durable assets have

¹ See Clark, *Review of Economic Progress*, March 1951; Kendrick, 'National Productivity and its Long-term Projection' (to be published in *Studies in Income and Wealth, Volume Fifteen*).

declined approximately in the same proportion as in the rest of the non-agricultural economy. Practically nothing is known about differences in the trend of productivity in the industries which produce durable goods and the trend in the economy as a whole, but there are enough factors working in both directions to justify the preliminary assumption that the ratio has not been far from unity, though any deviation probably has been in the direction of slower increase in the durable goods. The most important single component of investment, construction, apparently lagged considerably compared with the increase in productivity in the economy as a whole. On the other hand, other components, such as industrial machinery and automotive vehicles, are the product of industries in which the rise in productivity seems to have been well above the average. It also appears from the data on the ratio of capital formation to national product that the proportion of hours of work devoted to the production of durable goods has not changed much in the long run, although it may have increased slightly during the earlier part of the period – i.e. from the first to the second half of the nineteenth century – and declined during the later part.¹ This leaves the average life of durables, about which there is hardly any information. A study of the distribution of capital formation does not point to conspicuous changes. If a change had taken place one would assume that it was downward because producers' equipment and consumers' durables, which have gained in importance over the period, have a shorter average life than residential buildings or business structures.

These considerations are highly speculative. They lead, how-

¹ Estimates are available only beginning with 1869 (Kuznets, *National Product since 1869*, Part II).

In evaluating long-term changes in the ratio it should be kept in mind that the available estimates of capital formation omit a substantial part of capital formation in agriculture, viz. the excess of a large part of expenditures on soil clearing and soil improvement over soil deterioration. Since the share of agriculture in the economy of the U.S. has been declining, the omission is more important for the nineteenth than the twentieth century. Allowance for these forms of capital formation would then accentuate the decline in the ratio of capital formation to national product from the second half of the nineteenth to the first half of the twentieth century, but it would partly offset the probable increase between the first and the second half of the nineteenth century provided the ratio of omitted compared to recorded capital expenditures had remained stable. Actually the ratio may be assumed to have declined over the nineteenth century, which would accentuate the movements just described. Appropriate adjustments would then raise the national capital formation ratios, but might well make it look more level through the nineteenth century than it now appears. This probably would emphasize the decline during the twentieth century if otherwise the estimates now in use – which I believe to be generally on the low side – are accepted.

ever, to one conclusion which is of significance if any confidence can be placed in what has been set forth regarding direction and order of magnitude of the factors which determine the labor equivalent of R.T.W. per head. This is the conclusion that quantitatively the increase in output per hour of labor, i.e. the growth of productivity in the economy at large, has been the main determinant of the rate of growth of R.T.W. per head in constant prices; and that if it were not for this factor R.T.W. per head in constant prices would have declined over the last one hundred and fifty years.¹

Fortunately, we are not entirely dependent on such indirect argumentation if we want to study the trend of the labor equivalent of R.T.W. per head. Yet we are not so favored as to have a reasonably reliable direct statistical measure of the amount of labor embodied at various points of time in the stock of R.T.W. Having derived estimates of the current value of R.T.W. per head at approximately a dozen benchmark dates between 1805 and 1950 we may, of course, divide those figures by the average hourly rate of wages prevailing at these dates. Because of limitations of data this calculation must, however, be restricted to the non-agricultural sector of the economy. Results even then are not the same as accurate measures of the hours of labor embodied in non-agricultural R.T.W. The first and simpler reason is that the statistical material on wage rates is very inadequate for the entire nineteenth century with the result that the rough estimates that must be used are affected by a substantial margin of error which increases the similar margin in the estimates of the current value of R.T.W. Secondly, division of the current value of R.T.W. per head at one point of time by the hourly rate of wages prevailing at the same point cannot give the same result as the cumulation and depreciation of the labor equivalent of the output of durable goods on an annual basis, if the ratio between hourly wages and prices of durable goods changes.

If we remember these difficulties Table 4 may be regarded as broadly confirming our deductions, though it may modify them in a few instances. The labor equivalent of R.T.W. per

¹ The second part of the conclusion may be regarded as an impermissible isolation of one of several interrelated factors. Unless productivity had increased so strikingly hours of labor would have declined less, if at all, and the proportion of the population in the labor force might have increased more; on the other hand, the capital formation ratio might have declined more. Hence nothing can or should be said about the rate of growth of real R.T.W. per head if the trend of productivity had been considerably different from what it actually has been.

head outside of agriculture, measured in hours of labor, shows as expected a small decline over the period as a whole. There is, however, a substantial bulge from 1880 to 1929 which at its peak apparently carried R.T.W. per head in hours of labor to approximately 40 percent above the level of the first half of the nineteenth century. This movement probably reflects primarily an increase in the capital formation ratio. It is, of course, possible that the rise is partly the result of an increase in the average life of durables or a more rapid increase of productivity in the industries which produce durable goods than in the economy as a whole. Because we have no quantitative reliable information on these points we must, for the moment, rest content to observe their joint result. Beginning with 1900, and possibly even beginning with 1880, the labor equivalent of R.T.W. per head has been declining. Allocation of the decline to the various factors which may have caused it is not possible for this period either. It would appear, however, that the two main factors responsible for the decline were a moderate reduction in the rate of capital formation¹ and a decrease in the average life of durables which reflects the increasing importance of consumers' durables and of machinery and equipment relative to construction.

While most of the factors affecting the movement of R.T.W. per head cannot at the present be disentangled, it is possible to show separately the effect of one important determinant – not reflected in the figure of R.T.W. per head in terms of hours of labor – namely, the length of the work week or the work year. It then appears from column 5 of Table 4, that R.T.W. per head in terms of labor shows an increasing trend over the period, rising from somewhat less than 1.5 years in the first half of the nineteenth century to 2.25 years from 1880 to 1929, but falling to 1.75 years in 1948 if military assets are excluded, and to about 2 years if military assets are included. The differences between the movements in R.T.W. per head in terms of years of labor

¹ It is well to keep in mind that the ratio of capital formation relevant in this connection is the weighted average over the useful life of the different types of durable assets. When comparing the rate of capital formation relevant to national wealth in 1948 and 1929, for instance, one must take into account in the case of machinery the capital formation ratios prevailing in the years 1937 through 1948 and 1918 through 1929 respectively, and for residential construction those in the periods of 1899 through 1948 and 1880 through 1929 respectively, if a useful life of 12 and 50 years is assumed for these two types of durable assets. This explains why the average capital formation ratio relevant to R.T.W. of 1948 is substantially lower than that applicable for 1929, 1900 and 1880.

TABLE 4

*The Labor Equivalent of R.T.W. per Head
(excluding Agriculture)*

Year	R.T.W. per Head (current prices)	Average Hourly Wage		R.T.W. per Head	
		A	B	Hours of Labor	Years of Labor
	\$	\$	\$		
	(1)	(2)	(3)	(4)	(5)
1805	250	0.07	0.05	5,000	1.34
1850	380	0.11	0.08	4,750	1.32
1880	905	0.19	0.13	6,960	2.16
1900	1,085	0.23	0.16	6,780	2.29
1929	3,090	0.73	0.52	5,940	2.24
1948 excl. military assets	5,060	1.73	1.23	4,110	1.76
incl. military assets	5,640	1.73	1.23	4,590	1.96

Col. 1. 1805-1948: Obtained by dividing estimates of non-agricultural R.T.W., including consumers' durables but disregarding net foreign balance (col. 17 of Table 1), by number of non-farm population. Farm population estimates from 1850 are from *Progress of Farm Mechanization* (U.S.D.A. Miscellaneous Publication No. 630, October 1947,) p. 5, using 1945 figure for 1948; that for 1805 is a rough estimate.

Col. 2. 1805: Derived from Blodget's estimate of the average daily wage in five cities of 82 cents (*Economica*, pp. 142-43), on assumption of a work day of approximately 12 hours.

1850, 1880, 1900, and 1929: Obtained by multiplying the value for 1900 by non-agricultural wage index of B.L.S. (*Monthly Labor Review*, September 1933, p. 632).

1900: Douglas' estimate of average hourly earnings in all industries (*Historical Statistics of the United States*, Washington, 1949, p. 67).

1948: Obtained by multiplying 1929 value by index calculated by methods and from sources used by Clark (*Econometrica*, Vol. 17, 1949, p. 119).

Col. 3. 1805-1900: Obtained by multiplying 1929 value by index derived from col. 2.

1929: Clark, *loc. cit.*

1948: Derived from same methods and from same sources as used by Clark.

Col. 4. 1805-1948: Col. 1 divided by col. 3.

Col. 5. 1805-1948: Values of col. 4 divided by rough estimates of standard number of hours per year, excluding agriculture. These were based on the assumption of a work week of 72 hours in 1805; 69 hours in 1850; 62 hours in 1880; 57 hours in 1900; 51 hours in 1929 and 45 hours in 1948, all except the values for 1805 (rough estimate) and 1948 (miscellaneous sources) taken or approximated from Dewhurst, J. F., and Associates, *America's Needs and Resources* (New York, 1947), p. 695; and 52 work weeks per year.

and in terms of hours of labor, of course, are nothing but a reflection of the declining trend of hours per week, the much smaller and much more recent tendency for the work year to decline in terms of work weeks, due to the spread of paid and unpaid vacations, having been ignored.

Another, and possibly a simpler way of testing these deductions is to compare the rate of growth of R.T.W. per head in 1929 prices with calculations of the growth of 'productivity', i.e. output per man-hour in stable prices.¹ Table 2 indicates an average rate of growth of R.T.W. per head of approximately 2 percent for the entire period from 1805 to 1950 and one of approximately 1.5 percent for the seventy years prior to 1950. Estimates of productivity can be compiled with some degree of confidence only for the period after 1869 since there are no sufficiently reliable figures of national income before that date.

