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Chapter Title: Reproducible Wealth - Its Growth and Industrial Distribution, 1880-1939, and Index

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Reproducible Wealth
Its Growth and Industrial Distribution
1880-1939

The purpose of the analysis is partly to test the validity of the wealth estimates when compared with cumulated totals of capital formation based on commodity flow data; partly to attempt a distribution of capital formation by categories of industrial users. We first discuss the character of the wealth estimates that can be had for this purpose; then present the detailed basic and summary tables.

A CHARACTER OF THE ESTIMATES

1 *Scope*

The first official estimate of wealth in the United States was prepared for 1850. And the first estimate distributed by categories was for 1880. The 1890 estimate was similarly classified; and the 1900, 1904, 1912, and 1922 in considerably greater industrial detail.

In preparing its 1922 estimate, the Bureau of the Census defined wealth as the material wealth or value of tangible property within the continental United States, including, in addition, all vessels of the United States Navy and merchant marine. It decided to adhere closely to the methods previously used by the Census in computing wealth, and presented totals and their components for the selected years back to 1880.[1] The increment in these estimates should reflect, therefore, the accumulation of consumer commodities and capital formation and yield some information on the industrial distribution of the latter. But the data are not strictly comparable for the entire period and for several wealth categories no trustworthy conclusions can be reached.

The value of consumer goods in households was one category we had to omit. The 1922 estimate was based upon a questionnaire survey asking for the total fair value of household equipment and wearing apparel in use. In making estimates for earlier years attention was concentrated on production, imports, and exports with assumed periods of usefulness and rates of depreciation.[2] Because the methods for 1922 and preceding years differed and because the basis of the estimates for the years before

[1] "The chief merit of the method actually followed by the census of 1922 in evaluating the wealth of the people of the United States is its continuity with the methods used in earlier censuses" (*Estimated National Wealth*, Bureau of the Census, 1924, p. x).

[2] See *Wealth, Debt, and Taxation: 1913* (Bureau of the Census, 1915), I, 19-20, and *Wealth, Debt, and Taxation* (Special Report of the Census Office, 1907), pp. 25-6.

1922 was inadequate, an attempt to compile a comparable and acceptable series of values for this category was deemed hopeless. This omission did not affect the primary purpose of our study—to distribute capital formation by industrial categories—but it did preclude the possibility of presenting a series on *total* commodity wealth. Consequently, the definition of wealth used here was narrowed to omit commodity stocks in households.

Further exclusions had to be made to obtain data satisfactory for our purposes. For only two of the four components of capital formation, producer durable equipment and new construction, could the wealth estimates be used. For changes in claims against foreign countries they are useless, since they include the value of all property in the United States regardless of ownership. Nor are the Census of Wealth data on inventories usable. Although inventories were estimated for each wealth report, they were actually based on diverse and crude assumptions; so that the resulting series cannot be considered adequate.[3] The estimates of changes in both claims and inventories prepared in connection with the commodity flow and capital formation study were used here whenever necessary; but unfortunately, this left us with the distribution by channel of industrial destination only for the output of producer durable goods and for construction.

[3] E.g., for stocks of manufactured products in 1922 "it was assumed that 25 percent of the year's production of foodstuffs and kindred products and two-thirds of other products were in stocks at the close of the year" (*Estimated National Wealth*, p. 15).

In 1912 "it was assumed that one-twelfth of the value of foodstuffs and one-half of other products for domestic use were in the possession of the merchants, and the value of materials and products in possession of the factories was assumed to be an amount equal to one-sixth of the gross products of the year 1912" (*Wealth, Debt, and Taxation: 1913,* I, 19).

In 1900 "it allows for the value of materials and products in the possession of the factories an amount equal to two months' 'gross products' of 1900, and for the manufactured goods in the possession of merchants an amount equal to one-half the annual 'net products' of the factory output, exclusive of hand trades" (*Wealth, Debt, and Taxation,* Special Report of the Census Office, p. 24).

In 1890 "the Eleventh Census Report on Wealth, Debt, and Taxation, Part II, expressly states that it includes an estimate for the value of the products of manufactures in the hands of factory owners" (*ibid.*). But no explanation of the derivation is given.

In 1880 "three-quarters of the annual product of agriculture and manufactures and of the annual importation of foreign goods, assumed to be the average supply in the hands of producers or dealers," is reported (*Estimated National Wealth,* Table 3).

Even for producers' equipment and construction the wealth estimates cannot be used as reported. Some of their limitations we can merely list; for others we have attempted to adjust.

OMISSIONS

The coverage of the wealth estimates is narrower than that of the two corresponding components of capital formation in that they exclude the value of (a) streets and roads and (b) United States Navy and other military equipment.

a) *Streets and roads:* The Bureau of the Census omitted this item from its wealth estimates since "in most cities a part or all of the cost of such improvements is assessed against property presumably benefited by the improvement, such presumption doubtless being taken into account by officials in determining assessed valuations for purposes of taxation".[4]

Carried to its logical conclusion this argument is hardly valid. It would mean excluding irrigation enterprises from the national wealth just because farm land in the 'dry' states is not fertile unless irrigated; and electric power or electrical equipment just because the latter is virtually worthless without the former.

The reason for omitting streets and roads here is lack of data. For 1922 the Federal Trade Commission estimated the value of land and improvements in streets and roads to be $21,850 million —$9,100 million as the value of land and $12,750 million, of improvements.[5] But these estimates cannot be extrapolated to preceding decades on even a crude basis.

b) *United States Navy and other military equipment:* Since 1900 the Bureau of the Census has stated in its wealth reports that the value of the Navy is included, but only for 1912 and 1922 does it give separate figures. That for 1912, $402 million, is "the reported cost of the vessels of the United States Navy in active commission, the cost of light vessels and tenders of the Lighthouse Service, the cost of the vessels of the Revenue-Cutter Service, and the value of the floating equipment of the War Department. No depreciation is shown for the vessels of the United States Navy, as the Navy Department carries its vessels at cost".[6]

[4] *Ibid.,* p. 6.
[5] *National Wealth and Income,* 69 Cong., 1st Sess., Senate Doc. 126, pp. 28, 34, 40-3.
[6] *Wealth, Debt, and Taxation: 1913,* I, 18.

The figure for 1922, $1,446 million, is "the value of the floating equipment of the United States Navy . . . secured from the Navy Department".[7]

If 'in active commission' is understood to be the same category as 'in commission' a considerable part of the fleet appears to be omitted from the wealth estimates. According to the *Statistical Abstract, 1925,* Table 144, the tonnage displacement of vessels 'in commission' was 1,501,315 and of vessels 'out of commission' 745,227 on January 1, 1926. A third category, 'under construction and authorized but not placed', covers some 38 vessels, but for most of these, displacement is not given. Similar data for earlier years are not published in the *Statistical Abstract.*

It is doubtful, therefore, that the 1912 and 1922 data are complete or even comparable in scope. And since it would be difficult, if at all possible, to prepare estimates for the entire period, this item was excluded from our totals. For similar reasons, the value of other military equipment also was omitted.

EXCESSES

The wealth reports include two items that do not fit into the pattern of our purpose: the value of (a) land and (b) motor vehicles.

a) *Land:* The official wealth reports contain estimates of the value of real estate, i.e., the sum of the value of land and of improvements. Since our primary concern is with the value of reproducible wealth, in order to allocate capital formation industrially, we had to estimate the value of improvements separately. The details of this adjustment are given in Section B.

This exclusion of land limits even further the definition of wealth adopted. Theoretically we might have omitted land values from the capital formation analysis and included them in the wealth discussion. Practically, however, it was impossible because of the difficulty of reducing land values to a common and constant base. Data on real estate are reported at market, or book or cost values. While with some statistical ingenuity and arbitrariness the value of land could be segregated from the reported totals, information is not available whereby land values for the various industrial categories can be converted to a constant and

[7] *Estimated National Wealth,* p. 12.

comparable base. Table IV 1 gives the *reported* values of land by industrial groups; but this category is omitted from any summaries intended to show comparable real magnitudes.

Segregation of the value of land, for the purpose of estimating *reproducible* fixed capital, is a difficult statistical operation, and the results are subject to error. *National Wealth and Income,* our primary source for this distribution in 1922, is relied upon heavily and is supplemented by fragmentary material for the earlier years.

There is a distinct possibility that our estimates of land values include some improvements that should properly be included in our estimate of reproducible wealth. For agriculture, for example, in years for which the Census of Agriculture reports land separately, it is stated that the figures include the value of fences, tile drains, and other incidental improvements. Consequently, the value of improvements, net of land, may be understated.

b) *Motor vehicles:* In 1922 the value of motor vehicles was included as a separate category for the first time in the national wealth estimate. It is excluded from our totals for two reasons. First, it is too broad in coverage: we are concerned only with the value of trucks and that portion of the value of passenger cars used solely for business. Second, since motor vehicles are part of capital equipment and would be covered in any report on that item, and since our estimates of equipment for specific industries are based upon such reported totals, motor vehicles, so far as they are capital equipment, are already covered. An additional figure would, therefore, introduce duplication.

2   *Allocation by Type*

Within total reproducible fixed capital, the only allocation possible on the basis of both wealth and capital formation data is that between construction or real estate improvements, on the one hand, and producer durable goods or machinery and equipment, on the other.

While a rough and ready distinction between these two categories of durable capital can be made on the basis of attachment to or separability from a specific location, it is too much to expect the line to be drawn consistently between one Census of Wealth and the next or among industrial categories; or the distinction followed in preparing the capital formation estimates to be identical with that drawn in the responses to or estimates in the

Census of Wealth. Furthermore, for many industrial categories, the Census of Wealth does not itself separate out equipment and improvements from total capital (or from total real estate) ; and the segregation must be made on the basis of fragmentary data and assumptions of doubtful validity.

For these reasons, the estimates for each major category of reproducible durable wealth are less reliable than for their total; and in the comparison of wealth and capital formation data the over-all totals, rather than the two components of each, should be emphasized.

3   *Allocation by Industry*

The characteristic of the distribution of wealth and capital formation by industries most important to bear in mind is that it is based upon a mixture of two criteria: industrial affiliation of the unit *owning* and *using* the capital item. The significance of this mixture of criteria is not the same for the two major components of reproducible wealth. For equipment the distribution by ownership is probably not very different from that by use: it is unlikely that rented equipment is an appreciable percentage of the total. But for improvements there may well be a substantial discrepancy between the two, e.g., all property owned by real estate firms, or a preponderant part of it, would be redistributed on the basis of use; a considerable part of property used for residential purposes would be redistributed on the basis of ownership.

Ownership is the dominant criterion. Three broad groups can be distinguished by type of ownership: private, public utility, and tax exempt, the last including public and 'socially owned' property (nonprofit institutions, etc.). But for the minor industrial divisions within these major groups the classification is mixed, based in part on ownership and in part on use. The public utility subdivisions are based on ownership throughout the period whereas agricultural and residential property are based on use. For mining, manufacturing, and other industrial property, however, in the early period, when the estimates are derived from capital values, the classification is based on ownership, while in the later period, when the estimates are derived from expenditures, it is based on use.

Another source of difficulty in interpreting the industrial classification is the incomparability of the periods before and after

1922, because Census of Wealth data are used for the former, capital formation data for the latter. The distribution for the earlier years is more detailed; that for the later must use broader categories (see Table IV 12). And in some minor respects full comparability could not be established between the sums of the narrower and the broader industrial divisions.

4 . *Valuation*

Before the Census of Wealth data can be used, the valuation methods must be examined. In computing the 'value' of the several forms of wealth, what price has been assigned to them? Can these values be readily adjusted for changes in the price and value levels from one point of time to another? There is no single answer since the total is the sum of the components and the components have not been valued by similar methods.

As taxable real estate values are based on assessments and the relation of sales values to them, they can be said to approximate the current price of the property. Tax exempt property, on the other hand, is taken at book value, which may be assumed to be original cost modified by resale and revaluation.[8] The value of shipping is stated to be current reproduction cost; that of canals, the cost of construction. The totals, therefore, are sums of items evaluated at either market or book prices.[9] Obviously, any analysis of the uncorrected reported values would have little meaning.

Hence, once the reported values for the several industrial and type categories of wealth had been established, the next major task was to convert them to a common price base. Since we are dealing with both market and book values two sets of indexes had to be calculated: of current prices and of prices underlying book values.