For the period 1880 to 1950 the average rate of growth of output per man-hour in stable prices amounted to 1.8 percent per year.² The rise in productivity seems to have been particularly rapid in the decade before 1880, and may also have been fairly high from about 1850 to the Civil War. Since productivity probably rose at a less rapid rate in the fifty years prior to 1850 it is unlikely that the average rate of increase of output per man-hour for the entire period of one hundred and fifty years will deviate much from 1.75 percent or will exceed 2 percent. The rate of increase of output per head of the population is only slightly – about 0.25 per cent – lower than that of output per man-hour because the effects of the decrease in the length of the work week and of the increase in the participation in the labor force partly offset each other. Thus, the rate of growth of R.T.W. per head in 1929 prices of 2 percent seems to have been 0.25 to 0.5 percent higher than the rate of growth of output per head of the population for the period 1805 to 1950 taken as a whole. During the second half of the period for which the figures are more reliable, productivity (output per man-hour) appears to have increased slightly more rapidly than civilian

¹ This comparison covers the entire economy, not only the non-agricultural sector like the preceding comparison.

² This figure is obtained both by using Clark's calculations (*Review of Economic Progress*, March 1951, p. 3); or by starting from Kuznets' revised annual figures (*Annual Estimates of National Product, 1869-1949*, unpublished National Bureau of Economic Research memorandum). Kendrick's estimate is somewhat higher, yielding a rate of 2.1 percent for the period 1900-50, the average for which is probably slightly below that for 1880-1950.

R.T.W. per head, the difference being of the order of less than 0.25 percent per year. We know that the length of the work week declined at a rate of about 0.5 percent per year since about 1850, but that the participation in the labor force increased at the rate of approximately 0.25 percent. Hence the rate of growth of real R.T.W. per head apparently again exceeded that of output per head by between 0.25 to 0.5 percent a year. It is as yet impossible to say with any degree of confidence to what extent changes in the rate of capital formation, in the relative productivity in the industries which produce durable goods, in the average life of durables, and in the relative prices of durable and non-durable goods have contributed to this result. Such an analysis may confirm the expected decline in R.T.W. per head in terms of labor, or it may lead to a different evaluation of the trend in some of the factors which determine the labor equivalent of R.T.W.

3. *National capital coefficients*

The quantitative relation between national wealth and national income, cast in one form or another, has after long neglect recently become a subject of extended discussion.¹ In that situation and in the absence of useable estimates of national income of the United States prior to 1869, we may limit this section to a few comments on the ratio of real R.T.W. to net national product for the last half-century on an annual basis, a comparison not previously possible because of lack of annual estimates of R.T.W.

Table 5 shows four national capital coefficients.² The one set

¹ For a theoretical treatment, see Harrod, *Towards a Dynamic Economics* (London, Macmillan, 1948), Section III; Domar, 'Capital Expansion, Rate of Growth, and Employment' (*Econometrica*, Vol. 14, 1946, pp. 137-47); and 'The Problem of Capital Accumulation' (*American Economic Review*, Vol. XXXVIII, 1948, pp. 777-94). The problem is treated both theoretically and in terms of statistical data available for the United States in considerable detail in Fellner's paper 'Long-term Projections of Private Capital Formation: The Rate of Growth and Capital Coefficients' (to be published in *Studies in Income and Wealth, Volume Fifteen*).

² The R.T.W. estimates used here have been developed in connection with the author's Saving Study. A brief description of the methods used and preliminary figures, generally for four-year intervals from 1896 to 1948, will be found in *Studies in Income and Wealth, Volume Fourteen* (1951). Revised figures, together with a more detailed description of the methods used are intended for inclusion in Vol. III of the Saving Study. The estimates of net national product are based from 1929 on, on the Department of Commerce's figures for gross national product in 1939 prices (*Survey of Current Business*, January 1951), and for the earlier part of the period on an unpublished series by Kuznets.

is based on a comparison of total civilian R.T.W. with real net national product, while the other is limited to structures and producers' equipment and, therefore, excludes consumers' durable goods, inventories, monetary gold and silver, and net foreign balances. In both cases average as well as marginal coefficients are shown.

Probably the most interesting fact emerging from this table is the absence of any pronounced trend in the average national coefficient, either on the broader or the narrower concept, for the period 1897 to 1929.¹ What fluctuations are shown in the

TABLE 5
National Capital Coefficients: 1897 to 1950

Year	Average Coefficients		Marginal Coefficients	
	Total R.T.W.	Structures and Producers' Equipment	Total R.T.W.	Structures and Producers' Equipment
	(1)	(2)	(3)	(4)
1897 .	3.59	2.68		
1898 .	3.57	2.66	2.82	2.10
1899 .	3.44	2.54	1.70	0.96
1900 .	3.41	2.51	2.80	1.71
1901 .	3.20	2.37	1.11	0.94
1902 .	3.29	2.44	10.65	8.28
1903 .	3.27	2.42	2.88	2.04
1904 .	3.45	2.56	-5.73	-4.86
1905 .	3.34	2.49	1.81	1.42
1906 .	3.15	2.34	1.42	0.98
1907 .	3.19	2.37	4.16	3.16
1908 .	3.59	2.68	-1.38	-1.22
1909 .	3.16	2.38	0.58	0.55
1910 .	3.29	2.47	-43.31	-32.64
1911 .	3.47	2.61	-5.20	-3.90
1912 .	3.55	2.68	15.66	12.62
1913 .	3.55	2.68	3.38	2.63
1914 .	3.84	2.90	-2.52	-1.97
1915 .	3.60	2.70	1.21	0.68
1916 .	3.35	2.47	1.31	0.57
1917 .	3.13	2.28	1.19	0.60
1918 .	3.00	2.17	1.07	0.66
1919 .	3.10	2.24	-4.17	-2.20
1920 .	3.56	2.54	-0.85	-0.33
1921 .	3.91	2.76	-1.15	-0.43
1922 .	3.74	2.63	1.30	0.75
1923 .	3.37	2.35	0.99	0.60

¹ According to Fellner's calculations, based on Kuznets' decadal estimates, the overall capital coefficient showed a moderate upward trend from a little over 3 in the 'seventies to nearly 3.5 at the turn of the century.

TABLE 5 - continued

Year	Average Coefficients		Marginal Coefficients	
	Total R.T.W.	Structures and Producers' Equipment	Total R.T.W.	Structures and Producers' Equipment
	(1)	(2)	(3)	(4)
1924	3.46	2.42	9.64	6.75
1925	3.51	2.46	5.17	3.88
1926	3.45	2.42	2.59	1.80
1927	3.58	2.51	16.36	12.07
1928	3.68	2.59	15.37	12.06
1929	3.51	2.47	1.52	1.08
1930	3.99	2.81	-0.89	-0.64
1931	4.36	3.09	-0.16	-0.31
1932	5.07	3.63	0.51	0.15
1933	4.94	3.59	25.04	10.67
1934	4.30	3.15	-1.15	-0.63
1935	3.85	2.82	-0.53	-0.43
1936	3.37	2.45	0.07	-0.06
1937	3.27	2.35	1.18	0.36
1938	3.49	2.49	-0.76	-0.24
1939	3.21	2.29	0.25	0.09
1940	2.98	2.10	0.74	0.25
1941	2.43	1.68	0.42	0.14
1942	2.40	1.63	1.73	0.45
1943	2.12	1.43	-0.05	-0.08
1944	1.94	1.32	-0.43	-0.23
1945	1.96	1.34	1.15	0.46
1946	2.24	1.51	-0.50	-0.18
1947	2.43	1.59	-8.57	-3.11
1948	2.51	1.62	5.81	2.63
1949	2.67	1.71	-10.90	-6.22
1950	2.61		1.81	

ratio appear to reflect mainly the cyclical movements of real net national product. When comparison is limited to years of full employment, it is difficult to detect any movement in the ratio. For such years the broader ratio remains close to $3\frac{1}{2}$, and the narrower ratio to $2\frac{1}{2}$ times net national product.¹

¹ The actual level of the ratios is determined by the fact that in static conditions the overall ratio is equal to one-half the average life of total output. Now in an advanced economy, such as the U.S. for the last decades, about 60 percent of output has consisted of perishable commodities and services with an average life that for this purpose can be regarded as zero; about 15 percent of semi-durables with an average life of two years; and 10 to 15 percent each of consumers' durables and producers' equipment with a life of approximately ten years, and of construction with a life of about fifty years. The average life then is about seven years, which implies a ratio of about 3.5 (national capital coefficient) if the level of output is stable, and a slightly lower one - though hardly below 3 - if output is increasing regularly at a rate of about 3 to 4 percent a year. A considerable

During the Great Depression the ratio increases sharply because R.T.W. falls much less than net national product since, in the absence of violent destruction in war, real R.T.W. can at worst decline by the amount of total depreciation allowances. By the late 'thirties, however, both ratios have practically come back to the level prevailing during the thirty years preceding 1930, though this is partly due to the failure of net national product to reach its full employment level. Beginning with 1940 the increase in R.T.W. falls progressively below the growth in net national product with the result that the overall capital coefficient declines to a low of slightly less than 2 in 1944 and 1945. (If military assets are included in R.T.W. the ratio rises to approximately 2.3.) Even if correction is made for the apparent overstatement of real net national product during wartime in the Department of Commerce's estimates and Kuznets' figures¹ substituted the ratio cannot be raised to much above $2\frac{1}{2}$, which is still far below the prewar average. From 1946 on a sharp increase in the ratio is shown which by 1950 brings it to about 2.6 excluding military assets and to 2.8 including them.² These ratios are still considerably below any for the period 1897 to 1940. A discussion of the reasons for the difference and a judgment whether or not the difference is likely to be permanent would call for up-to-date figures on R.T.W. in the major industrial sectors which are not available, and for a much more detailed analysis than has yet been applied to the problem.³

change is required in the long-term distribution of output by durability to produce an average life of output outside a range of six and eight years and a R.T.W. : Net National Product ratio falling for protracted periods of time outside the range of 3 and 4.

The more familiar ratio of total national wealth to national income is, of course, higher – usually between 4 and 6 – because it includes land and other non-reproducible resources in the numerator. Moreover, since land tends to represent a higher proportion of total national wealth the less developed the economy, the total wealth-income ratio may be as high, or even higher, for a country with low as for one with high R.T.W. per head. In the form it is generally derived the overall ratio may also diverge from the national capital coefficient as it is calculated here because of differences between price-adjusted depreciated cumulated capital expenditures and the estimated market value of R.T.W. obtained by a rough process of capitalization of yields.

¹ *Long-Term Changes in the National Product in the United States of America since 1870*. See above, p. 40 of this volume.

² This movement again would disappear if Kuznets' estimates of net national product during wartime had been used rather than those of the Department of Commerce. The postwar level of the ratios, of course, would not be affected.