These indexes, used to convert reported values to a constant price base, are rough and subject to a considerable margin of error, especially for periods when changes in the price level were marked. They suffer from the paucity of statistical material, par-

[8] See Solomon Fabricant, *Capital Consumption and Adjustment* (National Bureau of Economic Research, 1938), for a discussion of the effect of revaluation of assets on book values.

[9] For more detailed discussion see the wealth reports of the Bureau of the Census and *National Wealth and Income,* Ch. II.

ticularly for the early years; and the index of prices underlying book values has the additional qualification that arbitrary life spans had to be assumed. Furthermore, the price indexes are annual averages whereas the value figures are for particular points of time. When prices are rising rapidly, converting the value at the beginning of the year by the average index for the year leads to an underestimate of the value in constant prices; an opposite bias occurs in periods of rapid price decline. For reasons stated below, two variants of adjustment for price changes were calculated for wealth components reported as valued at current prices. But when all is said and done, the adjustment remains the least satisfactory step in our procedure, and yields results that can be accepted only in their broadest indications.

5   Gross or Net

Are the wealth estimates gross or net of depreciation, i.e., do changes in them represent gross or net capital formation? Capital assets in the specific industries are estimated from reported 'capital invested', 'value of road and equipment', 'investment in plant and equipment', 'market value of taxable real estate', and even 'capitalization'. For some items it is expressly stated that depreciation has been allowed for; others, especially the estimates for the early part of the period, undoubtedly include undeducted depreciation, since not until recently has depreciation become an important consideration in business accounting.

The depreciation included in the total can be estimated roughly. For manufacturing, for which the Census instructions since 1890 have specifically stated that depreciation should be deducted, John R. Arnold has estimated that undeducted depreciation fluctuated between 4 and 5 percent from 1899 to 1919, and was smaller in the earlier years, becoming negligible before the Civil War.[10] For several public utilities, depreciation reserves are reported for 1922. The gross and net figures on capital are shown in the accompanying tabulation. Investment in 1922 is overstated by the amounts shown and we can assume less overstatement in the earlier years. For 1912 steam railroads, the one industry for which data are available, report $16,408 million for gross and $16,149 million for net value of road and equipment.

[10] 'Manufacturing Capital and Output, 1839-1931; Main Factors in Their Changes', *The Annalist*, July 7, 1933.

CAPITAL VALUES, 1922 (millions of dollars)

	GROSS	NET
Steam railroads, road and equipment	21,327	19,988
Street railways, road and equipment	5,059	4,878
Telephones, plant and equipment	2,205	1,746
Telegraphs, plant and equipment	361	257*
Electric light and power, plant and equipment	4,229	3,888*

* Total reserves, depreciation and other, deducted.

Although the Census reports are not definite concerning the deduction of depreciation allowances in every case, the assumption that the items reported at market values are net of depreciation is probably valid. On this assumption, at least 60 percent of our totals for the value of real estate improvements and of equipment is net. If we further assume that undeducted depreciation amounts to about 10 percent of the balance, our totals exceed net values by, at most, 5 percent.[11]

6 Comparison with Capital Formation

To test our estimates of the increase in the value of improvements and of equipment derived from the wealth data, we use the estimates of the flow of producer durable goods and total new construction for 1879-1938 from the capital formation study. The comparison in Table IV a, Part 1 shows that for the full period the increase in the wealth items falls $28 billion, or almost 20 percent, short of that indicated by net capital formation data; that this shortage is both absolutely and relatively greater for improvements than for durable equipment; that most of the shortage in improvements occurs during the decade 1912-22; and that the decade-to-decade discrepancies are relatively larger than those for periods of about twenty years.

Of the many reasons that could explain positive or negative discrepancies, the following are important:

a) The wealth data exclude street and road construction, which are covered in the net capital formation data. The net value of street and road construction for 1919-38, the only period for which statistics are available, was $19 billion in 1929 prices.[12] It

11 The 1922 ratio of net to gross derived from the text table is .927. In the earlier years, with smaller depreciation reserves, the ratio would approach unity. Solomon Fabricant's data on gross and net capital assets for transportation and public utility corporations in 1934 yield a ratio of .871 (*op. cit.*, p. 271).
12 Data underlying estimates in Table I 8.

TABLE IV a

Increase in Wealth Compared with Net Capital Formation, Census Dates, 1880-1922
1929 Prices (millions of dollars)

	1880 to 1890 (1)	1890 to 1900 (2)	1880 to 1900 (3)	1900 to 1912 (4)	1912 to 1922 (5)	1900 to 1922 (6)	1880 to 1922 (7)
1 WEALTH ITEMS ADJUSTED BY CURRENT COST (FOR MARKET VALUATION) AND PAST COST (FOR BOOK VALUATION)							
Improvements							
1 Wealth increase	21,162	19,868	41,030	47,819	1,076	48,895	89,925
2 Net construction	18,908	31,964	50,872	42,577	21,862	64,439	115,312
Equipment							
3 Wealth increase	6,927	8,338	15,265	18,093	2,627	20,720	35,985
4 Net producer durable equipment	4,406	4,919	9,325	14,237	14,891	29,128	38,453
Improvements and Equipment							
5 Wealth increase	28,089	28,206	56,295	65,912	3,703	69,615	125,910
6 Net construction & equipment	23,314	36,883	60,197	56,814	36,753	93,567	153,765
2 WEALTH ITEMS ADJUSTED BY AN AVERAGE OF CURRENT AND PAST COST (FOR MARKET VALUATION) AND PAST COST (FOR BOOK VALUATION)							
Improvements							
7 Wealth increase	20,050	20,486	40,536	50,645	9,659	60,304	100,840
8 Net construction	18,908	31,964	50,872	42,577	21,862	64,439	115,312
Equipment							
9 Wealth increase	6,909	8,792	15,701	18,077	2,120	20,197	35,898
10 Net producer durable equipment	4,406	4,919	9,325	14,237	14,891	29,128	38,453
Improvements and Equipment							
11 Wealth increase	26,959	29,278	56,237	68,722	11,779	80,501	136,738
12 Net construction & equipment	23,314	36,883	60,197	56,814	36,753	93,567	153,765

LINE
1 Derived from line 19 of Table IV 5.
2 & 8 Derived from col. 7 of Table II 15.
3 Derived from line 18 of Table IV 6.

LINE
4 & 10 Derived from col. 6 of Table II 15.
5 Sum of lines 1 and 3.
6 & 12 Sum of lines 2 and 4.

LINE
7 Derived from line 38 of Table IV 5.
9 Derived from line 36 of Table IV 6.
11 Sum of lines 7 and 9.

does not seem unreasonable to assume that the cumulated total for 1880-1922 was not far different from that figure.[18]

b) The wealth data exclude shipbuilding for the United States Navy and, indeed, net additions to stocks of all military equipment, which, so far as they originate in private production, are included in the net capital formation figures. This item, however, is minor.

c) Undeducted depreciation items, which are included in the wealth estimates, may have constituted a larger percentage of the total in 1880 than in 1922. Even if they did, the effect on the *understatement* of the increase in wealth can be only negligible, since the difference in the percentages would have to be large enough to offset the huge increase in the absolute values of wealth between 1880 and 1922 (from $32 billion to $158 billion, in 1929 prices, as shown in Tables IV 4 and IV 5).

d) A more important factor is that some improvements may be included with land; if they are, part of the net addition to improvements is omitted from the increase in wealth as measured in Table IV a. How much cannot be guessed, even crudely, but it may mean that the increase in the estimates based on the Census of Wealth is substantially less than that based on net capital formation data.

e) As already indicated, the adjustment of wealth data for changes in valuation is most difficult; and the results are subject to wide errors. For the wealth items that are supposed to be valued at market prices, it is not easy to assume that the reports are based upon a wide variety of well sampled current market transactions; and it is impossible to construct accurate indexes of changing market valuation. To measure changes in the market values of improvements and durable equipment in Table IV a, Part 1, we used current construction costs or current prices of durable equipment—a procedure that may be valid for the shorter lived items of durable equipment sold on well organized central business markets but can yield only the crudest approximation for the long

18 The Federal Trade Commission estimated the value of improvements embodied in public roads and streets to be $12.75 billion as of December 31, 1922 (*National Wealth and Income,* p. 43). This total, based largely on past costs, is, according to the Commission's own statement, an underestimate (see particularly the bottom of p. 41) and should not be adjusted for depreciation. In view of the much lower level of cost underlying this estimate, as compared with the 1929 price level, the assumption in the text does not seem unreasonable.

lived structures, etc. sold on thousands of local markets. For the wealth items supposed to be reported at book value, the cost may not be identical with the original construction or production cost minus the accumulated depreciation; but for lack of better data we adjusted for changes in values on the basis of indexes of past production or construction costs calculated on the assumption of a constant life period.

The errors in these procedures are likely to be biggest for wealth items that are reported as valued at current prices, for periods during which the prices have risen or fallen drastically and quickly, or for items reported at book values for periods during which readjustments in book values (from original costs) are likely to be major. On both counts, 1912-22 is the period for which we could expect the biggest error. For improvements, the use of current construction costs may well have overcorrected the current price wealth items in 1922, since prices of real estate may have risen less than current construction costs—either because of a more sluggish movement or because an easier supply of new construction units had already been anticipated. For durable equipment the change in the wealth items may reflect a writing down of assets in the postwar reconversion process of a type that cannot be reflected in our price indexes; and certainly not in the estimates derived from net capital formation data.

We could not improve or replace our price indexes for capital wealth items reported at book values. But for those valued at market prices, we give an alternative price index in the form of a simple mean of the index of past costs and of current production costs. The assumption is that current market prices underlying the valuation of wealth items do not fully reflect the ups and downs in the current cost of new items, but are rather a cross between past and current costs. The changes introduced are not great; but they do reduce the discrepancy between the two sets of estimates in 1912-22 and lessen the difference between the two totals for 1880-1922 from $28 to $17 billion (Table IV a, Part 2).

The factors discussed so far stress the possible biases and errors in the wealth data. We turn now to those in net capital formation estimates:

f) Net construction and net durable equipment totals allow for the deduction of consumption estimates that include depletion

of nonreproducible assets. As these assets are presumably part of the land values changes in them do not enter the values of improvements and durable equipment derived from the wealth data. Consequently, while in calculating net capital formation, it is correct to deduct the calculable consumption of nonreproducible assets, it is not correct to make this deduction in comparing net increases in construction and equipment with net increases shown by the corresponding wealth items.

In the 1920's the ratio of depletion to total consumption was roughly 5 percent (Solomon Fabricant, *Capital Consumption and Adjustment,* Table 30, proportion of depletion to total, the latter excluding automobiles and repairs and maintenance items). Since for most of the period, consumption and net capital formation were about equal (see Table II g), the increase represented by net capital formation should, for comparison purposes, be 5 percent, or about $8 billion, larger than is shown in Table IV a.

g) On the other hand, depreciation, depletion, and fire losses— the only items used in estimating consumption—do not exhaust the types of capital consumption. Items may be discarded before the end of the depreciation period; items may be destroyed by forces other than fire. Hence net capital formation totals tend to be biased upward by an amount that cannot even be guessed, but that may be substantial (as was already suggested with reference to durable equipment for 1912-22).

h) Capital formation is also too high so far as it includes items that may have been charged to maintenance and other current expenses. However, so far as the items are really durable, the wealth reports are an understatement rather than the net capital formation account an overstatement.

i) If too long a life period for improvements and equipment was assumed in calculating consumption, the consumption totals are too low and the net capital formation residuals too high. If, on the contrary, too short a life period was assumed, the consumption estimates are too high and the net capital formation residuals too low.

It is difficult to balance all these factors. Those to which magnitudes have been assigned (a and f) reduce the total discrepancy for 1880-1922 $19 billion and raise it $8. This still leaves a discrepancy of $17 billion in Part 1 of Table IVa, and of $6 billion in Part 2. Of the other factors the ones that lead to an understate-

ment of the wealth figures seem most important (d and e). Of these (d) could well account for a large part or all of the remaining discrepancy in Part 2.

The preceding discussion has also indicated why the differences were so large during the decade 1912-22; and why the discrepancy should have been relatively greater for improvements than for durable equipment. That the differences between the two sets of estimates are relatively, and sometimes absolutely, greater for short periods than for long is due to other factors.

The first is the comparative importance of net changes and of the totals used as diminuend and subtrahend. Under conditions of steady growth or decline, the shorter the period the smaller the total change compared with the initial and terminal quantities. Hence, errors in the latter may greatly affect the net difference, i.e., the total change. The longer the period, on the contrary, the less the relative effect on the net difference of errors in the terminal quantities. This argument is of particular bearing in connection with possible errors in the adjustment of wealth totals for changes in valuation.

The second factor is also more important in short period comparisons. The capital formation data are for overlapping decades (1879-88, 1884-93, 1889-98, 1894-1903, etc.) and in the form of annual averages; from these we calculated the total flow for 1880-90, 1890-1900, 1900-12, and 1912-22. That the dates for the wealth data are June 1 for 1880, 1890, and 1900, and December 31 for 1912 and 1922 also had to be taken into account. We calculated the capital formation for each period as follows:

1880-90: (8.5 × annual average for 1879-88) + (1.5 × annual average for 1889-98)
1890-1900: (8.5 × annual average for 1889-98) + (1.5 × annual average for 1899-1908)
1900-12: (8.5 × annual average for 1899-1908) + (4 × annual average for 1909-18)
1912-22: (1 × annual average for 1904-13) + (9 × annual average for 1914-23)

Other combinations of decade figures would have yielded different results. For example, if the estimates for 1912-22 were the sum of 6 times the annual average for 1909-18 and 4 times the annual average for 1919-28, improvements would have totaled $32,779 million, and equipment $14,540 million, instead of $21,862 million and $14,891 million. And were annual estimates available, the differences might well be reduced.

For these reasons we used, in subsequent analyses, longer time spans—subdividing the full period for which wealth and capital formation could be estimated into three twenty-year spans. Also, for reasons stated above, we considered the capital formation estimates more reliable in general than changes in wealth totals reduced to constant and comparable valuation; and used the wealth estimates only to suggest the distribution of capital formation by industrial destination for long periods when the capital formation estimates themselves did not give the information.[14]

[14] We also tried to compare the totals for real estate and equipment based upon the *Census of Wealth for 1922* with the values of fixed assets based upon the capital stock tax returns summarized in *Statistics of Income, 1924,* pp. 41-76. The comparison is difficult since the date for which the capital stock tax returns are reported is not identical with that of the *Census of Wealth;* the returns are not complete for all corporations; do not include fixed assets in the hands of unincorporated enterprises; and may well be based upon a definition and valuation of fixed assets that differ materially from the contents and valuation base of real estate and of durable equipment in the *Census of Wealth.* Before making the comparison we had to adjust the corporate data for undercoverage and for exclusion of noncorporate assets. These adjustments could be made for the capital stock tax returns data as of the end of 1923, and cover adequately four major divisions— mining, manufacturing, public utilities, and other industries (construction, trade, service, finance, and miscellaneous).

For these four categories, the value of real estate and equipment based on the *Census of Wealth* is estimated to be $96.3 billion at the end of 1922; that based on the corporate data, $86.4 billion at the end of 1923. If we allow for an addition to assets during 1923, the estimate based on the wealth data is roughly 15 percent higher than that based on the corporate data. However, for mining and manufacturing combined the two estimates are quite close ($35.5 billion from wealth data and $34.8 from corporate data). The major discrepancy is in the public utility group ($37.2 billion from the wealth data and $30.8 from corporate data) for which the wealth estimates are based upon a careful consideration of the valuations as checked by various regulatory commissions; and for which the reporting of assets as part of corporate income statistics has not been too complete, even in recent years. The discrepancy for 'other' industries, while sizable ($23.6 billion from wealth data and $20.8 from corporate data), cannot be assigned too much significance, because in so many subdivisions, corporations constitute a small proportion of the total; and hence the 'blow up' from corporate to total bases may easily be deficient.

While, in the nature of the case, the comparison cannot be conclusive there seems on the surface little reason to infer a sizable error in the wealth estimates. They may not reflect upward or downward revaluations of assets as promptly as corporate data. But they are sufficiently grounded on various censuses (agriculture, manufacturing, mining, utilities, etc.) and other comprehensive data to yield an estimate perhaps more indicative of the general order of magnitude than a set derived by raising the totals on corporate assets to cover all durable reproducible commodity wealth.

B   Basic Tables

Three groups of tables are presented below:

1) *Tables IV 1-IV 7:* estimates of the value of improvements and equipment and data basic to them. Estimates of reproducible wealth are given for June 1, 1880; June 1, 1890; June 1, 1900; December 31, 1912; December 31, 1918; and December 31, 1922. To each table are appended notes giving sources and methods and, in some cases, alternatives the reader may consider preferable.

Although the value of land is excluded from our estimates, Table IV 1, which gives estimates for the *Census of Wealth* dates, is presented in the belief that it may be of interest to some students.

Table IV 7 gives (unless otherwise noted) the wealth totals at the initial date of the period for which additions to reproducible wealth are available, January 1, 1919.

2) *Tables IV 8 and IV 9:* estimates of changes in the value of improvements and equipment, based upon capital formation, 1919-38. Gross and net additions to construction and equipment are given in current and 1929 prices.

3) *Tables IV 10-IV 13:* summary tables. The entries are either transcribed or derived from the preceding tables in this Part or Part II.

TABLE IV 1

Value of Land, Census Dates, 1880-1922 (millions of dollars)
Based on Reported Valuation

		VALUATION BASE	1880 (1)	1890 (2)	1900 (3)	1912 (4)	1922 (5)
1	Agriculture	Market	8,158	10,623	13,058	31,574	41,541
2	Mining	Book	364	818	1,189	2,109	3,362
3	Manufacturing	Book	320	776	1,027	1,700	4,328
4	Other industrial	Market	1,293	2,844	3,507	5,382	9,382
5	Residential	Market	3,170	7,687	10,513	18,455	36,011
6	Total taxable, excl. public utilities		13,305	22,748	29,294	59,220	94,624
7	Tax exempt	Book	1,152	2,170	3,307	6,689	11,065
8	Steam railroads	Book	886	1,494	1,741	2,602	3,202
9	Street railways	Book	15	41	157	434	455
10	Pullman, express, etc.	Book	4	7	8	9	38
11	Telephone	Book	1·	3	14	34	66
12	Telegraph	Book	4	6	6	7	11
13	Shipping & canals	Book	145	176	237	454	511
14	Electric light & power	Book	0	9	46	222	424
15	Waterworks	Book	12	12	13	14	18
16	Irrigation	Book	1	3	5	18	28
17	Pipe lines	Book	0.5	2	8	18	25
18	Total public utilities		1,069	1,753	2,235	3,812	4,778
19	Total land		15,526	26,671	34,836	69,721	110,467

The derivation of the value of land is given in the notes to Table IV 2.

TABLE IV 2

Value of Real Estate Improvements, Census Dates, 1880-1922
(millions of dollars)
Based on Reported Valuation

	VALUATION BASE	1880 (1)	1890 (2)	1900 (3)	1912 (4)	1922 (5)
1 Agriculture	Market	2,039	2,656	3,557	6,889	11,169
2 Mining	Book	91	201	325	644	1,120
3 Manufacturing	Book	363	879	1,450	3,450	8,772
4 Other industrial	Market	1,374	2,491	3,173	6,044	8,320
5 Residential	Market	3,361	6,736	9,527	20,676	31,904
6 Total taxable, excl. public utilities		7,228	12,963	18,032	37,703	61,285
7 Tax exempt	Book	626	1,237	2,061	4,258	7,164
8 Steam railroads	Book	3,376	5,794	7,054	10,672	13,220
9 Street railways	Book	104	288	1,131	3,156	3,339
10 Pullman, express, etc.	Book	4	7	9	10	44
11 Telephone	Book	9	33	178	455	882
12 Telegraph	Book	43	70	72	94	144
13 Shipping & canals	Book	145	176	237	454	511
14 Electric light & power	Book	0	44	223	1,100	2,113
15 Waterworks	Book	209	225	242	261	325
16 Irrigation	Book	27	60	97	325	495
17 Pipe lines	Book	10	42	141	323	450
18 Total public utilities		3,927	6,739	9,384	16,850	21,523
19 Total improvements		11,781	20,939	29,477	58,811	89,972

LINE 1

COL. 1 AND 2: The value of farm real estate is reported in the *Census of Agriculture.* The value of improvements is assumed equal to 20 percent of the total value of real estate (the average of the ratio of improvements to real estate in 1900—21%, 1912—18%, and 1922—21%).

COL. 3: The value of improvements is reported in the *Census of Agriculture.*

COL. 4 AND 5: Obtained directly from the Bureau of Agricultural Economics. The figures reported are for March 1 of the following year but are assumed correct for the end of the given year.

LINE 2

COL. 1: The 1880 wealth estimate includes the item "Mines (including petroleum wells) and quarries together with one-half the annual product reckoned as the average supply in the hands of producers or dealers" reported to amount to $781 million. One-half of the value of product, the sum of the value of product for precious metals, nonprecious metals, quarries, and petroleum reported in the 1880 *Census Compendium,* is subtracted, leaving $641 million as the value of capital invested.

The 1880 *Census of Mines* also reports separately the value of real estate, plant, and working capital for nonprecious mines, and on the assumption that the percentage distribution shown is representative of the entire mining industry, the value of real estate in 1880 is computed. The further apportionment of the value of real estate between the value of land and of improvements is based on the 1890 ratio of buildings to real estate (see the notes to col. 2).

Several other estimates of total capital invested are possible. The 1902 *Census of Mines* reports $1,449 million for capital invested in 1880 (more than double the figure we use). However, the 1890 *Census* reports $369 million for value of product in 1880; and if we subtract from the wealth estimate for 1880 one-half of this we get a smaller estimate of capital invested than the one we use. The 1902

Census reports $252 million for value of product in 1880; using this subtrahend, we get a slightly larger estimate of capital invested.

A somewhat different apportionment of total capital among real estate, equipment, and working capital is also possible if we use the nonprecious mining distribution for the total *excluding* petroleum and accept the 1880 *Census of Mines* figures for petroleum: $2 million for buildings, $4 million for machinery, and $27 million for total capital.

COL. 2: The 1890 *Census Abstract* reports capital invested in the mining industry as $1,292 million. The *Minerals Census* for 1890 classifies capital invested in specific mineral industries, $1,276 million, into four groups: land, building and fixtures, tools, etc., and cash and miscellaneous. The ratio of building and fixtures to the total is applied to total capital invested. The resulting estimate of 'building' is probably too high because of the inclusion of 'fixtures' but no correction could be made for this item.

Here also alternative estimates could have been made from other data. The 1890 wealth estimate for "Mines and quarries including product on hand" is $1,291 million but on the assumption that one-half of the annual product is included (following the procedure used for 1880) investment would be reduced to about $1,000 million.

The value of product reported in the 1890 *Census Abstract* as comparable with 'capital invested', which we accept, is $419 million. The same source gives $587 million as the total value of product. Had we used this figure the capital invested figure would have been increased 40 percent. We did not, because later *Census of Mines* reports do not show it. E.g., the 1902 *Census* gives (without explanation) $411 million and $438 million as the 1890 value of product, and the 1919 *Census* accepts the latter.

The 1902 *Census* gives "capital invested" figures for 1890 as $1,288 million and $1,311 million (also without explanation). The 1919 *Census* reports the latter but qualifies it as "for producing mines". These figures are not very different from those we adopted.

COL. 3: Total capital invested is estimated by multiplying the value of product by the ratio of capital invested to it. The value of product is interpolated between 1890 and 1902 (see the notes to col. 2 for 1890 and the *Census of Mines and Quarries* for 1902) by means of the Bureau of Mines data on value of product (see *Mineral Resources*). The ratio of capital invested to value of product is interpolated along a straight line between 1890 and 1909 (see the notes to col. 2 for 1890 and the *Census of Mines and Quarries* for 1909).

The value of real estate is estimated by multiplying total capital invested by the ratio of the value of real estate to it. The ratio of the value of real estate to capital invested is interpolated along a straight line between 1890 and 1922 (see the notes to col. 2 for 1890 and to col. 5 for 1922).

The value of improvements is the product of the value of real estate and the ratio of the value of improvements to it. This ratio also is interpolated along a straight line between 1890 and 1922 (see the notes to col. 2 for 1890 and to col. 5 for 1922).

An alternative for the value of mining real estate is the estimate in the 1900 wealth report, $687 million; our estimate is $1,514 million. Our estimate for 1890 is $1,019 million, and the ratio for 1900 of the value of real estate (wealth estimate) to the value of product is much lower than in other years. Consequently, the wealth estimate seems unreasonably low and was disregarded.