³ For an extended discussion making use of Kuznets' data on R.T.W. in the different industrial sectors from 1869 to 1938, see Fellner's paper, particularly Sections V to VIII.

Foregoing such causal analysis it may possibly be said that the national capital coefficient is likely to increase for several more years, particularly if military assets are included in R.T.W., and then would not be far from the level observed between 1897 and 1929. For civilian R.T.W. alone, and particularly for structures and equipment, however, the difference will still remain substantial and call for explanation.

No mention has been made so far of the marginal capital coefficients. They turn out to be exceptionally erratic, which may be due partly to defects in the underlying statistics, but also appears to reflect lack of pronounced correlation between year-to-year changes in R.T.W. and in net national product. This certainly casts some doubt if not on the theoretical validity, then at least on the practical applicability of much of the so-called accelerator analysis to short-run problems.

4. The long-term trend of real R.T.W. per head

We may close this preliminary interpretation of the figures which are now available on the trend of R.T.W. in the U.S. since the beginning of the nineteenth century by considering briefly whether the data point to the existence of a long-term trend in R.T.W., and especially whether such a trend can be extrapolated into the future.

Two ways to answer the question will be tried. The first is to derive the answer exclusively from an analysis of the benchmark figures of R.T.W., and in particular of R.T.W. per head. These figures appear to warrant four conclusions:

(a) During the past century and a half, real R.T.W. per head has increased fairly regularly at the rate of a little more than 2 percent when the effects of major disturbances such as World War I and II or the Great Depression are excluded.

(b) There is some evidence of a deceleration in the rate of growth of real R.T.W. per head beginning with the fourth quarter of the nineteenth century. On this basis we probably could expect in the next generation a rate of increase of 1.5 to 2 percent per year, possibly nearer to the lower limit.

(c) The great risk of extrapolating apparent trends derived from periods as short as ten to twenty years is demonstrated by developments since the end of World War II. Continuation of the trend in the rate of growth of civilian R.T.W. per head since

1929 would have led one to expect quite low values. Actually, real civilian R.T.W. per head has increased at a rate of more than 4 percent per year during the six years 1946 to 1951. Even if the rate should decline substantially during the next four years, the decadal rate of growth for the period 1946 to 1955 – barring another major war – will be one of the highest, if not the highest, on record. By the end of the decade the ratio of R.T.W. to net national full employment product, which has been fairly stable during the half-century preceding World War II at or at slightly above 3, will have reached that level again. This, then, will be the time for the test whether the high rates of the last few years are a purely temporary phenomenon reflecting the need for making good the deficiencies which had accumulated between 1930 and 1945, or whether the long-term rate of growth has returned to the average level of the preceding one hundred and fifty years; or whether possibly it has risen above that level.

(d) The rate of growth of 2 percent per year could not be extrapolated backward far beyond 1805. It means that real R.T.W. per head is halved every thirty-five years and this implies that in 1700 R.T.W. per head was the equivalent of only \$20 in 1929 prices. Such a low value is difficult to accept, but I shall leave the judgment in this matter to economic historians more familiar with the early colonial economy.¹

¹ It is not within the scope of this paper to compare the rate of growth of real R.T.W. per head in the United States with that which prevailed in other countries. It is obvious, however, that the present values of real R.T.W. per head in either Europe, the Near East or the Far East, rule out the possibility that the rate of growth could have averaged as much as 2 percent, or for that matter 1 or 0.5 or 0.25 percent per year, during a substantial period of the history of these countries. Such a rate of growth extrapolated backwards would soon lead to values of real R.T.W. per head so low as to be patently incompatible with what we know about the physical equipment of these economies in past centuries. To make this statement, indeed, is nothing but to belabor the obvious fact that once we take the long view, extending the scope of our investigations over millenia rather than centuries, the average rate of growth must necessarily have been extraordinarily small compared to the rates with which we have become familiar since the industrial revolution; or, to put it more realistically, that periods of growth have alternated with periods of decline, and that even during the former the average rates of growth have been small by modern standards.

The only country paper submitted at the 1951 Conference that gives real R.T.W. or national wealth data over a long period of time was Coppola d'Anna's report on Italy. In that country private wealth per inhabitant in stable (1901-05) prices increased at an average rate of 1 percent from 1860 to 1915, and at one of less than 0.9 percent from 1860 to 1938. At such rates real wealth per head grows by about 150 percent every century. Beginning with Coppola d'Anna's figure of total private wealth per head of 1,308 lire in 1860, and assuming that R.T.W. represented a little less than one-half of total private wealth (the ratio in 1901 was 56 percent if we average the two sets of figures shown in Coppola d'Anna's Annex C) we obtain a figure of R.T.W. per head in 1860 of about

Auto-interpretation of statistical time series is never too fruitful an approach. We may, therefore, for a second answer turn to the forces behind the average rate of growth of real R.T.W. per head to decide whether a continuation of the trend evidenced during the last century and a half is likely. It has been shown in sub-section 2 that in the past the main factor in the rise of real R.T.W. per head has been the increase in real output per man-hour and that the changes in the other factors which influence real R.T.W. per head have approximately offset each other. May we expect this situation to continue?

The first of the factors which influence real R.T.W. per head, other than real output per man-hour, is the length of the work week and the work year. Continuation of the annual decline of about 0.5 percent per year would bring the work week from its present level of 45 hours down to 39 hours in one and to 33 hours in two generations. Both values are not so low as to rule out the continuation of the previous trend, especially if part of the reduction takes the form not of a decline of hours per week but of a decrease of the number of weeks worked during the year as the practice of paid vacations spreads. On the other hand, a less rapid decline is rather more probable.

A substantial change in the average life of durables does not appear likely unless far-reaching technological changes occur which cannot be foreseen now. If there is a moderate change it

600 lire in 1901-05 prices - something in the order of \$200 in 1929 prices compared with \$440 for U.S.A. in 1850. Extrapolation backward at a rate of 1 percent yields a figure of 20 lire for the zenith of the Renaissance, when Italy was one of the wealthiest countries in Europe; and of less than one centesimo for Italy at the time of the height of the prosperity of the Roman Empire - though not of the peninsula - (second century A.D.), obviously absurd results which only demonstrate the inapplicability of a rate of 1 percent per year over such periods. (Even at a rate of 0.5 percent the extrapolated value would have been as low as approximately 100 lire for 1500 and 10 centesimi for 100 A.D.)

Data on Saxony are given in Jostock's paper on Germany, but only in current values. Applying to them the index used by Jostock for the national income of Germany the rate of growth of real R.T.W. of Saxony is approximately 1 percent per year for the period from 1880 to 1911.

For other countries recourse has been had to Clark's calculations (*Conditions of Economic Progress*, 2nd edition (London, Macmillan, 1951), pp. 486-89) which are based on census-type estimates of reproducible wealth, not always entirely comparable from benchmark to benchmark. With two exceptions, both highly suspect - Japan from 1913 to 1930 and Hungary from 1890 to 1928 - they show no long-term annual rate of growth of real R.T.W. per head of as much as 2 percent. For periods not affected by major wars they seem to lie mostly within the range of 1 to 1.5 percent. This finding is of some interest for two reasons. First, the rates while distinctly lower than those found for the U.S. are of a comparable order of magnitude; secondly, they are sufficiently high for extrapolation backwards, i.e. beyond the middle of the nineteenth century, to lead to results as absurd as those just exemplified for Italy.

will probably be in the direction of a further decline reflecting an increase in the importance of consumers' durable goods and a shorter life of machinery and equipment due to more rapid obsolescence.

Too little is known about the relationships between the productivity in the industries which produce durable goods and in the rest of the economy to venture an appraisal. The apparent wide scope for relative improvement in the efficiency of building, as well as the apparent trend towards an increasing share in national output of services which are not susceptible to much of an increase in productivity, would lead one to expect that any change from this side will tend to increase the relative productivity in the industries which produce durable goods.

These three factors, then, will tend to reduce real R.T.W. per head if it is calculated by reducing current expenditures by means of an index of the general price level such as a gross national product deflator. This leaves the capital formation ratio as the crucial factor, and the only one which may tend toward an increase in real R.T.W. per head. During the last century the ratio of investment, including consumers' durable goods, to gross national product appears to have kept within the range of 25 and 30 percent except during wars, although it has been characterized by wide short-term fluctuations. Whether this ratio will increase sufficiently to offset the tendencies towards a reduction of the rate of growth of real R.T.W. per head emanating from the other factors is doubtful. It certainly seems unlikely that the increase can be large enough to boost the rate of growth above its nineteenth-century level. The outcome apparently will depend mainly on the relative strength of two forces. If the rate of saving of individuals is determined mainly not by the level of real national income, but by each individual's position on the Lorenz curve of incomes, as recent investigations have made probable,¹ and if the tendency for incomes to become more equally distributed may be assumed to continue, then we may expect a decline in the pressure on the rate of saving and capital formation from this side. This tendency, however, may be offset partly, fully, or more than completely, by an increase in the share of business and government saving in total national saving. To evaluate the likelihood of such a

¹ See Brady and Friedmann, 'Savings and the Income Distribution' (*Studies in Income and Wealth, Volume Ten, 1947*); also J. S. Duesenberry, *Income, Saving and the Theory of Consumer Behavior*, Cambridge, Mass. 1949, Chapter III.

development would lead us well beyond the confines of this paper.

Even full realization of the speculative nature of what we can say about probable or possible trends in the factors that determine the rate of growth of real R.T.W. per head, would appear to permit the conclusion that the rate of growth will continue to depend primarily on the increase in the overall productivity of the American economy. We might even venture the further conclusion that the rate of growth in real R.T.W. per head will be somewhat smaller than that in real output per man-hour. That probably is as far as we can or need to go here. If we may assume that the rate of increase of output per man-hour of 1.5 and 2 percent which the American economy has experienced over the last century¹ will continue during the next one or two generations, then we may also be fairly confident that real R.T.W. per head will increase at approximately the same rate.

¹ The high level of this rate, it should be remembered, was partly due to the declining share of agriculture in the economy. The gain in overall productivity from this shift can hardly be of substantial importance in the future.