COL. 4: The value of improvements in 1912 is estimated by a procedure analogous to that for 1900 (see the notes to col. 3) except that the ratio of capital invested to value of product is interpolated along a straight line between 1909 and 1919. The data basic to this ratio are reported in the *Census of Mines and Quarries* for 1909 and 1919.

Table IV 2 continued:

LINE 2 *(concl.)*

COL. 5: For the value of real estate we accepted Robert R. Doane's estimate of $4,482 million which he bases on the Federal Trade Commission's figure of $6 billion but corrects in the light of state distributions (see *The Anatomy of American Wealth;* Harper, 1940; pp. 209, 217-8). This reduction seems reasonable, especially since the F.T.C. figure is based on *Statistics of Income* data, which include all fixed assets, and is therefore an overestimate. For the allocation of real estate between land and improvements we accepted Doane's estimates of 75 percent for land and 25 percent for improvements (in line with our 1890 figures, 80 and 20 percent).

Total capital invested, to which the value of real estate is related in deriving the 1900 and 1912 estimates, is extrapolated from 1919 with the value of product as index. The value of product, reported for 1919 in the *Census of Mines and Quarries,* is extrapolated to 1922 by the Bureau of Mines series.

The Federal Trade Commission estimates the ratio of value of land to value of real estate in mineral counties to be 0.609 (*National Wealth and Income,* p. 35). This ratio is too low for mining *property* since it covers all real estate in those counties.

LINE 3

COL. 1: Total capital invested is reported in the *1900 Census of Manufactures.* The value of buildings is estimated by multiplying capital invested by the ratio of the value of buildings to it for 1879 (Paul Douglas, *Theory of Wages;* Macmillan, 1934; p. 115):

"It seems undeniable that buildings and machinery did not increase as rapidly in comparison with working capital during the eighties as they did during the fifteen years which followed 1889 when buildings advanced from 13.4 to 15.8 per cent, or an increase of 2.4 points, and machinery, etc., from 24.3 to 27.5 points a year, respectively. We have assumed that the growth in the proportions which buildings formed of the total was at approximately only one-quarter of the rate of speed of the nineties and for machinery at only one-fifth. This would give 13.0 per cent as the probable figure for buildings in 1879 and 24.0 per cent as that for machinery, tools, and equipment."

COL. 2: The value of buildings is from the *1900 Census of Manufactures.*

The $3,059 million for "machinery of mills, and production on hand, raw and manufactured" in the wealth estimate for 1890 was not used in our calculations.

COL. 3: The value of buildings is from the *Census of Manufactures.*

The value of real estate, the sum of the value of land and of buildings, from this source, $2,478 million, checks with the value for 1900 in *Wealth, Debt, and Taxation* (Department of Commerce and Labor, 1907), $2,477 million.

The *1914 Census Abstract* reports capital (excluding hand and neighborhood trades) as $8,975 million; but since the original figure, $9,817 million, has broader coverage, we did *not* adjust it to the lower level.

COL. 4: The value of buildings is estimated by multiplying total capital by the ratio of the value of buildings to it. The ratio is interpolated along a straight line between 1909 and 1914 (for the ratio in 1909 and 1914 see Douglas, *op. cit.,* Ch. 5, Table 4). Total capital is estimated by dividing the value of machinery (*Wealth, Debt, and Taxation: 1913,* I) by the ratio of the value of machinery to it (calculated by a method similar to that for the ratio of buildings to total capital).

As a check on these estimates the value of fixed assets also was computed and the percentage distribution of total capital derived. The value of fixed assets is interpolated between 1904 and 1922 with the value of buildings and machinery as index (for 1904, see the *Census of Manufactures,* and for 1922, see the notes to col. 5). The value of land is obtained by subtraction. The percentage distribution of total capital is compared in the accompanying table with that for 1904.

PERCENTAGE DISTRIBUTION OF TOTAL CAPITAL (MANUFACTURING)

	1904	1912
Land	7.7	7.9
Buildings	15.7	16.1
Machinery	27.5	28.5
Other capital	49.0	47.5
Total	100.0	100.0

Total capital in 1912 is estimated to be $21,404 million, a reasonable figure when compared with total capital reported for 1909 and 1914 in the *Census of Manufactures*—$18,428 million and $22,791 million.

COL. 5: The value of buildings is estimated by multiplying total capital by the ratio of the value of buildings to it (Douglas, *op. cit.*, Ch. 5, Table 4). Total capital is derived by extrapolating the 1919 figure (*Census of Manufactures*) by the index of the value of fixed assets (unpublished series prepared by Solomon Fabricant).

Total capital may have a wider margin of error than the other estimates since Douglas' ratios are assumed to have a more or less steady trend and Fabricant's index of fixed assets is used for total capital. Working capital, and therefore total capital, may undergo marked cyclical fluctuations. Unfortunately, no data are available with which to check on this point.

Total fixed assets, essential to the computations for col. 4, are estimated by dividing the sum of the value of buildings and of machinery (for the latter see the notes to Table IV 3, line 3, col. 5) by its ratio to the value of fixed assets. The ratio is derived from data on land and other fixed assets for Missouri (*Missouri Red Book*, 1923).

Lowell J. Chawner's estimates of expenditures for manufacturing plant ('Capital Expenditures for Manufacturing Plant and Equipment—1915 to 1940', *Survey of Current Business*, March 1941) were used to test the accuracy of our estimates. Total capital in 1914 (*Census of Manufactures*), multiplied by Douglas' ratio of buildings to capital yielded an estimate of the value of buildings in 1914. To this total were added Chawner's estimates of plant expenditures for 1915-22, yielding $8,646 million as the 1922 value of buildings, gross of depreciation for 1915-22. Our estimate for 1922, net of depreciation, is $8,772 million.

Several other estimates of the value of capital and some of its components can be compared with our figures. Our estimate of total capital is $53,164 million. The Federal Trade Commission, in *National Wealth and Income*, uses $44,000 million, the 1919 figure, stating that "there was probably comparatively little change for 1922".

The Census figure, $52,611 million (*Estimated National Wealth*, 1924) is derived by extrapolating the 1919 figure to 1921 by the value of land, buildings, and machinery for a sample of 60 corporations, 1919-21, and assuming that the increase from 1921 to 1922 was at the same rate as from 1920 to 1921. An error was introduced in the initial steps by the use of $44,567 million for total capital in 1919 instead of $44,467 million, as reported in the *1920 Census of Manufactures* (VIII, 14).

The difference between our estimate of the value of buildings, $8,772 million, and Douglas', $8,681 million, is also due to the use of an incorrect figure for total capital in 1919, since Douglas uses the data in *Estimated National Wealth*.

Our estimate of the value of land is $4,397 million; of the value of real estate, therefore, $13,169 million. The Federal Trade Commission puts this item at $24,000 million—definitely an overestimate since its basis is *Statistics of Income* corporate data, which include machinery. By applying the 1904 ratio of real estate to capital (.235) to total capital as reported in *Estimated National Wealth*, Doane estimates the value of real estate to be $12,364 million.

An alternative estimate for the value of land is also possible. On the basis of

Table IV 2 continued:
LINE 3 (*concl.*)
a sample of Massachusetts corporations, collected by the National Bureau (Financial Research Program), the 1904 ratio of machinery to fixed assets can be extrapolated and applied to the 1922 machinery figure to yield total fixed assets. The value of land, $5,833 million, is the difference between total fixed assets and the value of machinery and buildings. The percentage distribution of fixed assets on this basis is land, 18.9; buildings, 28.8; and machinery, 52.3; for the estimates we use, the percentage distribution is land, 14.9; buildings, 30.2; and machinery, 54.9. For a sample of Wisconsin corporations the National Bureau also collected some fixed asset data; the percentage distribution for it is land, 17.2; buildings, 36.9; and machinery, 45.9. We accepted the Missouri data as more typical and reliable.

LINE 4
The values of all taxable real estate (excluding public utilities) in the wealth reports for 1880, 1890, 1900, 1912, and 1922 are basic to our estimates.   ·

COL. 1: To the value of taxable real estate as reported is added the value of mining real estate (see the notes to line 2, col. 1) since in the wealth estimate the latter, combined with the product on hand, is shown separately. From the total the value of real estate in agriculture, mining, and manufacturing (see the notes to lines 1-3, col. 1) is subtracted to yield the value of other industrial and residential real estate.

The value of land in total taxable real estate is obtained by multiplying the value of real estate by the ratio of the value of land to it. The ratio is extrapolated from 1900 (see the notes to col. 3) by the ratio for agriculture, mining, and manufacturing combined. The value of other industrial and residential buildings is the difference between the value of real estate and of land.

The value of other industrial real estate is the difference between the value of other industrial and residential real estate and the value of residential real estate (for which see the notes to line 5, col. 1). The value of other industrial buildings is based on the assumption that the ratio of the value of other industrial and residential real estate is applicable to the value of other industrial real estate alone.

COL. 2: The method is analogous to that used for col. 1 except that total taxable real estate as given in the wealth report already includes mining real estate.

COL. 3: To the total value of taxable real estate reported is added the value of tax exempt property used for agriculture and manufacturing since both are presumably covered in the agricultural and manufacturing statistics. The value of other industrial and residential real estate is estimated by the method described for col. 1, with the value of mining real estate given in the wealth report as part of the subtrahend.

The value of land in all taxable real estate is estimated by the method described for col. 1. The ratio of the value of land to the total value of real estate is extrapolated from 1922 (for which see the notes to col. 5) by the comparable ratio for five sample states. The data for the latter ratio in 1922 are the percentages for California, Colorado, Indiana, Minnesota, and West Virginia (*National Wealth and Income*), weighted by the value of taxable property reported for those states (*Estimated National Wealth*) ; the data for the 1900 ratio are from *Wealth, Debt, and Taxation* (Special Report of the Census Office, Washington, D. C., 1907), Table 2.

From this point on the procedure is the same as that outlined for col. 1.   ·

COL. 4: The method is the same as that for col. 1 except that the ratio of the value of land to the value of real estate for all taxable property is interpolated along a straight line.

COL. 5: The method here too is similar to that for col. 1 except that the value of land included in total taxable real estate as estimated by the Federal Trade Commission (*National Wealth and Income*) is used.

LINE 5

COL. 1 AND 2: The value of residential real estate is estimated by multiplying the value of other industrial and residential real estate (see the notes to line 4, col. 1) by the ratio of the former to the latter. The ratio is extrapolated along a straight line, based on the data for 1900 and 1922.

For the assumption under which the total value of real estate is divided into the value of land and of buildings see the notes to line 4, col. 1.

COL. 3: The method is similar to that for col. 1 except that the value of residential real estate is given separately in *Wealth, Debt, and Taxation.*

COL. 4: The method is similar to that for col. 1 except that the ratio of the value of residential real estate to the total value of taxable real estate is interpolated along a straight line between 1900 and 1922.

COL. 5: The method is similar to that for col. 1 except that the value of residential real estate is from *A Study of the Physical Assets, Sometimes Called Wealth, of the United States, 1922-1933,* prepared by the University of Notre Dame, Bureau of Economic Research (1939).

LINE 6

Sum of lines 1-5.

LINE 7

COL. 1-5: The total value of tax exempt real estate as given for 1922 in the Notre Dame report is extrapolated for the earlier years with the value of tax exempt real estate in the wealth reports as index. The 1900 figure had first to be reduced by the value of tax exempt agricultural and manufacturing real estate, already covered in the estimates for those groups.

To estimate the value of buildings we assumed the same percentage distribution between land and buildings as for taxable real estate. The percentage of the value of land to the value of real estate in 1922 is 60.7, the figure the Federal Trade Commission uses (*National Wealth and Income,* pp. 31-5). The Notre Dame percentage is 24.5 (*A Study of the Physical Assets,* pp. 123-32). *Federal Ownership of Real Estate and Its Bearing on State and Local Taxation* (76 Cong., 1st Sess., House Doc. 111) gives two divisions of federal real estate—one based on cost, the other on assessed valuation—for property owned June 30, 1937. The percentage of land in real estate is 9.0 on the cost basis, and 43.7 on the assessed valuation basis.

LINE 8

Available statistics cover the cost of construction of roads as a whole, and the division into land and equipment in all years is based on the 1922 distribution. The ratio of the value of improvements to the total value of real estate that the Federal Trade Commission reports for 1922 (*National Wealth and Income*) is extrapolated for the other years with the similar ratio for taxable real estate as index. The derivation of the cost of construction is given below for each year.

COL. 1: The cost of construction reported in the *1880 Census of Transportation* is raised to the total by including the Census estimate of such cost not reported.

As the estimate in the wealth report for 1880 is for railroad capital, it includes the value of equipment. It also includes the investments and cash assets of the railroads and is, therefore, too broad in coverage.

COL. 2: The cost of road and equipment is reported in the *1922 Statistics of Railways.* The segregation of equipment is based on the percentage distribution of the total in the *1890 Census Abstract.*

Several other figures for the cost of road and equipment are available. The estimate we use is $8,134 million; the wealth report shows $8,296 million; the *1890 Census Abstract* reports $8,041, of which $7,202 million is for road and $838 million for equipment (the percentage division we apply to the total we use); *Statistics of Railways for 1890* reports $7,755 million, of which $7,333 million is

Table IV 2 continued:

LINE 8 (*concl.*)

for road and $422 million for equipment. As the latter division gives, unreasonably, a lower percentage for equipment than we have for 1880, it was not used.

COL. 3: The cost of road and equipment is reported in the *1922 Statistics of Railways*. The division into real estate and equipment is derived by interpolating the ratio of real estate to the total along a straight line between 1890 and 1922, and applying the resultant ratio to the total for 1900 (see the notes to col. 2 for 1890 and to col. 5 for 1922).

Our total of the cost of road and equipment is $10,263 million whereas the estimate for railroad capital in the wealth report is $9,036 million. Our estimate checks, however, with the total in the *1900 Statistics of Railways*. The latter also reports the cost of road and of equipment separately, $9,675 million and $588 million; but as the percentage of the cost of equipment to the total seems unreasonably low, it was disregarded.

COL. 4: The method is similar to that for col. 3 except that the cost of road and equipment for switching and terminal companies is taken from the *1912 Statistics of Railways*.

The estimate of railroad capital in the wealth report differs from ours in that it is net of depreciation.

COL. 5: To the cost of road and equipment for both railroads and switching and terminal companies (*Statistics of Railways*) we added the cost of road and equipment for private and intrastate companies (*Estimated National Wealth*). The segregation of the values of land, improvements, and equipment is based on the percentage distribution in *National Wealth and Income*.

The difference between our total, $21,327 million, and that in the wealth report, $19,951 million, is due almost entirely to the deduction for depreciation made by the Bureau of the Census.

LINE 9

COL. 1: The only available data are miles of lines reported in the *1890 Compendium of the Census*. The cost of road and equipment is estimated by multiplying the number of miles by average cost per mile, the latter being assumed to be the same as in 1890. Real estate is segregated by multiplying the estimated cost of road and equipment by the 1890 ratio of real estate to the total, extrapolated by the similar ratio for steam railroads. The further division of real estate into land and improvements is based on the 1922 ratio extrapolated by the ratio of land to real estate for taxable real estate.

COL. 2: The total cost of street railways in the *Census Compendium* is divided into animal, electric, cable, and steam railways in the *1890 Transportation Census*. Also given for sample railways (for each of the four types) is the division of the total cost into road and equipment cost. On the basis of these samples (over 50 percent coverage) and total cost a weighted ratio of equipment to total cost is derived and applied to total cost to yield separate estimates of the cost of equipment and of construction. The cost of construction is divided into land and improvements by the method used in obtaining the 1880 estimate.

COL. 3-5: The estimates for road and equipment are taken from the wealth reports except for 1922, when depreciation was deducted. For that year the figure, before depreciation, in the *Census of Electrical Industries* is used. The series, taken from both sources, is, in millions of dollars: 1900, 1,576; 1902, 2,168; 1904, 2,220; 1907, 3,638; 1912, 4,597; 1917, 5,136; 1922, 5,059 (4,878 after deducting depreciation). The 1922 total is divided into land, improvements, and equipment by means of the Federal Trade Commission percentages. For the other years the ratio of equipment to the total is interpolated between 1890 and 1922 by the similar ratio for steam railroads and applied to the total to yield the value of

equipment and real estate. Real estate for years other than 1922 is distributed by extrapolating the 1922 ratio of land to real estate (derived from the Federal Trade Commission ratios) by the similar ratio for taxable real estate.

LINE 10

COL. 1 AND 2: The total is extrapolated from 1900 by the cost of steam railroad real estate and equipment. The value of real estate is estimated by multiplying the total by the ratio of real estate to it. This ratio (derived for 1922 from Federal Trade Commission data) is extrapolated with the similar ratio for steam railroads as index. The value of improvements is estimated by multiplying the value of real estate by the ratio of improvements to real estate. This ratio, also derived for 1922 from Federal Trade Commission data, is extrapolated with the similar ratio for taxable real estate as index.

COL. 3-5: The total value is given in the wealth reports. The value of improvements is estimated by the methods described in the notes to col. 1 and 2.

Wealth, Debt, and Taxation for 1900 and 1904 states: "The value of Pullman and private cars was ascertained in connection with the estimates of the value of railroads. . . ." The report for 1912 states: "The estimate of the value of cars belonging to the Pullman and other private car companies is based upon the report rendered by the Pullman Company to the Interstate Commerce Commission, which shows the cost of property and equipment, exclusive of land." The report for 1922 states: "The estimated values of cars belonging to the Pullman Company and express companies are based on reports . . . to the Interstate Commerce Commission. . . . The estimated value of privately owned cars . . . is based on the number of such cars as shown in the Equipment Register of January, 1923, and the average value of such cars. . . . The estimated values of the three classes of cars are combined into a single item in this report."

It would seem, therefore, that our estimates are too large in that they include cars owned by other industries and presumably covered under equipment in those industries. On the other hand, they are too small in that they exclude the value of real estate and other equipment owned by the Pullman Company and express companies. Also, if the wealth item is only *cars,* as stated above, we are in error in following the Federal Trade Commission's technique of dividing the total into land, improvements, and equipment.

Some other data are available for 1922 in the Interstate Commerce Commission's published data for the Pullman and express companies—*Preliminary Abstract of Statistics of Common Carriers:*

EXPRESS COMPANIES	(millions of dollars)
Land (cost)	5
Buildings (cost)	10
Equipment (cost)	22
Total (cost)	37
Depreciation	10
Net physical property	27
Equipment (inventory value)	13
of which cars " "	0.7
PULLMAN COMPANY	
Cost of property and equipment	195
Reserve accounts	74

Similar data are not available for any of the other years for which we have wealth estimates.

LINE 11

For no years do we have statistics other than for total investment in plant and equipment. The value of real estate is estimated by multiplying this total by the ratio of real estate to it. The ratio, derived for 1922 from Federal Trade Commission data *(National Wealth and Income),* is extrapolated with the similar ratio

Table IV 2 continued:

LINE 11 *(concl.)*

for steam railroads as index. The value of improvements is estimated by multiplying the value of real estate by the ratio of improvements to it. This ratio (also derived for 1922 from Federal Trade Commission data), is extrapolated with the similar ratio for taxable real estate as index.

COL. 1: The only investment figure reported is for capital stock and funded debt (given in the *1880 Census of Transportation* and also in the *1912 Census of Telephones*). The *1880 Census* also reports total miles of wire and the miles of wire of companies reporting capital stock and funded debt. The reported figure was raised accordingly.

COL. 2: 'Investment in plant and equipment' is given in the *1927 Census of Telephones* with a note "Partial enumeration only". In the *1912 Census of Telephones* this item is reported as "capital stock and funded debt". Data by which this figure can be stepped up to the total are not available.

COL. 3-5: The estimates of investment in plant and equipment are from the wealth reports. They agree with the *Census of Telephones* figures for 1912 and 1922, and seem reasonable when assembled with the latter figures for earlier years. The combined series is, in millions of dollars: 1900, 400; 1902, 404; 1904, 586; 1907, 820; 1912, 1,081; 1917, 1,258; 1922, 1,746.

LINE 12

The values of land, improvements, and equipment were estimated by the same method as for telephones (see the notes to line 11).

COL. 1: Investment in plant and equipment is assumed equal to 'franchise and construction', $93 million, for land telegraph only (*1880 Census of Transportation*). In a table on world statistics in the same volume 'cost of line and equipment' is given as $18.7 million with a note: "based on the report of the president of the Western Union Telegraph Co. for 1869, and upon other data found in Mr. Lines' report".

COL. 2: No data on investment are reported. We interpolate between 1880 and 1902 on the basis of 'Telegraph lines; stocks owned of leased telegraph companies that are merged in Western Union Co.'s system; franchises; patents, etc.' given by the Western Union Telegraph Co. in its annual reports for 1880, 1890, and 1902.

COL. 3-5: For 1900, 1904, 1912, and 1922 estimates of plant and equipment are given in the wealth reports; for 1902, 1907, 1912, 1917, and 1922 in the *Census of Telegraphs*. For 1912 alone do the two sources check. The series based on the two sources is in millions of dollars: 1900, 212; 1902, 162; 1904, 227; 1907, 210; 1912, 223; 1917, 253; 1922, 361 (*Census of Telegraphs*) and 204 (*Estimated National Wealth*). Since for 1900 and 1904 the description of the derivation in the wealth reports is vague, and since the figures seem out of line with those in the *Census of Telegraphs* we used the *1902 Census of Telegraphs* estimate for 1900. Wireless is included for the first time in 1907.

For 1922 we use the figure reported in the *Census of Telegraphs*. The 1922 estimate in the wealth report is net of depreciation reserves but still seems unreasonably low. The *Census of Telegraphs* reports 'Reserves, depreciation and other' as $94 million; subtracting that from the gross figure, we obtain $267 million; the wealth estimate is $204 million.

LINE 13

The cost of canals (described below) and the value of vessels (see the notes to Table IV 3, line 12) were estimated separately, then combined and raised to the value of total fixed capital before being classified into land, improvements, and equipment.

The total value of fixed capital is estimated by dividing the value of vessels (equipment) by its ratio to the total. The ratio is obtained as the complement of the ratio of real estate to total fixed capital, which is estimated for 1880, taken for 1922 from *National Wealth and Income,* and interpolated along a straight line for other years. The ratio for 1880 is derived as follows:

For steamship traffic the value of vessels is $80 million; of capital invested, $112 million (*1880 Census of Transportation*). Assuming that the difference represents real estate we multiplied its ratio to the comparable value of vessels by the total value of vessels to obtain the value of real estate in shipping. The ratio of real estate to total fixed assets is obtained by dividing the value of real estate in shipping plus the cost of canals by the value of real estate in shipping plus the cost of canals plus the value of vessels.

The real estate value is estimated by subtracting the value of equipment from total fixed capital. It is divided into land and improvements on the assumption that the Federal Trade Commission's distribution (*National Wealth and Income*) is applicable for the entire period.

Canals

COL. 1 AND 2: The cost of operated and of abandoned canals is given in the *1916 Census of Water Transportation*. An alternative estimate for operated canals, $170 million, is given in the *1880 Census Compendium;* our estimate is $184 million.

COL. 3: The estimates of the cost of canals, both operated and abandoned, are interpolated along a straight line between 1890 and 1906 (for 1906 also reported in the *1916 Census of Water Transportation*).

COL. 4: The estimate of the cost of abandoned canals is interpolated between 1906 and 1916 (for 1916 also reported in the *1916 Census of Water Transportation*). The cost of operated canals is estimated by adding $51 million to the 1906 figure. In *Wealth, Debt, and Taxation: 1913,* I, it is stated: "The increase in the valuation reported for 1912 over the valuation shown for 1904 and 1900 is due largely to the construction of the Barge Canal in New York, upon which $50,864,369 has been expended down to October 1, 1912."

COL. 5: For both operated and abandoned canals the 1916 value (*Census of Water Transportation*) is used. In *Estimated National Wealth* it is stated: "the values of canals and investments in canalized rivers were taken from a report of the Bureau of Census for 1916".

The figures in the wealth reports for 1900, 1904, 1912, and 1922 are smaller than those described above, presumably because they exclude the value of real estate in shipping; on the other hand, they include the value of the Navy in 1900 and 1904. The comparison is, in millions of dollars:

SHIPPING AND CANALS

	1900	1904	1912	1922
Wealth estimates	538[a]	846[a]	1,089	1,506
Present estimates	817[b]	. . .	1,693[b]	2,044[b]
[a] Includes Navy.		[b] Includes shipping real estate.		