APPENDIX TABLES

Table

- I. Composition of Reproducible Tangible Durable Wealth of U.S., 1805-1948
- II. Components of Tangible Wealth under Variant Definitions
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- VI. King's Estimates of Reproducible Tangible Wealth (excluding Inventories), 1850-1910
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- IX. Cyclical Position of National Wealth Benchmark Years
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TABLE I
Composition of Reproducible Tangible Durable Wealth of U.S., 1805-1948

Year	Total		Non-farm Consumers		Agriculture					Non-agricultural Business			Government (including non-profit institutions but excluding military)			International	
	Consumers' Durables		Residences	Consumers' Durables	Structures	Equipment	Inventories		Consumers' Durables	Structures	Equipment	Inventories	Structures	Equipment	Inventories	Gold and Silver	Other
	Incl.	Excl.					Live-stock	Crops									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
A. ABSOLUTE FIGURES IN CURRENT PRICES (\$ BILLION)																	
1805	0.58	0.54	0.10	0.02	0.21	0.03	0.06	0.03	0.02	0.08		0.07	0.02			0.02	-0.08
1850	4.15	3.85	0.80	0.20	0.65	0.15	0.54	0.15	0.10	1.14		0.45	0.12			0.15	-0.30
1880	24.7	22.4	4.9	1.9	2.0	0.4	2.0	0.5	0.5	5.8	2.4	4.6	0.6	0.2		0.6	-1.1
1890	43.3	38.9	10.8	3.8	2.7	0.5	2.6	0.7	0.7	10.3	4.9	7.0	1.2	0.4		1.2	-2.8
1900 A	61.0	55.0	15.0	5.2	3.6	0.8	3.3	0.8	0.8	14.3	7.8	8.5	2.1	0.7		1.7	-2.8
1900 B	56.9	50.9	15.9	5.2	3.3	1.2	3.1	1.4	0.8	12.9	5.3	5.4	3.1	0.1		1.6	-2.3
1912	107.2	93.6	25.7	11.7	5.6	2.2	5.6	2.6	1.9	23.5	11.3	8.4	7.9	0.2		2.5	-2.1
1922	242.1	211.1	57.3	27.2	12.4	3.3	5.4	3.1	3.7	45.9	27.4	24.0	19.6	0.2	0.1	4.4	8.2
1929	327.3	285.1	91.2	38.4	12.2	3.9	6.5	3.0	3.8	59.1	33.9	28.4	28.9	0.6	0.1	4.8	12.4
1939	308.6	276.1	87.9	30.0	9.0	3.5	5.1	2.2	2.6	54.1	29.9	22.1	39.1	0.8	1.0	19.6	1.7
1948	709.1	618.2	190.7	83.0	25.6	12.9	14.7	7.5	8.0	97.8	75.9	63.0	79.1	4.8	2.1	27.4	16.6
B. SHARE IN TOTAL REPRODUCIBLE WEALTH IN CURRENT PRICES																	
1805	100.0	93.1	17.3	3.5	36.2	5.2	10.3	5.2	3.4	13.8		12.1	3.4			3.4	-13.8
1850	100.0	92.8	19.3	4.8	15.7	3.6	13.0	3.6	2.4	27.5		10.8	2.9			3.6	-7.2
1880	100.0	90.3	19.7	7.7	8.1	1.6	8.1		2.0	23.4	9.7	18.5	2.4	0.8		2.4	-4.4
1890	100.0	89.6	24.9	8.8	6.2	1.2	6.0		1.6	23.8	11.3	16.2	2.8	0.9		2.8	-6.5
1900 A	100.0	90.2	24.6	8.5	5.9	1.3	5.4		1.3	23.4	12.8	13.9	3.5	1.2		2.8	-4.6
1900 B	100.0	89.5	27.9	9.1	5.8	2.1	5.4	2.5	1.4	22.6	9.3	9.5	5.4	0.2		2.8	-4.0
1912	100.0	87.3	24.0	10.9	5.2	2.1	5.2	2.4	1.8	22.0	10.6	7.9	7.4	0.1		2.3	-2.0
1922	100.0	87.3	23.7	11.2	5.1	1.4	2.2	1.3	1.5	19.0	11.3	9.9	8.1	0.1	0.0	1.8	3.4
1929	100.0	87.2	27.9	11.7	3.7	1.2	2.0	0.9	1.1	18.1	10.4	8.7	8.8	0.2	0.0	1.5	3.8
1939	100.0	89.4	28.5	9.7	2.9	1.1	1.6	0.7	0.9	17.5	9.7	7.2	12.7	0.3	0.3	6.3	0.6
1948	100.0	87.2	26.9	11.7	3.6	1.8	2.1	1.1	1.1	13.8	10.7	8.9	11.1	0.7	0.3	3.9	2.3

TABLE I (Continued)

Year	Total		Non-farm Consumers		Agriculture					Non-agricultural Business			Government (including non-profit institutions but excluding military)			International	
	Consumers' Durables		Residences	Consumers' Durables	Structures	Equipment	Inventories		Consumers' Durables	Structures	Equipment	Inventories	Structures	Equipment	Inventories	Gold and Silver	Other
	Incl.	Excl.					Live-stock	Crops										(13)	(14)	(15)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
C. ABSOLUTE FIGURES IN 1929 PRICES (\$ BILLION)																	
1805	1.04	0.96	0.19	0.04	0.39	0.06	0.08	0.04	0.04	0.15		0.07	0.04			0.02	-0.08
1850	10.25	9.46	2.11	0.53	1.71	0.39	1.12	0.31	0.26	3.00		0.75	0.32			0.25	-0.50
1880	52.1	45.6	11.6	5.1	4.9	0.7	4.5	2.0	1.4	13.2	3.7	4.3	1.4	0.3		0.6	-1.6
1890	94.9	82.1	26.0	10.6	6.5	1.0	6.2	2.3	2.0	23.2	9.8	7.1	2.7	0.9		1.2	-4.8
1900 A	134.2	117.6	35.4	14.3	8.5	1.5	6.4	2.6	2.3	32.9	16.8	10.3	4.7	1.6		1.7	-4.8
1900 B	118.1	101.5	33.3	14.3	6.8	2.0	6.4	2.6	2.3	25.7	11.3	9.2	7.4	0.1		1.3	-4.7
1912	183.6	158.5	48.7	21.7	9.4	3.4	6.5	3.6	3.4	40.7	20.9	11.2	15.0	0.3		2.1	-3.2
1922	247.0	218.1	61.6	25.4	12.0	3.5	7.2	3.2	3.5	48.2	28.1	22.4	19.4	0.1	0.1	4.0	8.2
1929	332.9	289.1	92.4	40.0	12.5	3.9	6.5	3.0	3.8	61.0	34.7	28.4	29.4	0.6	0.1	4.3	12.4
1939	321.0	276.9	87.9	40.7	10.4	3.8	6.6	3.2	3.4	54.3	30.1	24.9	40.6	0.8	1.1	10.9	2.1
1948	403.0	336.4	91.8	60.6	11.5	8.5	6.5	4.5	6.0	53.1	48.1	39.7	41.5	3.1	1.4	15.7	11.0
D. SHARES IN TOTAL REPRODUCIBLE WEALTH IN 1929 PRICES																	
1805	100.0	92.3	18.3	3.9	37.5	5.8	7.7	3.8	3.8	14.4		6.7	3.9			1.9	-7.7
1850	100.0	92.3	20.6	5.2	16.7	3.8	11.0	3.0	2.5	29.3		7.3	3.1			2.4	-4.9
1880	100.0	87.5	22.3	9.8	9.4	1.3	8.6	3.8	2.7	25.3	7.1	8.3	2.7	0.6		1.2	-3.1
1890	100.0	86.7	27.5	11.2	6.9	1.1	6.5	2.4	2.1	24.5	10.3	7.5	2.8	1.0		1.3	-5.1
1900 A	100.0	87.6	26.4	10.7	6.3	1.1	4.8	1.9	1.7	24.5	12.5	7.7	3.5	1.2		1.3	-3.6
1900 B	100.0	86.0	28.2	12.1	5.8	1.7	5.4	2.2	1.9	21.8	9.6	7.8	6.3	0.1		1.1	-4.0
1912	100.0	86.3	26.5	11.8	5.1	1.9	3.5	2.0	1.9	22.1	11.3	6.1	8.2	0.2		1.1	-1.7
1922	100.0	88.3	25.0	10.3	4.9	1.4	2.9	1.3	1.4	19.5	11.4	9.1	7.9	0.0	0.0	1.6	3.3
1929	100.0	86.9	27.8	12.0	3.8	1.2	2.0	0.9	1.1	18.3	10.4	8.5	8.8	0.2	0.0	1.3	3.7
1939	100.0	86.2	27.4	12.7	3.2	1.2	2.1	1.0	1.1	16.9	9.4	7.8	12.6	0.2	0.3	3.4	0.7
1948	100.0	83.5	22.8	15.0	2.9	2.1	1.6	1.1	1.5	13.2	11.9	9.9	10.3	0.8	0.3	3.9	2.7

NOTES TO TABLE I

SECTION A

- 1805: All figures taken from Table IV except that (a) one-sixth of line 1b has been assigned, rather arbitrarily, to non-farm non-residential buildings; (b) one-half of the \$60 per family allotted to furniture, apparel, etc., has been regarded as representing consumers' durables; and (c) the totals for consumers' durables and inventories have been roughly split between farmers and non-farmers on the basis of guideposts like share in the population and relationships for later periods for which data are available.
- 1850: Figures for cols. 1, 3, 5-7, 16, and 17 taken from Table V. Cols. 4, 8, 9, and 12 derived by a rough split of totals for consumers' durables and inventories along the lines indicated for 1805, starting from an assumed value of consumers' durables of about \$300 million for 1850, somewhat below King's estimate (cf. Table VI, col. 10) which apparently includes clothing and a few other non-durables. The total of cols. 10 and 11 was obtained by subtracting the estimates for inventories and of consumers' durables from line 16 and then adding ships (line 14). Col. 13 is a very rough estimate based on King's figure (cf. Table VI, col. 7).
- 1880, 1890,
and 1900A: Cols. 5, 6, 10, 11, 13, and 14 are taken from Kuznets' *National Product since 1869*, Tables IV, 2, and IV, 3; col. 17 from *op. cit.*, p. 229. Col. 3 was obtained by assuming that 75 percent of Kuznets' estimation of total value of non-farm residences (Table IV, 1, line 5, plus IV, 2, line 5) was attributable to structures. Col. 7 is taken from Census reports (*Historical Statistics*, p. 10). Col. 12, which includes crop inventories, was derived by adding to Kuznets' inferred estimate for 1880, constructed on the basis of the information given in *National Product since 1869*, p. 228, changes in inventories derived from the decadal averages shown (*ibid.*, p. 111, col. 5) and then subtracting cols. 7 and 16 of this table. The sum of cols. 4 and 9 was estimated by applying to the 1900B value and index derived from King's estimates of consumers' durables (Table VI, col. 10). The total was then split roughly between farmers and non-farmers by method described for 1805. Col. 16 was taken from *Annual Report of the Bureau of the Mint* for 1929, p. 106, averaging figures for June 30 of the year indicated and the following year. The totals shown in cols. 1 and 2 thus represent a combination of Kuznets' data with a few outside estimates.
- 1900B-1948: Figures are taken with minor changes and a few added breakdowns from Goldsmith, 'A Perpetual Inventory of National Wealth', *Studies in Income and Wealth, Volume Fourteen*, Table I, pp. 18-19. Derivation of the figures will be explained in detail in the Saving Study.

SECTION C

- 1805, 1850: Cols. 3-6, 9-11, 13, and 14 obtained from Section A by means of division by Snyders' index of the general price level (*Historical Statistics*, p. 231, Col. L1); cols. 12, 16, and 17 by Warren and Pearson's index of wholesale prices (*ibid.*, col. L2), and cols. 7 and 8 by their indexes of wholesale farm prices (*ibid.*, col. L4).

1880-1900A: Cols. 5, 6, 10, 11, 13, and 14 from Kuznets' *National Product since 1869*, Tables IV, 5, and IV, 6; col. 17 from Table IV, 10. Col. 3 obtained by applying Kuznets' deflator to revised estimates shown in Section A of this table. Kuznets' totals for inventories (*op. cit.*, Table IV, 10) have been split by carrying back the estimates for cols. 7 and 8 of line 1900B with the help of Kuznets' decadal averages for changes (*op. cit.*, Table II, 10); using the figures of col. 16 of this table for holdings of gold and silver; and treating col. 12 as residual. Thus any deviation from Kuznets' estimates for cols. 7, 8, and 16 - separate figures for which have not been published - will appear in col. 12, but the total of all four columns coincides with Kuznets' figure. Cols. 4 and 9 were obtained by dividing the figures in Section A of this table by Snyder's index of the general price level, and linking the resulting figures to the values in line 1900B.

1900B-1948: Same source as Section A.

TABLE II
Components of Tangible Wealth under Variant Definitions
 (\$ billion of 1929 purchasing power)

Year ¹	Popula- tion (millions)	Domestic Reproducible Tangible Durable Assets			Other Domestic Assets			International Assets		
		Civilian		Military	Semi- durables and Perish- ables	Land	Subsoil Assets	Gold and Silver	Foreign	
		Excluding Con- sumers' Durables	Con- sumers' Durables						Assets	Liabilities
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
1805 . . .	6.26	1.0	0.1	—	(0.1)	1.3	—	—	—	0.1
1850 . . .	23.26	9.7	0.8	—	(0.5)	7.5	(0.5)	0.3	—	0.5
1880 A ² . . .	50.26	46.6	.	—	.	.	.	.	-1.6	
B ³ . . .	50.26	40.5	6.5	—	(3.0)	(28.0)	(2.0)	0.6	(0.2)	1.8
1900 A ² . . .	76.09	120.7	.	(0.1)	.	.	.	1.7	-4.8	
B ³ . . .	76.84	105.0	16.6	(0.1)	(7.0)	60.1	(3.0)	1.3	1.8	6.6
1912 . . .	96.28	159.7	25.0	(0.2)	9.0	80.1	(5.0)	2.1	4.0	7.2
1922 . . .	111.00	205.9	28.9	(5.0)	10.0	87.8	(6.5)	4.0	11.7	3.5
1929 . . .	122.42	272.4	43.8	(2.0)	15.0	111.0	8.0	4.3	21.6	9.2
1939 . . .	131.43	263.9	44.1	2.1	15.0	101.5	11.0	10.9	17.8	15.7
1945 . . .	140.39	273.8	46.9	55.0	16.0	93.9	9.5	12.7	16.4	15.5
1948 . . .	148.05	309.6	66.6	44.2	23.0	83.6	(9.5)	15.7	22.7	11.6
1950 . . .	153.08	335.0	83.0	36.2	28.0	(85.0)	(10.0)	14.9	(24.0)	(12.0)

¹ Year end from 1900 B on; about mid-year for other dates. ² Kuznets' estimates (adjusted in the case of residential structures).

³ Estimates of this paper.

() Rough guesses. — Below \$50 million or insignificant in relation to year's total reproducible wealth. . Unknown.

NOTES TO TABLE II

- Col. 1: Mid-year to 1900A; average of 1st July of current and following year to 1945; 1st January of following year thereafter. Data to 1939 from *Historical Statistics*, p. 26; for 1945, *Statistical Abstract*, 1949, p. 7; for 1948 and 1950 from *Survey of Current Business*, December 1949, May 1951, p. S-10.
- Cols. 2
and 3: From Table I, Section A. (Figures for 1880B reduced by 13 percent, the ratio between B and A estimates for 1900.) Excludes gold and silver and net foreign assets.
- Col. 4: From 1939 on from Table III, col. 11.
- Col. 5: Rough estimates based on assumption that semi-durables and perishables equalled fully one-third of consumers' durables from 1929 on, and represented an increasingly higher ratio of consumers' durables at earlier dates. For considerations supporting the ratios used cf. Goldsmith, 'A Perpetual Inventory of National Wealth' (*Studies in Income and Wealth, Volume Fourteen*), pp. 36-38.
- Col. 6: For 1900-1948 taken, with some modifications, from Goldsmith, *op. cit.*, Table I. Figure for 1850 obtained by applying ratio of current value of land to reproducible assets (from Table II) to 1929 value of reproducible assets; that for 1880 by applying ratio of land to reproducible tangible wealth interpolated between 1850 and 1900 values. Estimate for 1805 based on Blodget (*Economica*, p. 196), including only land under cultivation or close to cultivation areas.
- Col. 7: Very rough estimates. (For some justification for those of 1929 to 1946, see Goldsmith, *op. cit.*, pp. 41-42.)
- Col. 8: From Table I, Section C.
- Cols. 9
and 10: Obtained by applying to rough estimates of the current value of foreign assets and foreign liabilities the same deflators as used in Table I, Section C, col. 17. (The difference between cols. 9 and 10 is identical with Table I, Section C, col. 17.)

TABLE III
Value of Durable Reproducible Military Assets, 1939-1950
 (\$ billion)

Year	Expenditures on Durable Military Assets		Original Cost of Durable Military Assets		Depreciation Allowances			Value of Stock of Military Assets		Adjusted Value	
	Current	1929 Prices	Undepreciated	Depreciated	Original Cost	1929 Prices	Replacement Cost	1929 Prices	Current Value	Current Prices	1929 Prices
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1939 . . .	0.5	0.4	5.0	2.6	0.5	0.4	0.4	2.1	2.6	2.6	2.1
1940 . . .	0.7	0.6	5.7	2.8	0.5	0.4	0.4	2.3	2.8	2.8	2.3
1941 . . .	3.5	2.9	9.2	5.7	0.6	0.5	0.5	4.7	5.5	5.4	4.5
1942 . . .	13.5	11.0	22.7	17.9	1.3	1.1	1.1	14.6	17.0	15.0	13.0
1943 . . .	21.0	18.9	43.7	36.1	2.8	2.4	2.4	31.1	34.5	30.0	28.0
1944 . . .	21.0	21.0	64.7	52.5	4.6	4.1	4.1	48.0	51.0	43.0	42.0
1945 . . .	13.5	15.0	78.2	60.0	6.0	5.6	5.6	57.4	55.0	52.0	55.0
1946 . . .	2.9	2.9	81.1	56.2	6.7	6.3	7.0	54.0	77.9	77.9	54.0
1947 . . .	2.0	1.6	83.1	51.3	6.9	6.5	9.1	49.1	73.1	73.1	49.1
1948 . . .	2.4	1.7	85.5	46.7	7.0	6.6	10.4	44.2	71.0	71.0	44.2
1949 . . .	3.2	2.2	88.7	42.7	7.2	6.7	11.0	39.7	65.7	65.7	39.7
1950 . . .	5.0	3.4	93.7	40.2	7.5	6.9	11.5	36.2	60.5	60.5	36.2

NOTES TO TABLE III

- Col. 1. 1939-1946: Obtained by distributing increase in col. 3 between 1939 and 1946 among individual years on basis of (a) expenditures on munitions and war construction (*Budget of U.S. Government*, 1947, p. 752); (b) proportion of value of output of aircraft, ships, guns, combat and motor vehicles, and communications and electronic equipment to total munitions production (*Industrial Mobilization for War*, War Production Board, Vol. I, p. 962), and (c) index of volume of munitions production (*Survey of Current Business*, 1947 Supplement, p. 15).
- 1947-1950: Sum of expenditures on aircraft procurement; construction of ships; other major procurement; military public works; stockpiling; civilian components and research and development expenditures (using only one-half of the last two items) in *Budget of U.S. Government*, 1949, p. M-14; 1950, p. M-20; and 1951, p. M-28.
- Col. 2. 1939-1945: Derived from col. 1 on assumption that level of munitions prices in 1944, when quantity production was established, was comparable to 1929 price level of non-military commodities (the index of civilian prices of metals and metal products, then under control, was only 3 percent above the 1929 level in 1944), but that prices of military commodities declined, in comparison to the 1944 level, by about 10 percent a year from 1942 through 1945.
- 1946-1950: Derived on assumption that prices of military assets moved in relation to 1945 level like B.L.S. index of wholesale prices of (civilian) metals and metal products.
- Col. 3. 1939: Estimated on basis of col. 4, assuming about 11-year life and equal distribution of expenditures.
- 1940-1945: Cumulation of col. 1 on 1939 basis.
- 1946: Reeve and associates in *Studies in Income and Wealth, Volume Twelve*, p. 502.
- 1947-1950: Cumulation of col. 1 on 1946 basis.
- Col. 4. 1939: Obtained from depreciation of roughly estimated expenditures on durable military assets in period before 1939.
- 1940-1945: Cumulation of difference between cols. 1 and 5 on 1939 basis.
- 1946: Reeve and associates, *op. cit.*
- 1947-1950: Cumulation of difference between cols. 1 and 5 on 1946 basis.