For 1880 the wealth report's figure for telegraphs, shipping, and canals is $419 million. Our total for the two groups is $539 million.

For 1890 the wealth report's figure for telegraphs, telephones, shipping, canals, and equipment is $702 million. Our total for the three groups is $798 million.

LINE 14

The values of land, improvements, and equipment are estimated by the same method as for telephones (see the notes to line 11).

COL. 1: We assumed the investment to be zero since of those companies surviving in 1902 only 7 began operations in 1881, and there are no other figures by which

Table IV 2 continued:

LINE 14 (*concl.*)

we can estimate the investment in 1880. If it was not zero, it was probably very close to it.

COL. 2: The 1902 *Census of Electric Light and Power* reports the number of stations in operation in 1890. Plant and equipment is estimated on the basis of the number of stations and the estimated cost of plant and equipment per station. The latter figure, available for 1902 from the *Census,* is extrapolated to 1890 by the similar figure for New York electric light and power stations (also reported for 1890 and 1902 in the *1902 Census*).

COL. 3-5: The estimates are from the wealth reports. They agree with the *Census of Electric Light and Power* figures for 1912 and 1922, and seem reasonable when assembled with the latter figures for earlier years. The combined series is, in millions of dollars: 1900, 403; 1902, 483; 1904, 563; 1907, 1,054; 1912, 2,099; 1917, 2,933; and 1922, 4,229.

LINE 15

The 1922 distribution of total investment into land, improvements, and equipment (*National Wealth and Income*) is applied throughout the period.

COL. 1 AND 2: Total investment in 1880 and 1890 is derived by assuming the same annual increment as held from 1900 to 1904.

COL. 3-5: Total investment is from the wealth reports.

LINE 16

According to the *1930 Census of Irrigation of Agricultural Lands,* "The investment includes cost of construction and cost of acquiring rights. The latter usually consists of filing fees only, . . ." Assuming therefore that improvements make up the preponderant part, we used the Federal Trade Commission percentages for waterworks—5 for land, 90 for improvements, and 5 for equipment—and kept them constant for the entire period.

COL. 1: The value of irrigation enterprises is an extrapolation of the 1890 figure based on the investment in 1930 of companies in business in 1880, 1890, and 1900. While the latter series (*1930 Census of Irrigation*), includes, of course, investments made after the date in question, it was thought to be a better basis for extrapolation than a straight line. The ratio of the percentage change in this series from 1880 to 1890 to the percentage change from 1890 to 1900 was applied to the percentage change in capital invested as reported in 1890 and estimated for 1900.

COL. 2: The estimate is that in the *1912 Census of Wealth, Debt, and Taxation,* which states (p. 18): "These enterprises increased in value from $66,062,275 in 1889 to $360,865,270 in 1912. . . ."

Another estimate for 1890, $30 million, is reported in the *1930 Census of Irrigation.*

COL. 3: The only figure reported is in the *1930 Census of Irrigation.* Since figures are also given there for 1890 and 1910 we used that series as an index to interpolate between the 1890 and 1912 figures in the wealth reports. The 1910 figure is used for 1912 without any adjustment (the former, from the *Census of Irrigation,* is $321 million and the latter, from the *Census of Wealth, Debt and Taxation,* is $361 million).

COL. 4: The estimate is from the wealth report.

COL. 5: The 1920 figure in the *Census of Irrigation,* but excluding government investment, is used.

The figure for 1922 may well be an underestimate. For 1930 the *Census of Irrigation* reports the 'cost of preparing land for irrigation', an item not included

in 'investment in irrigation enterprises'. The two figures for 1930 are for investment $1,033 million, and for cost of clearing land $524 million.

LINE 17

The only figure for investment in pipe lines, a rough estimate for 1922 (*Estimated National Wealth*), is extrapolated by mileage figures for interstate pipe lines (Walter Splawn, 'Transportation by Pipe Lines', *Oil and Gas Journal*, Sept. 22, 1938). No data for intrastate mileage are available for these years, but for 1924-38 the ratio of interstate to total mileage is quite stable.

The 1922 Federal Trade Commission percentage distribution into the value of land, improvements, and equipment (*National Wealth and Income*) is applied throughout the period.

LINE 18

Sum of lines 8-17.

LINE 19

Sum of lines, 6, 7, and 18.

TABLE IV 3

Value of Equipment, Census Dates, 1880-1922 (millions of dollars) Based on Reported Valuation

	VALUATION BASE	1880 (1)	1890 (2)	1900 (3)	1912 (4)	1922 (5)
1 Agriculture	Market	407	494	750	1,392	2,292
2 Mining	Book	143	202	399	980	2,001
3 Manufacturing	Book	670	1,584	2,543	6,091	15,949
4 Other industrial	Market	889	1,778	2,227	3,809	5,901
5 Total taxable, excl. public utilities		2,109	4,058	5,919	12,272	26,143
6 Tax exempt	Book	222	438	730	1,507	2,536
7 Steam railroads	Book	418	846	1,468	3,134	4,905
8 Street railways	Book	19	60	288	1,007	1,265
9 Pullman, express, etc.	Book	37	64	82	104	463
10 Telephone	Book	9	36	208	592	1,257
11 Telegraph	Book	46	77	84	122	206
12 Shipping & canals	Market	156	221	343	785	1,022
13 Electric light & power	Book	0	23	134	777	1,692
14 Waterworks	Book	12	12	13	14	18
15 Irrigation	Book	1	3	5	18	28
16 Pipe lines	Book	1	2	8	18	25
17 Total public utilities		699	1,344	2,633	6,571	10,881
18 Total equipment		3,030	5,840	9,282	20,350	39,560

LINE 1

COL. 1-3: Value of farm equipment is reported in the Census of Agriculture.

COL. 4 AND 5: The estimates are those prepared by the Bureau of Agricultural Economics (*Income Parity for Agriculture*, Part II, Sec. 3, Washington, D. C., Aug. 1940). Forty percent of the value of automobiles is included to cover business use of passenger cars.

The figure for 1922 is $2,292 million; that reported in *Estimated National Wealth* is $2,605 million. The latter excludes automobiles and trucks, estimated by the Bureau of Agricultural Economics to be $750 million, of which $358 million was included in our estimate.

LINE 2

COL. 1 AND 2: The method is the same as that described for value of improvements (see the notes to Table IV 2, line 2, col. 1 and 2).

Table IV 3 continued:

LINE 2 *(concl.)*

COL. 3-5: Value of equipment is obtained by multiplying capital other than real estate by the ratio of machinery to it. The derivation of the former is given in the notes to Table IV 2, line 2, col. 3-5; for the latter the 1890 figure is used (see the notes to Table IV 2, line 2, col. 2).

LINE 3

COL. 1 AND 2: The method is the same as that described for value of improvements (see the notes to Table IV 2, line 3, col. 1 and 2).

COL. 3: See the notes to Table IV 2, line 3, col. 3 for the method. Value of equipment, $2,543 million, checks with the value in the wealth report for 1900, $2,541 million.

COL. 4: The value of machinery is given in *Wealth, Debt, and Taxation: 1913*, I.

COL. 5: The estimate is obtained by multiplying total capital (see the notes to Table IV 2, line 3, col. 5) by the ratio of the value of machinery to it (*Estimated National Wealth* and used also by Douglas).

We checked our estimate of the value of machinery in 1922 against Chawner's estimates of expenditures for manufacturing equipment. The method and sources are the same as those for Table IV 2, line 3, col. 5. Our total is $15,949 million; that based on Chawner's data is $15,755 million.

LINE 4

As no estimates for this item are available for any year, we had to make our own. The National Bureau (Financial Research Program) has collected data on fixed assets for Massachusetts nonmanufacturing corporations. The material is available for several years but unfortunately for a varying and small number of corporations. For the largest sample, covering 129 corporations, 1920-21, the ratio of the value of machinery to the value of fixed assets is .274 in 1920 and .270 in 1921. We took .25 for the entire period, 1880-1922. Since the manufacturing ratio of the value of machinery to the value of fixed assets rose only slightly (from .50 in 1880 to .55 in 1922) the assumption of constancy in the ratio for 'other industrial' probably does not introduce a great error. On the basis of the value of real estate (see the notes to Table IV 2, line 4) and this ratio the value of equipment can be estimated.

The data in the Notre Dame report are a possible check on our estimate. Appendix B, Table 8, of *A Study of the Physical Assets, Sometimes Called Wealth, of the United States* gives total commercial and industrial fixed assets, based upon corporate data from *Statistics of Income,* and divided (a) by industry and (b) into land, buildings, and equipment. The figure for all industries other than manufacturing and mining is $22,868 million in 1922; our figure is $23,603 million ($17,702 million for real estate and $5,901 for equipment).

The Notre Dame division by type of asset, based on the Federal Trade Commission division of real estate and the Census of Wealth estimate of manufacturing machinery, and allowing for no other type of equipment, is questionable. Its ratio of equipment to total commercial and industrial fixed assets is .32. Ours, obtained by combining manufacturing, mining, and 'other industrial', is .40.

LINE 5

Sum of lines 1-4.

LINE 6

For the value of equipment in 1922 we took the Notre Dame estimate and assumed that in the preceding years it was the same percentage of the value of buildings.

LINE 7

The method is the same as for the value of real estate (see the notes to Table IV 2, line 8).

LINE 8

The method is the same as for the value of real estate (see the notes to Table IV 2, line 9).

LINE 9

The method is the same as for the value of real estate (see the notes to Table IV 2, line 10).

LINE 10

The method is the same as for the value of real estate (see the notes to Table IV 2, line 11).

LINE 11

The method is the same as for the value of real estate (see the notes to Table IV 2, line 12).

LINE 12

COL. 1: The value of vessels is from the *1880 Census of Transportation.*

COL. 2: The value of vessels is from the *1890 Census Compendium.*

In the *1916 Census of Water Transportation* the value of vessels is reported as $207 million; in the *1890 Census Compendium,* as $221 million ($215 million plus $6 million for canal boats).

COL. 3: The value of vessels is estimated as the product of the tonnage and the value per ton. Tonnage is interpolated between 1890 and 1906 (for 1890 given in the *Census Compendium* and for 1906 in the *Census of Water Transportation*) by tonnage of the total merchant marine (*1923 Annual Report,* Bureau of Navigation). Value per ton, computed for 1890 and 1906, is interpolated along a straight line. Value figures for 1890 and 1906 are from the sources cited for tonnage.

COL. 4: The value of vessels is estimated as the product of tonnage and value per ton, but both are interpolated along a straight line since the tonnage figures in the Bureau of Navigation report increase from 1906 to 1916 whereas the tonnage figures in the *Census of Water Transportation* decrease.

COL. 5: The value of vessels, the difference between the figure for shipping and canals, excluding the Navy (*Estimated National Wealth*), and the cost of operated canals (see the notes to Table IV 2, line 13, col. 5), $1,022 million, is larger than the 1916 figure, $960 million. If abandoned canals had also been deducted from the total the value of vessels in 1922 would have been lower than in 1916. This seemed unlikely since the tonnage given in the Bureau of Navigation report for 1922 is much bigger than the 1916 tonnage figure, as is the 1926 tonnage than the 1916, both reported in the *1926 Census of Water Transportation.*

LINE 13

The method is the same as for the value of real estate (see the notes to Table IV 2, line 14).

LINE 14

The method is the same as for the value of real estate (see the notes to Table IV 2, line 15).

LINE 15

The method is the same as for the value of real estate (see the notes to Table IV 2, line 16).

LINE 16

The method is the same as for the value of real estate (see the notes to Table IV 2, line 17).

LINE 17

Sum of lines 7-16.

LINE 18

Sum of lines 5, 6, and 17.

Table IV 4
Price Indexes (1929:100), Census Dates, 1880-1922

		1880 (1)	1890 (2)	1900 (3)	1912 (4)	1922 (5)
	CONSTRUCTION					
1	Market price, all construction*	79.2	77.7	79.5	97.9	173.2
2a	Market price, residential	42.2	41.4	42.3	52.1	92.2
2b	Market price, residential, 2d variant	43.2	43.6	43.2	50.5	77.5
3a	Market price, other private	41.5	40.7	41.7	51.3	90.8
3b	Market price, other private, 2d variant	42.8	43.2	43.0	50.1	76.8
4a	Market price, farm	41.8	41.0	42.0	51.7	91.5
4b	Market price, farm, 2d variant	43.0	43.4	43.1	50.3	77.2
5	Book value, all construction	44.6	46.2	44.6	49.1	62.8
	EQUIPMENT					
6a	Market price	62.1	49.0	49.8	55.9	94.7
6b	Market price, 2d variant	64.4	50.0	47.3	54.2	96.4
7	Book value	66.6	51.1	44.8	52.5	98.0

* 1913:100

LINE 1

This index, necessary for the extrapolation of lines 2-4 and basic to the computation of line 5, is a weighted average of an index of building materials prices, and of an index of building wage rates. Constant weights for these two components, used for the entire period, are derived from the data for 1919-33 on the cost of materials and the cost of materials and wages and salaries, in 1929 prices (*Commodity Flow and Capital Formation,* Table VI-5, lines 19 and 20).