- Col. 5. 1939-1946: Obtained by depreciating col. 1 (and corresponding rough estimates for 1930-1938) at a rate of 9 percent required to reach 1946 benchmark of col. 4. This is probably the lowest rate that can be considered and a somewhat higher overall rate, up to about 15 percent, may take account more adequately of obsolescence on some types of equipment, particularly aircraft.
- 1947-1950: Obtained by depreciating col. 1 at rate of 9 percent.
- Col. 6. 1939-1950: Same method of depreciation as used in col. 5, but applied to col. 2.
- Col. 7. 1939-1945: Assumed equal to col. 6.
- 1946-1950: Col. 6 times annual average of B.L.S. index of wholesale prices of metals and metal products shifted to 1944 basis.
- Col. 8. 1939: Rough estimate based on col. 9.
- 1940-1950: Obtained by cumulating difference between cols. 2 and 6 on 1939 basis.
- Col. 9. 1939: Assumed equal to col. 4. (Estimate of \$5 billion given by Reeve and associates in *op. cit.*, p. 502, and designated as 'arbitrary', is regarded as too high.)
- 1940-1945: Roughly interpolated between 1939 and 1946 values on basis of col. 8 and price trend.
- 1946: Reeve and associates, *op. cit.*
- 1947-1950: Col. 8 times year-end value of B.L.S. index of wholesale prices of metals and metal products on 1946 basis.
- Cols. 10 and 11: 1939-1940: Same as cols. 8 and 9 respectively.
- 1941-1945: Cols. 8 and 9, respectively roughly adjusted for battle losses of materiel.
- 1946-1950: Same as cols. 8 and 9 respectively.

TABLE IV

Estimate of Reproducible Tangible National Wealth for 1805

	\$ million
1. Structures:	
(a) Farm residences and service buildings	210
(b) Non-farm residences and other buildings	120
	330
2. Public utilities	15
3. Mills	5
4. Public buildings	20
5. Ships	40
6. Inventories	100
7. Livestock	60
8. Farm implements	32
9. Consumer goods	75
10. Gold	18
	\$695
11. Total reproducible durable tangible assets	\$695
12. Net foreign investments in U.S.	80
	\$615
13. Domestically owned durable tangible assets	\$615

NOTES TO TABLE IV

Line 1: Obtained on the assumption that of Samuel Blodget's estimate (*Economica: A Statistical Manual for the U.S.A.*, 1806, p. 196) for 'Habitations including apparel, shops, barns, implements, tools, etc.' per family of \$360, about 80 percent, or \$300, can be attributed to the value of the structures, a ratio which would correspond roughly to that in King's estimates of national wealth for 1850 (*The Wealth and Income of the People of the United States*, p. 259). Instead of Blodget's round figure of one million families, an estimate of 1.1 million has been used, based on an average size of family of 5.73 persons obtained by straight-line interpolation between 1790 and 1850 values (*Historical Statistics*, Series B172, p. 29).

Line 1a: The total of line 1 (assumed to exclude the value of land underlying structures) has been divided into farm (residences and service buildings) and non-farm structures. The split was based on the share of the non-farm population and of the relationship at later benchmark dates between the average value per farm structure (including farm service buildings) and non-farm residence. The share of the non-farm population was estimated at 20 percent on the basis of its share in employment which could be extrapolated from the decadal figures available back to 1820 (*Historical Statistics*, p. 63). The average value of non-farm residences was estimated, on the basis of relationships which can be approximated for 1850 (see Table V) and 1880 (on the basis of Kuznets' figures on the value of real estate improvements given in *National Product since 1869*, p. 202), at somewhat more than twice that for farm residences and service buildings together. Combination of these two estimates meant allocating about 65 percent of line 1 to farm residences and other farm buildings.

Line 1b: Line 1 less 1a.

Line 2: Blodget's estimate for 'turnpike, canal and toll bridge stock'.

- Line 3: Blodget's estimate for 'flour, grist, saw, iron and other mills' of \$4 million slightly increased because it is designated as a minimum.
- Line 4: Blodget's estimate for public buildings and other public property, including churches. Apparently no allowance is made for public streets and roads.
- Line 5: This item is included, without specification as to amount, in Blodget's estimate of 'stock in trade' of \$150 million. It has been estimated on the basis of 1,140,000 gross tons of shipping (*Historical Statistics*, Series K-95, p. 208) and an average value per ton of about \$35. The latter figure is based on the data cited in J. G. Hutchins, *The American Maritime Industries and Public Policy, 1789-1914*, Cambridge, Mass. 1941, pp. 133, 202, indicating that in 1791 'the best American ships sold at a price of about \$34 per ton', and that in the early 1830's 'best American ships rarely cost over \$55 per ton. Ordinary freighters then sold at prices ranging between \$35 and \$59 per ton', assuming (a) that these figures refer to newly constructed tonnage; (b) that the cost of new tonnage varied between 1791 and 1830 in accordance with the general price level (cf. *Historical Statistics*, Series L-1, p. 232); and (c) that the average value per ton of the entire Merchant Marine was about one-quarter below cost of reproduction.
- Line 6: Sum of Blodget's estimate for inventories of 'country produce' of \$26 million, and an estimate for other inventories of about \$75 million. Blodget includes an unspecified amount for inventories of 'European and Indian merchandise' in his estimate for 'stock in trade' which totals \$150 million. The estimate of \$60 million has been obtained by assuming, as the Bureau of Census does for 1900 to 1922, that inventories of foreign commodities were equal to one-half a year's imports as given in *Historical Statistics*, Series A-67, p. 10, and M-54, p. 244. The overall estimate of approximately \$100 million thus makes a small allowance for inventories of domestic non-agricultural commodities.
- Line 7: It is assumed that livestock accounted for most of Blodget's figure of \$70 million for 'carriages and livestock'.
- Line 8: Residual between Blodget's total for 'stock in trade' of \$150 million and the separate estimates for shipping (line 5), inventories of imported goods (line 6), and gold (line 10). Blodget did not indicate whether farm implements were included in his estimate, or whether they were included at all. An estimate of about \$30 million, or about \$5½ per head of the rural population, is compatible with the Census estimates of \$152 million, or \$7½ per head, in 1850 (cf. Table V, line 12), if account is taken of the decline in prices, and if it is assumed that the quantity of implements used per farm was substantially smaller in 1805 than in 1850.
- Line 9: Sum of home furnishings and apparel (residual from line 1) and carriages (included in line 7).
- Line 10: Included without specification in Blodget's estimate of 'stock in trade'. The figure of \$18 million is the amount of 'specie in U.S.' taken from A. B. Hepburn, *History of Coinage and Currency in the United States*, New York 1915, p. 87.
- Line 11: Sum of lines 1 through 10.
- Line 12: Based on estimate of \$75 million for 1803 cited by Cleona Lewis, *America's Stake in International Investments*, Washington, Brookings Institution, 1938, pp. 152, 560.
- Line 13: Line 11 less line 12.

TABLE V

Adjusted Census Estimate of National Wealth in 1850

	\$ million
1. Reported value	7,136
2. Tax-exempt property	350
3. Value of slaves	800
4. Adjusted value	6,686
5. Consumers' non-durables	100
6. Durable tangible assets	6,586
7. Land: Agricultural	2,618
8. Land: Other	400
9. Reproducible durable tangible assets	3,568
10. Farm buildings and fixed improvements	654
11. Non-farm residential buildings	800
12. Farm machinery and implements	152
13. Livestock	544
14. Ships	140
15. All other reproducible tangible assets	1,278
16. All other, adjusted	1,900
17. Gold	154
18. Total reproducible durable tangible assets	4,450
19. Net foreign investments in U.S.	300
20. Domestic equity in durable tangible assets	4,150

NOTES TO TABLE V

Line 1: *Preliminary Report of Eighth Census, 1862, p. 195.*

Line 2: Estimated at about 5 percent of total reported value, approximately the ratio indicated in the Census of 1880, the first one in which tax-exempt property was estimated separately (see *Historical Statistics, p. 10*). The value of church property alone in 1850 was given at \$87 million (*Seventh Census, 1853, p. xlviii*).

Line 3: It is impossible on the basis of the material now available to decide which of the estimates of the value with which the slaves were entered in the Bureau of the Census estimates of national wealth for 1850 and 1860 – this is not necessarily the same as their actual value – is nearest to the truth. The Bureau of the Census itself apparently has never issued an estimate of the value of slaves included in the national wealth total for 1850. However, at least two slightly different estimates for 1860 have been found, one of \$1,660 million (derivable from Ninth Census, *Industry and Wealth, 1872, p. 8*) and the other of \$1,500 million (*Wealth, Debt and Taxation, 1907, p. 31*). These figures correspond respectively to an average assessed value per slave of about \$410 and \$380. A somewhat higher estimate (\$500 per slave) was made by Dr. William Elder in 1863 (*Debt and Resources of the United States, Philadelphia 1863, p. 17*) and adopted by D. A. Wells (*Annual Report of the Special Commissioner of Revenue for 1869, p. xi*), and apparently also by Ruggles in his report to the International Statistical Congress in Berlin (see *Bankers' Magazine, 1863-4, p. 889*). The *Bankers' Magazine* (1862-3, p. 247) stated, 'From careful inquiries we infer that their [the slaves'] average assessed value in 1860 was \$500 each', whether editorializing or reporting another's findings is not clear.

Between 1850 and 1860 the average price of slaves ('prime field hands') in four major markets increased by about two-thirds (values read off from chart in U. B. Phillips, *Life and Labor in the Old South*, Boston 1929, p. 177), yielding an estimate for 1850 on the basis of the Census figures of approximately \$250 and \$230 respectively. Elder's estimate for 1850 is \$300, indicating the same relationship to the 1860 level as the index derived from Phillips' data.

Application of the same index to the various figures available for 1860 leads to an estimate of an average value per slave in 1805 of 38 percent of 1860, i.e. between \$145 (Census, 1907), \$155 (Census, 1872), or \$190 (*op. cit.*, p. 89), considered by its author on the high side.