The construction materials price index is derived from Shaw's unpublished data. The wage index for 1890 and later years is derived from Paul H. Douglas' figures on full time weekly earnings in the building trades (*Real Wages in the United States;* Houghton Mifflin, 1930, p. 137). The data for the years prior to 1890 are based on wage rates for various occupations in several states (Bureau of Labor Statistics *Bulletin 499*). The occupational groups covered are bricklayers, carpenters, engineers, firemen, hod carriers, masons, painters, plasterers, and plumbers. Linked relatives are based on quotations for two successive years for identical states. The 1890 index is extrapolated to the earlier years by the arithmetic average of the relatives.

LINE 2a

COL. 1-4: The index is extrapolated from 1922 by means of line 1.

COL. 5: The value of residential construction in current prices divided by the value in 1929 prices. The value figures are from Part I, Tables I 7 and I 8, col. 1.

LINE 2b

Average of lines 2a and 5.

LINE 3a

The method is the same as for line 2.

LINE 3b

Average of lines 3a and 5.

LINE 4a

The average of lines 2 and 3 is used here since farm values include both residential and business property.

LINE 4b

Average of lines 4a and 5.

LINE 5

The index of prices underlying book values is based on the construction cost index (line 1) and the assumption of a fifty-year life. The materials price index is extra-

polated to 1840 by the index for lumber and building materials (*Wholesale Prices, Wages and Transportation,* Part I, p. 91). The wage data are available back to 1840 in the Bureau of Labor Statistics *Bulletin 499* (see the notes to line 1 for the derivation of the index).

The weights used in computing the index of prices underlying book values are the product of the constant price values of new construction and the estimated percentage of construction in use in a given year. The construction values (see the notes to Tables II 5, col. 7, and II 14, col. 4) are annual averages for the decades from 1829-38 to 1909-18 and annual estimates from 1914 on. The percentage in use is based on the assumption of a fifty-year life so that in 1890, for example, 2 percent of construction in 1841, 4 percent in 1842, etc. are the weights assigned to the price index for those years. The decade averages, however, are for periods whose terminal years do not coincide with the specific years for which the index of prices underlying book values is desired. We were therefore compelled, in deriving the index for 1890, for example, to use average annual construction, 1889-98, in deriving the weights for 1889 and 1890.

The resultant index of prices underlying book values is used to extrapolate the 1922 index (see the notes to col. 5).

COL. 1: Since there are no price data for years before 1840 the index of prices underlying book values in 1880 does not take account of construction for 1831-39.

COL. 5: *Capital Consumption and Adjustment,* Table 35.

LINE 6a

Shaw's price index for producer durable goods is adjusted by minor groups to the 1929 level. His data are available for 1869, 1879, and 1889-1922. Interpolation for 1880 is by the price index for metals and implements excluding pocket knives (*Wholesale Prices, Wages and Transportation,* Part I, p. 92; see also the notes to Table II 6, col. 1).

LINE 6b

Average of lines 6a and 7.

LINE 7

The method is like that used for line 5 except that annual data on the value of production are used and a thirteen-year life is assumed. For the derivation of the values see Table II 4, col. 1. For the price index see the notes to line 6a; extrapolation of the index back to 1868 is on the basis indicated there for the interpolation for 1880.

TABLE IV 5

Value of Real Estate Improvements, Census Dates, 1880-1922
1929 Prices (millions of dollars)

	1880 (1)	1890 (2)	1900 (3)	1912 (4)	1922 (5)
A ADJUSTED BY CURRENT COST (FOR MARKET VALUATION) AND PAST COST (FOR BOOK VALUATION)					
1 Agriculture	4,878	6,478	8,469	13,325	12,207
2 Mining	206	439	735	1,317	1,783
3 Manufacturing	821	1,919	3,281	7,055	13,968
4 Other industrial	3,311	6,120	7,609	11,782	9,163
5 Residential	7,964	16,271	22,522	39,685	34,603
6 Total taxable, excl. public utilities	17,180	31,227	42,616	73,164	71,724
7 Tax exempt	1,416	2,701	4,663	8,708	11,408
8 Steam railroads	7,638	12,651	15,959	21,824	21,051
9 Street railways	235	629	2,559	6,454	5,317
10 Pullman, express, etc.	9	15	20	20	70
11 Telephone	20	72	403	930	1,404
12 Telegraph	97	153	163	192	229
13 Shipping & canals	328	384	536	928	814
14 Electric light & power	0	96	505	2,249	3,365
15 Waterworks	473	491	548	534	518
16 Irrigation	61	131	219	665	788
17 Pipe lines	23	92	319	661	717
18 Total public utilities	8,884	14,714	21,231	34,457	34,273
19 Total improvements	27,480	48,642	68,510	116,329	117,405
B ADJUSTED BY AN AVERAGE OF CURRENT AND PAST COST (FOR MARKET VALUATION) AND PAST COST (FOR BOOK VALUATION)					
20 Agriculture	4,742	6,120	8,253	13,696	14,468
21 Mining	206	439	735	1,317	1,783
22 Manufacturing	821	1,919	3,281	7,055	13,968
23 Other industrial	3,210	5,766	7,379	12,064	10,833
24 Residential	7,780	15,450	22,053	40,943	41,166
25 Total taxable, excl. public utilities	16,759	29,694	41,701	75,075	82,218
26 Tax exempt	1,416	2,701	4,663	8,708	11,408
27 Steam railroads	7,638	12,651	15,959	21,824	21,051
28 Street railways	235	629	2,559	6,454	5,317
29 Pullman, express, etc.	9	15	20	20	70
30 Telephone	20	72	403	930	1,404
31 Telegraph	97	153	163	192	229
32 Shipping & canals	328	384	536	928	814
33 Electric light & power	0	96	505	2,249	3,365
34 Waterworks	473	491	548	534	518
35 Irrigation	61	131	219	665	788
36 Pipe lines	23	92	319	661	717
37 Total public utilities	8,884	14,714	21,231	34,457	34,273
38 Total improvements	27,059	47,109	67,595	118,240	127,899

Values in 1929 prices are obtained by dividing the reported values (Table IV 2) by the appropriate price indexes (Table IV 4). Table IV 4, line 4a is used for line 1; Table IV 4, line 5 for lines 2, 3, 7-17, 21, 22, 26-36; Table IV 4, line 3a for line 4; Table IV 4, line 2a for line 5; Table IV 4, line 4b for line 20; Table IV 4, line 3b for line 23, and Table IV 4, line 2b for line 24.

TABLE IV 6

Value of Equipment, Census Dates, 1880-1922
1929 Prices (millions of dollars)

	1880 (1)	1890 (2)	1900 (3)	1912 (4)	1922 (5)
A ADJUSTED BY CURRENT COST (FOR MARKET VALUATION) AND PAST COST (FOR BOOK VALUATION)					
1 Agriculture	655	1,008	1,506	2,490	2,420
2 Mining,	215	395	891	1,867	2,042
3 Manufacturing	1,006	3,100	5,676	11,602	16,274
4 Other industrial	1,432	3,629	4,472	6,814	6,231
5 Total taxable, excl. public utilities	3,308	8,132	12,545	22,773	26,967
6 Tax exempt	333	857	1,629	2,870	2,588
7 Steam railroads	628	1,656	3,277	5,970	5,005
8 Street railways	29	117	643	1,918	1,291
9 Pullman, express, etc.	56	125	183	198	472
10 Telephone	14	70	464	1,128	1,283
11 Telegraph	69	151	188	232	210
12 Shipping & canals	251	451	689	1,404	1,079
13 Electric light & power	0	45	299	1,480	1,727
14 Waterworks	18	23	29	27	18
15 Irrigation	2	6	11	34	29
16 Pipe lines	2	4	18	34	26
17 Total public utilities	1,069	2,648	5,801	12,425	11,140
18 Total equipment	4,710	11,637	19,975	38,068	40,695
B ADJUSTED BY AN AVERAGE OF CURRENT AND PAST COST (FOR MARKET VALUATION) AND PAST COST (FOR BOOK VALUATION)					
19 Agriculture	632	988	1,586	2,568	2,378
20 Mining	215	395	891	1,867	2,042
21 Manufacturing	1,006	3,100	5,676	11,602	16,274
22 Other industrial	1,380	3,556	4,708	7,028	6,121
23 Total taxable, excl. public utilities	3,233	8,039	12,861	23,065	26,815'
24 Tax exempt	333	857	1,629	2,870	2,588
25 Steam railroads	628	1,656	3,277	5,970	5,005
26 Street railways	29	117	643	1,918	1,291
27 Pullman, express, etc.	56	125	183	198	472
28 Telephone	14	70	464	1,128	1,283
29 Telegraph	69	151	188	232	210
30 Shipping & canals	242	442	725	1,448	1,060
31 Electric light & power	0	45	299	1,480	1,727
32 Waterworks	18	23	29	27	18
33 Irrigation	2	6	11	34	29
34 Pipe lines	2	4	18	34	26
35 Total public utilities	1,060	2,639	5,837	12,469	11,121
36 Total equipment	4,626	11,535	20,327	38,404	40,524

Values in 1929 prices are obtained by dividing the reported values (Table IV 3)
by the appropriate price indexes (Table IV 4). Table IV 4, line 6a is used for
lines 1, 4, and 12; Table IV 4, line 7 for lines 2, 3, 6-11, 13-16, 20, 21, 24-29,
31-34; Table IV 4, line 6b for lines 19, 22, and 30.

TABLE IV 7: Value of Improvements and Equipment, January 1, 1919 (millions of dollars)

	IMPROVEMENTS			EQUIPMENT		
	Reported Value (1)	Price Index (1929:100) (2)	Value 1929 Prices (3)	Reported Value (4)	Price Index (1929:100) (5)	Value 1929 Prices (6)
1 Agriculture						
a Adj. by current cost	9,541	102.2	9,336	2,625	122.6	2,141
b Adj. by av. of current & past cost	9,541	80.2	11,897	2,625	104.1	2,524
2 Mining	1,113	58.3	1,909	1,899	85.5	2,221
3 Manufacturing	7,293	58.3	12,509	13,118	85.5	15,343
4 Other industrial						
a Adj. by current cost	7,687	98.0	7,844	5,064	122.6	4,131
b Adj. by av. of current & past cost	7,687	78.2	9,830	5,064	104.0	4,869
5 Residential	31,754		33,905			
6 Total taxable, excl. public utilities						
a Sum of 1a, 2, 3, 4a, & 5	57,388		65,503	22,706		23,836
b Sum of 1b, 2, 3, 4b, & 5	57,388		70,050	22,706		24,957
7 Tax exempt	5,496	58.3	9,427	1,944	85.5	2,274
8 Steam railroads	12,247	58.3	21,007	3,264	85.5	3,818
9 Street railways	3,565	58.3	6,115	1,244	85.5	1,455
10 Pullman, express, etc.	24	58.3	41	250	85.5	292
11 Telephone	670	58.3	1,149	905	85.5	1,058
12 Telegraph	116	58.3	199	153	85.5	179
13 Shipping & canals						
a Adj. by current cost	513*	58.3	880	969	122.6	790
b Adj. by av. of current & past cost	513*	58.3	880	969	104.0	932
14 Electric light & power	1,604	58.3	2,751	1,196	85.5	1,399
15 Waterworks	299	58.3	513	17	85.5	20
16 Irrigation	427	58.3	732	24	85.5	28
17 Pipe lines	357	58.3	612	20	85.5	23
18 Total public utilities						
a Sum of 8-12, 13a, 14-17	19,822		33,999	8,042		9,062
b Sum of 8-12, 13b, 14-17	19,822		33,999	8,042		9,204
19 Total improvements						
a Sum of 6a, 7, & 18a	82,706		108,929	32,692		35,172
b Sum of 6b, 7, & 18b	82,706		113,476	32,692		36,435

* Book valuation and, therefore, adjusted by cost index.