The figure of \$250 for each of the 3.2 million slaves (*Historical Statistics*, p. 277) used in the table for 1850, adopting the higher of the two Census figures, has been chosen primarily because it produces a more acceptable figure for reproducible wealth. Use of Elder's estimate, it should be noted, would not affect the figure for adjusted reproducible durable tangible assets (line 18) because this is obtained as the sum of independently estimated components (lines 10 to 14, 16 and 17), but it would change lines 4, 6, 9, and 15.

Line 4: Line 1 plus line 2 less line 3.
 Line 5: Rough estimate obtained by slightly reducing King's figure of \$135 million (*The Wealth and Income of the People of the United States*, p. 259) because his estimates generally tend to exceed those of the Census.

Line 6: Line 4 less line 5.

Line 7: Estimated at 80 percent of the Census figure for the value of agricultural land and buildings (*Seventh Census*, p. lxxii), the average ratio for the Censuses of 1900 and 1912 for which separate figures were first reported. (This ratio is also applied by Kuznets to the total value of agricultural land and buildings in the Censuses of 1880 and 1890; see *National Product since 1869*, p. 202).

Line 8: Rough estimates based on the assumption that approximately one-third of the value of non-farm real estate represented the value of non-agricultural land.

Line 9: Line 6 less lines 7 and 8.

Line 10: Estimated at 20 percent of the Census figure for farm land and buildings.

Line 11: Estimated on the basis of 1 million non-farm residential dwellings and an average structure value of \$800 per dwelling.

The number of dwellings was derived on the assumption of a non-farm population of 5 million and an average of 5 persons per dwelling. The size of the non-farm population was estimated on the basis of an urban population of 3.5 million (*Statistical Abstract of the United States, 1950*, p. 8) and a relation of non-farm to urban population of about 1.4, corresponding to that prevailing in 1910, the first date for which an estimate of farm population is available (*Statistical Abstract, 1950*, p. 21). The estimate of the average structure value was obtained by dividing Kuznets' figure for 1890 (*National Product since 1869*, p. 202), after adjusting to an assumed share of land of only 25 percent, by 7.9, million dwellings (*Historical Statistics*, p. 174) and reducing the resulting figure by about 40 percent in accordance with the estimated change in construction costs of residential buildings between 1850 and 1890 based on changes in wage rates and cost of building materials. (See G. F. Warren and F. A. Pearson, *Gold and Prices*, New York 1935, pp. 31, 317.)

This estimate is reasonably well confirmed by two contemporary sets of figures. The first of these is the average value per dwelling in New York State, which in 1855 was given as \$1,351 (*Census of the State of New York for the Year 1865*, p. cl). This figure probably includes land, which possibly accounted for approximately one-sixth of the total value, reducing average structure value to not much over \$1,150. As approximately one-third of all dwellings in New York State were on farms at that time (derived from *Twelfth Census*, Vol. V, p. 688, assuming an average of six persons per farm) and the average value of farm dwellings has always been considerably lower than that of non-farm residences, probably by as much as 75 percent (see notes to Table IV, line 1a), the average structure value per non-farm residence should have amounted to about \$1,400 in 1855. If house prices moved in accordance with building material prices and wage rates, which may be regarded as reflecting cost of construction, their value in 1850 should have been approximately one-eighth lower than in 1855, bringing the average down to approximately \$1,200. The national average of non-farm dwellings has always been considerably below that for New York State. Using the 1890 relation of two-thirds (derived from *Eleventh Census, Farms and Homes*, pp. 63 and 405, for incumbered homes), the 1850 average for the United States would work out at about \$800, exactly the figure used in Table V. This relationship appears to have been fairly stable over time, the 1940 Census showing a ratio of 0.72 between the average value of one-family mortgaged homes in the United States as a whole and in New York State (*Statistical Abstract, 1947*, p. 808), while the Real Property Inventory gives a ratio for all owner-occupied dwellings of 0.64 in 1930 (D. L. Wickens, *Residential Real Estate*, New York 1941, p. 84).

The second indication of the average value of dwellings is provided by the estimates of construction costs in the early fifties cited by E. W. Martin (*The Standard of Living in 1860*, Chicago 1942, pp. 422-25). These figures point to an average construction cost per room for the simple types of structures which, of course, dominate any national average, of approximately \$300. Assuming an average of five rooms per dwelling - approximately the present ratio which does not seem to have changed considerably during the last 50 years - and an average accumulated depreciation in 1850 of two-fifths of original cost, we obtain an average structure value per dwelling of about \$900.

A similar though possibly somewhat lower level would be obtained by capitalizing average house rents. (Martin, *op. cit.*, pp. 422-23) at a rate between 8 and 10 percent.

A considerably higher figure for line 11 - about \$1,050 million - would result by beginning with the average value of non-farm owner-occupied incumbered homes in 1890 of about \$3,200 (*Abstract of the Eleventh Census*, 2nd edition, p. 238), and adjusting for (a) the lower average value of rented homes; (b) the share of land; and (c) the lower cost of construction in 1850. King's estimate of the value of urban residential buildings in 1850 of \$1,271 million (*The Wealth and Income . . .*, p. 259), derived as the 1900 ratio of the income of the urban population, is possibly higher - if it does not include rural non-farm residences - even after making a liberal allowance, say of 25 percent, for the value of land which probably is included in his figure.

Lines 12
and 13: *Seventh Census*, p. lxxii.

Line 14: Estimated on the basis of a merchant fleet of 3.5 million tons (*Historical Statistics*, Series K-95, p. 208) and an average value of \$40 per ton, the same as given for 1860 in *Present Progress of Shipbuilding in the United States* (Appendix F to Report of Special Commissioner of Revenue for 1867), p. 198, as price level increased only slightly from 1850 to 1860.

(A slightly higher figure for 1860 – viz. \$50 per ton – is given by S. B. Ruggles in his report to the International Statistical Congress in Berlin, as reported in *Bankers' Magazine*, 1863–64, p. 891).

- Line 15: Line 9 less sum of lines 10 through 14. The figure includes primarily non-residential non-farm buildings; machinery and equipment not on farms; business inventories; and consumers' durables. The only component for which a Census estimate is given is the capital of railroads, public utilities, manufacturing and mining enterprises. This is put at \$533 million, compared to King's estimate of \$909 million excluding inventories (*op. cit.*, pp. 256–8), leaving \$745 million for plant, equipment and inventories in trade, construction and service industries, for institutional and government structures and for consumers' durables, all of which King estimated by indirect methods at \$1,040 million, again excluding inventories.
- Line 16: Obtained by combining (a) King's estimate (*op. cit.*, pp. 256–9) for railway and other public utility structures and equipment (\$639 million); factory, office, store and miscellaneous business buildings (\$563 million); machinery and tools (\$247 million); churches, theatres, etc. (\$150 million) and furniture, carriages, etc. (\$350 million) reduced by about one-third because his figures are generally above Census data; with (b) an estimate of about \$600 million for inventories based on later relationships to reproducible wealth.
- Line 17: 'Specie in the United States' as given in Hepburn, *A History of Coinage and Currency in the United States*, p. 177. This item is probably not included in line 1 and hence not covered in lines 15 and 16.
- Line 18: Line 9 plus excess of line 16 over line 15 plus line 17 plus rough allowances for reproducible assets included in line 2.
- Line 19: Based on estimates for 1843 (\$225 million) and 1853 (\$380 million) discussed by Lewis, *op. cit.*, pp. 519–22.
- Line 20: Line 18 less line 19.

Note: No use has been made in the Table of the seemingly exhaustive classification of the Census Bureau's national wealth total of 1850 to be found in Mulhalls' *Dictionary of Statistics* (1892, p. 593) because there is no explanation of how the figures were arrived at, and because he apparently is unaware of the inclusion of slaves in the Census total. Mulhalls' estimates are as follows (\$ million):

Land	3,310	Railroads	290	Houses	1,000	Cattle	550
Factories	520	Furniture	500	Sundries	966	(possibly including slaves)	

TABLE VI
King's Estimates of Reproducible Tangible Wealth (excluding Inventories), 1850-1910
(\$ million)

Year	Total (1)	Structures						Equipment		Consumer Goods		Misc. (12)	
		Non-farm (2)	Farm			Com- mercial (5)	Indus- trial and Public Utility (6)	Recrea- tional, etc. (7)	Farm (8)	Other (9)	Dur- ables (10)		Other (11)
			Residential (3)	Other (4)									
1850	4,468	1,271	366	550	450	752	150	152	247	350	135	45	
1860	8,890	2,016	731	1,097	850	2,081	250	246	419	800	300	100	
1870	13,258	3,029	804	1,206	1,400	3,478	375	337	869	1,100	500	160	
1880	21,521	5,015	1,060	1,591	2,000	5,912	600	406	1,967	1,900	800	270	
1890	31,970	7,794	1,275	1,912	2,737	9,417	970	494	2,171	3,600	1,200	400	
1900	43,006	10,021	1,423	2,134	3,340	12,702	1,200	750	3,256	4,880	2,000	1,300	
1910	75,591	17,546	2,530	3,795	6,125	26,700	2,200	1,265	4,730	6,700	3,000	1,000	

NOTES TO TABLE VI

- Col. 1: Sum of cols. 2 to 12.
- Cols. 2-3: From *The Wealth and Income of the People of the United States, 1915*, p. 259. It is not certain whether the figures exclude value of land underlying structures. (This also applies to cols. 3 through 7.)
- Col. 4: *Op. cit.*, p. 256, includes 'barns and other out-buildings on farms'.
- Col. 5: *Op. cit.*, p. 256. Designated as 'Office, store and miscellaneous'.
- Col. 6: *Op. cit.*, pp. 256-7. Covers manufacturing, mining and public utilities. Probably also includes equipment in public utility industries.
- Col. 7: *Op. cit.*, p. 259. Designated as 'Churches, theatres, etc.'.
- Col. 8: *Op. cit.*, p. 258.
- Col. 9: *Op. cit.*, p. 258. Designated as 'Movable machinery and tools in manufacturing, mining and miscellaneous industries'. Probably does not include equipment in public utility industries.
- Col. 10: *Op. cit.*, p. 259. Designated as 'Furniture, carriages, automobiles, etc.'.
- Col. 11: *Op. cit.*, p. 259. Designated as 'Clothing, personal ornaments, etc.'.
- Col. 12: *Op. cit.*, p. 259. Content not indicated, but apparently does not include inventories or livestock.

TABLE VII

*Kuznets' Estimates of Reproducible Tangible National Wealth
of U.S. (excluding Consumers' Durables), 1880-1922*
(\$ billion)

Year	Total	Real Estate Improvements	Equipment	Inventories	Net Foreign Assets
	(1)	(2)	(3)	(4)	(5)
A. 1929 PRICES					
1880	42.0	27.5	4.7	11.4	-1.6
1890	72.2	48.6	11.6	16.8	-4.8
1900	104.7	68.5	20.0	21.0	-4.8
1912	179.1	116.3	38.1	29.7	-5.0
1922	205.6	117.4	40.7	42.5	5.0
B. CURRENT PRICES					
1880		11.7	3.0		-1.1
1890		20.9	5.8		-2.8
1900		29.5	9.3		-2.8
1912		58.8	20.4		-3.7
1922		90.0	39.6		5.4

Part A: *National Product since 1869*, Table IV-5, line 19 (col. 2); IV-6, line 18 (col. 3); IV-10, col. 3 (col. 4); and IV-10, line 4 (col. 5).

Part B: *Op. cit.*, Table IV-2, line 19 (col. 2); Table IV-3, line 18 (col. 3) and p. 229, footnote to col. 4 (col. 5).

TABLE VIII
National Wealth Deflators
 (Annual average 1929=100)

Year	P.I. Deflators		Kuznets	G.N.P. Deflator		General Price Level (Snyder)	Cost of Construction	Wholesale Prices	Cost of Living
	Total Reproducible Tangible Wealth	Structures and Equipment	Kuznets	Dept. of Commerce					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1805 ¹						54		109	
1850 ¹						38		65	31
1880 ¹			46			46	31	68	46
1890 ¹			45	52		44	49	59	45
1900 ²	46	47	44	50		45	49	58	47
1912 ²	55	55	51	64		56	55	73	58
1922 ²	98	97	82	100		89	94	104	99
1929 ²	98	98	100	98	98	97	98	95	99
1939 ²	94	94		83	84		100	82	81
1948 ²	178	176			150		195	168	139

¹ Average for year.

² End of year.

NOTES TO TABLE VIII

- Col. 1: Obtained by dividing Table I, Section A, col. 1, less cols. 7, 8, 12, and 15-17 by same columns of Table I, Section C.
- Col. 2: Obtained by dividing sum of cols. 3-6, 9-11, and 14-15 of Table I, Section A, by same columns of Table I, Section C.
- Col. 3: Obtained from *National Product since 1869* by dividing sum of Table IV-2, line 19, and Table IV-3, line 18, by sum of Table IV-5, line 19, and Table IV-6, line 18.
- Col. 4: Obtained from unpublished estimates of gross national product in current and 1929 prices.
- Col. 5: Obtained by dividing estimates of gross national product in current prices by those in 1939 prices and shifting quotient to 1929 basis (*Survey of Current Business*, January 1951, p. 9).
- Col. 6: *Historical Statistics*, p. 231. Year end figures for 1900-1948 obtained, a in columns 7, 8, and 9, by averaging annual averages of current and following year.
- Col. 7: From 1901 on average of indices of residential, commercial and industrial, and public utility construction (Boeckh; Marshall and Stevens). For earlier dates extrapolations by means of indices of building material prices and wages (Warren and Pearson).
- Col. 8: Index of Bureau of Labor Statistics, 1805-1939 (*Historical Statistics*, pp. 233-4, 1948; *Monthly Labor Review*, July 1950, p. 185).
- Col. 9: From 1913 on, Bureau of Labor Statistics; before, index of Federal Reserve Bank of New York (*Historical Statistics*, pp. 235-6) linked to index of Bureau of Labor Statistics.

TABLE IX

Cyclical Position of National Wealth Benchmark Years

Year	Thorp	NBER	Business Activity	Industrial and Commercial Production	Deflated Gross National Product
			Percent of Trend	Percent of Trend	Percent of 5-Year Moving Average
	(1)	(2)	(3)	(4)	(5)
1805	Prosperity				
1850	Prosperity	About midway between 1848 trough and 1853 peak	103.3		
1880	Prosperity	Midway between 1878 trough and 1882 peak	107.7	102	
1890	Prosperity; recession	Cyclical peak	109.7	109	
1900	Prosperity; brief recession	Cyclical trough	100.3	94	98.9
1912	Revival; prosperity	Midway between 1911 trough and 1913 peak	104.2	102	99.0
1922	Revival; prosperity	Midway between 1921 trough and 1923 peak	93.4		94.7
1929		Cyclical peak	108.3		108.8
1939		Incipient recovery from 1938 trough			95.4
1946		Slightly past cyclical trough			94.7
1948		Cyclical peak			100.0

Col. 1: *Business Annals*, pp. 115 ff.

Col. 2: Burns and Mitchell, *Measuring Business Cycles* (NBER, 1946), p. 78, to 1929. For later years based on Chart 6 in G. H. Moore, *Statistical Indicators of Cyclical Revivals and Recessions* (NBER, Occasional Paper No. 31, 1950).

Col. 3: Ayres, *Turning Points in Business Cycles*, p. 128.

Col. 4: Frickey, *Production in the U.S., 1860-1914*, p. 60.

Col. 5: From 1939 on, *Survey of Current Business*, January 1951, p. 9; for earlier years, unpublished estimates by NBER.

TABLE X

Rate of Growth of Reproducible Tangible Durable Non-military Wealth, Annually, 1897-1950

End of Year	R.T.W.		R.T.W. per Head		Rate of Growth	
	Consumers' Durables		Consumers' Durables		Consumers' Durables	
	Included	Excluded	Included	Excluded	Included	Excluded
	\$ billion of 1929		\$ of 1929		Percent per year	
(1)	(2)	(3)	(4)	(5)	(6)	
1896	103.7	89.2	1,449	1,247		
1897	106.1	91.2	1,457	1,252	0.55	0.40
1898	109.6	94.2	1,477	1,270	1.37	1.44
1899	113.9	97.8	1,509	1,296	2.17	2.05
1900	118.1	101.5	1,537	1,321	1.86	1.93
1901	121.3	104.1	1,547	1,329	0.65	0.61
1902	127.8	110.0	1,600	1,377	3.43	3.61
1903	133.1	114.6	1,636	1,408	2.25	2.25
1904	136.6	117.6	1,646	1,417	0.61	0.64
1905	142.7	122.8	1,686	1,451	2.43	2.40
1906	149.8	128.8	1,737	1,494	3.02	2.96
1907	156.9	135.1	1,786	1,537	2.82	2.88
1908	160.6	138.6	1,792	1,547	0.34	0.65
1909	165.5	142.7	1,810	1,560	1.00	0.84
1910	172.7	149.0	1,854	1,600	2.43	2.56
1911	176.9	152.6	1,870	1,613	0.86	0.81
1912	183.6	158.5	1,907	1,647	1.98	2.11
1913	190.5	164.9	1,941	1,680	1.78	2.00
1914	195.6	169.9	1,960	1,702	0.98	1.31
1915	202.7	176.9	2,002	1,747	2.14	2.64
1916	213.0	186.2	2,074	1,813	3.60	3.78
1917	219.7	192.1	2,113	1,847	1.88	1.88
1918	223.1	195.7	2,128	1,867	0.71	1.08
1919	228.5	200.7	2,161	1,898	1.55	1.66
1920	235.9	207.7	2,195	1,932	1.57	1.79
1921	238.9	210.9	2,186	1,930	-0.41	-0.10
1922	247.0	218.1	2,225	1,965	1.78	1.81
1923	259.5	228.5	2,296	2,022	3.19	2.90
1924	270.0	237.2	2,348	2,063	2.26	2.03
1925	283.9	248.5	2,435	2,131	3.71	3.30
1926	298.4	260.2	2,524	2,201	3.66	3.28
1927	310.2	270.3	2,590	2,257	2.61	2.54
1928	321.2	279.3	2,652	2,306	2.39	2.17
1929	332.9	289.1	2,719	2,361	2.53	2.39
1930	337.6	293.7	2,732	2,377	0.48	0.68
1931	335.1	292.3	2,693	2,349	-1.43	-1.18
1932	325.3	285.1	2,598	2,277	-3.53	-3.07
1933	314.0	275.9	2,492	2,190	-4.08	-3.82
1934	307.7	270.7	2,427	2,134	-2.61	-2.56
1935	306.3	268.7	2,399	2,105	-1.15	-1.36
1936	309.3	269.6	2,408	2,099	0.38	-0.29
1937	316.6	274.5	2,448	2,122	1.66	1.10
1938	316.8	274.4	2,430	2,105	-0.74	-0.80
1939	321.0	276.9	2,442	2,107	0.49	0.10
1940	331.8	284.7	2,502	2,148	2.46	1.95

INCOME AND WEALTH

TABLE X (Continued)

End of Year	R.T.W.		R.T.W. per Head		Rate of Growth	
	Consumers' Durables		Consumers' Durables		Consumers' Durables	
	Included	Excluded	Included	Excluded	Included	Excluded
	\$ billion of 1929		\$ of 1929		Percent per year	
	(1)	(2)	(3)	(4)	(5)	(6)
1941	346.5	295.6	2,587	2,207	3.40	2.75
1942	349.6	299.1	2,579	2,206	-0.31	-0.05
1943	344.6	295.4	2,510	2,152	-2.68	-2.45
1944	339.0	291.4	2,440	2,098	-2.79	-2.51
1945	334.3	287.4	2,381	2,047	-2.42	-2.43
1946	356.5	303.5	2,498	2,127	4.91	3.91
1947	380.2	319.8	2,614	2,199	4.64	3.39
1948	403.0	336.4	2,722	2,272	4.13	3.32
1949	419.2	346.4	2,783	2,300	2.24	1.23
1950	(445.0)	(362.0)	(2,910)	(2,370)	(4.57)	(3.04)

NOTES TO TABLE X

Values for benchmark years (1900, 1912, 1922, 1929, 1939, and 1948) are those shown in Table I, Section C, cols. 1 and 2, although with small difference. Those for other years are derived by the same procedures. (A description of sources and methods will be given in Vol. III of the author's Saving Study.)