COLUMN 1

LINE 1: The estimate is for March 1 as obtained from the Bureau of Agricultural Economics.

LINE 2: Capital invested is reported in the *1919 Census of Mines and Quarries*. The value of real estate is obtained by multiplying capital invested by the ratio of real estate to it. The ratio is interpolated along a straight line between 1890 and 1922 *(for the latter see the notes to Table IV 2, line 2, col. 2 and 5)*.

The value of improvements is obtained by multiplying the value of real estate by the ratio of improvements to it. The ratio is interpolated along a straight line between 1890 and 1922 (for the latter see the notes to Table IV 2, line 2, col. 2 and 5).

This value figure is for the end of 1919, and no data are available by which a figure for January 1, 1919 could be computed.

LINE 3: Capital invested is reported in the *1919 Census of Manufactures*. The value of improvements is obtained by multiplying capital invested by the ratio of improvements to it (Paul H. Douglas, *Theory of Wages*, Ch. 5, Table 4).

Here also the figure is for December 31, 1919 but there is some evidence that the estimate for the first of the year would not be much smaller. Chawner estimates expenditures for plant in 1919 as $815 million, and for equipment, $1,409 million. Fabricant estimates depreciation as $1,152 million, leaving a $1,072 million net increase in 1919 in the value of plant and equipment. It can be assumed therefore that the December 31, 1919 figure is representative of the situation at the beginning of the year (the error involved after converting the increase in the value of plant and equipment to 1929 prices amounts to less than 5 percent of the December 31, 1919 value).

LINE 4: The value of manufacturing improvements is used to interpolate the value of other industrial improvements between 1912 and 1922 (for the latter see the notes to Table IV 2, line 4, col. 4 and 5).

LINE 5: From the value of residential improvements in 1922 (see Table IV 2, line 5, col. 5) residential real estate construction, 1919-22, is subtracted, and to it residential real estate consumption, 1919-22, is added (see Part I, Table I 7, col. 1, and the notes to Table I 16, col. 1).

LINE 7: The total value of real estate and equipment is interpolated between 1912 and 1922 (see the notes to Table IV 2, line 7, and Table IV 3, line 6, for derivation of estimates for these years) by the value reported for property of states and of cities of 30,000 and over. The values of both state and city property in 1912 are reported in the *Census of Wealth, Debt, and Taxation, 1913*. The state property figures in 1918 and 1922 are from *Financial Statistics of States, 1919* and *1923*. Since the majority of the states report for fiscal years ending June 30 we have not made any further adjustment. The property figures for cities of 30,000 and over in 1918 and 1922 are from *Financial Statistics of Cities, 1918* and *1923* (no data are available for 1922).

The ratios of improvements and of equipment to total real estate and equipment are interpolated along a straight line between 1912 and 1922 (see the notes to Table IV 2, line 7, and Table IV 3, line 6) and applied to the estimated total for 1918 to yield the values of improvements and equipment.

LINE 8: The gross value of road and equipment for steam railroads and switching and terminal companies are both given in the *1918 Statistics of Railways*. The ratios of real estate to road and equipment and land to real estate are interpolated along a straight line between 1912 and 1922 (see the notes to Table IV 2, line 8, col. 4 and 5). By applying these ratios to the value of road and equipment, we get the values of improvements and of equipment.

Table IV 7 continued:

COLUMN 1 *(concl.)*

Total depreciation on road and equipment for both steam railroads and switching and terminal companies, also reported in the *1918 Statistics of Railways,* is divided into depreciation on road and on equipment by means of the 1920 figures for depreciation on equipment and total depreciation *(1938 Statistics of Railways).* The 1920 relation is assumed to apply in 1918.

LINE 9: Value of road and equipment at the end of 1917 is reported in the *Census of Electric Railways.* The ratios of real estate to road and equipment and of land to real estate are interpolated along a straight line between 1912 and 1922 (see the notes to Table IV 2, line 9, col. 3-5). By applying these ratios we get the values of improvements and of equipment at the end of 1917. To obtain the value of improvements, December 31, 1918 we add construction expenditures in 1918 as estimated by Lowell Chawner *(Construction Activity in the United States, 1915-1937).*

LINE 10: The value of plant and equipment is interpolated between 1912 and 1922 by gross revenues reported by the Pullman Company *(Statistical Abstract, 1923).* The ratios of real estate to plant and equipment and land to real estate are interpolated along a straight line between 1912 and 1922 (see the notes to Table IV 2, line 10, col. 3-5). By applying these ratios we get the values of improvements and of equipment.

LINE 11: Value of plant and equipment, December 31, 1917 is reported in the *1932 Census of Telephones.* For the procedure see the notes to line 9; for the sources see the notes to Table IV 2, line 11.

LINE 12: Value of plant and equipment, December 31, 1917 for telegraph companies is reported in the *1932 Census of Electric Light and Power Stations* and that for wireless companies in the *1917 Census of Telegraphs.* For the procedure see the notes to line 9; for the sources, see the notes to Table IV 2, line 12.

LINE 13: Value of vessels is interpolated between 1916 and 1922 by the gross tonnage reported *(1923 Annual Report,* Bureau of Navigation). On the basis of the value of vessels the value of improvements is derived by the procedure described in the notes to Table IV 2, line 13.

LINE 14: Value of plant and equipment, December 31, 1917 is reported in the *Census of Electric Light and Power Stations.* For the procedure see the notes to line 9; for the sources see the notes to Table IV 2, line 14.

LINES 15 AND 16: Value of capital is interpolated along a straight line between 1912 and 1922. See the notes to Table IV 2, lines 15 and 16, for the 1912 and 1922 figures and the procedure used to derive the values of improvements and of equipment.

LINE 17: The procedure is described in the notes to Table IV 2, line 17.

COLUMN 2

The price indexes are averages for the year; values are for the first of the year. So far as prices were moving upward during this period the figures in constant prices are underestimates.

LINES 1a AND 4a: Market price index. The sources and methods are given in the notes to Table IV 4, lines 3a and 4a.

LINES 1b AND 4b: Average of market and cost price indexes; see the notes to Table IV 4, lines 3b and 4b.

LINES 2, 3, 7-17: Index of prices underlying book values. The sources and methods are given in the notes to Table IV 4, line 5.

COLUMN 3

LINES 1-4, 7-17: Col. 1 divided by col. 2.

LINE 5: See the notes to col. 1, line 5; Table I 8, col. 1; and the notes to Table I 16, col. 6.

COLUMN 4

LINE 1: Estimate prepared by the Bureau of Agricultural Economics (*Income Parity for Agriculture,* Part II, Sec. 3, Washington, D. C., Aug. 1940). To allow for business use, it includes 40 percent of the value of automobiles.

LINE 2: The value of equipment is obtained by multiplying the value of other assets (capital invested minus real estate) by the ratio of equipment to it. For the derivation of the value see the notes to col. 1, line 2; for the ratio see the notes to Table IV 3, line 2, col. 3-5.

LINE 3: See the notes to col. 1, line 3. The ratio of equipment to capital invested is also from Douglas' *Theory of Wages.*

LINE 4: The value of real estate is derived by dividing the value of improvements (see the notes to col. 1, line 4) by the ratio of improvements to it. The ratio is interpolated along a straight line between 1912 and 1922 (see the notes to Table IV 2, line 4, col. 4 and 5). With value of real estate estimated the value of equipment is derived by the procedure described in the notes to Table IV 3, line 4.

LINES 7, 8, 10-17: See the notes to col. 1, lines 7, 8, 10-17.

LINE 9: See the notes to col. 1, line 9. To obtain the value of expenditures in 1918 the 1919 figure was extrapolated by the number of street railway cars built, the procedure used by George Terborgh (see *Federal Reserve Bulletin,* Sept. 1939).

COLUMN 5

LINES 1a, 4a, AND 13a: Market price index. The sources and methods are given in the notes to Table IV 4, line 6a.

LINES 1b, 4b, AND 13b: Average of market and cost price indexes; see the notes to Table IV 4, line 6b.

LINES 2, 3, 7-12, 14-17: Index of prices underlying book values. The sources and methods are given in the notes to Table IV 4, line 7.

COLUMN 6

LINES 1-4, 7-17: Col. 4 divided by col. 5.

TABLE IV 8

Value of Additions to Improvements and Equipment, Gross and Net Current Prices, 1919-1938 (millions of dollars)

	IMPROVE-MENTS Gross (1)	EQUIP-MENT Gross (2)	IMPROVE-MENTS & EQUIP-MENT Gross (3)	CONSUMP-TION OF IMPROVE-MENTS & EQUIP-MENT (4)	IMPROVE-MENTS & EQUIP-MENT Net (5)
1 Agriculture	3,650	11,067	14,717	17,254	-2,537
2 Mining & manufacturing	8,098	38,804	46,902	52,795	-5,893
3 Other industrial	12,455	30,787	43,242	29,639	13,603
4 Residential	50,414	...	50,414	42,281	8,133
5 Total taxable, excl. public utilities	74,617	80,658	155,275	141,969	13,306
6 Nonprofit institutions	6,841	...	...	...	...
7 Public a	20,352	...	...	...	...
8 Tax exempt	27,193	2,999	30,192	16,667	13,525
9 Steam railroads	5,582	5,350	10,932	...	...
10 Transit	1,170	1,169	2,339	...	...
11 Telephone	2,762	3,785	6,547	...	...
12 Electric light & power	5,011	4,630	9,641	...	...
13 Other public utilities b	3,000	1,463	4,463	...	...
14 Total public utilities	17,525	16,397	33,922	18,533	15,389
15 Total a	119,334	100,054	219,388	177,169	42,219

a Excludes construction of streets and roads, $18,684 million.
b Includes pipe lines, gas, and telegraph and cables.

COLUMN 1

LINE 1: Sum of annual estimates of nonresidential construction (see the notes to Table I 7, col. 2).

LINES 2, 3, AND 6: 'Other private construction' (Table I 7, col. 2) minus agricultural construction (an unpublished series underlying the former) yields a total which is distributed among mining and manufacturing, other industrial, and nonprofit institutions. This distribution is based upon the percentage distribution of expenditures on plant for mining and manufacturing, commercial and miscellaneous, and buildings for nonprofit institutions (George Terborgh, 'Estimated Expenditures for New Durable Goods, 1919-1938', *Federal Reserve Bulletin,* Sept. 1939 and Feb. 1940). The series for mining and manufacturing, however, is adjusted to exclude mining development outlays.

'Other industrial' (line 3) covers all types of private property other than railroads, electric light and power, telephones, electric railways and buses, pipe lines, gas, telegraph and cables, mining and manufacturing, and agriculture. It therefore includes miscellaneous public utilities not estimated separately below.

LINE 4: Table I 7, col. 1 contains the annual estimates of which this item is the sum.

LINE 5: Sum of lines 1-4.

LINE 7: From annual estimates of total public construction (Table I 7, col. 5) the value of construction of streets and roads (Lowell J. Chawner, *Construction Activity in the United States* and the *Survey of Current Business,* June 1943 and June 1944), was deducted.

LINE 8: Sum of lines 6 and 7.

LINES 9-13: The allocation of the total public utility estimate (see the notes to line 14) to the minor public utility groups is based on the percentage distribution of Terborgh's estimates for those groups (see the notes to lines 2, 3, and 6 for the source of Terborgh's data).

LINE 14: Table I 7, col. 3 contains the annual estimates of which this item is the sum.

LINE 15: Sum of lines 5, 8, and 14.

COLUMN 2

LINE 1: Sum of annual estimates prepared by the BAE (*Income Parity for Agriculture*, Part II, Sec. 3). To allow for business use, it includes 40 percent of expenditures on automobiles.

LINES 2 AND 3: Total expenditures on mining and manufacturing and other industrial business equipment is the difference between total expenditures on equipment (the sum of annual estimates in Table I 6, col. 2) and expenditures on agriculture, public utility, and tax exempt equipment. Agricultural expenditures are from line 1; public utility and tax exempt expenditures, from lines 14 and 8, respectively. The residual is apportioned between the two groups by the percentage distribution of the similar total from Terborgh's data (see the notes to col. 1, lines 2, 3, and 6 for source).

LINE 5: Sum of lines 1-3.

LINE 8: Expenditures on equipment are derived for 1923-33 from the estimates of the value of equipment in the Notre Dame report (*A Study of the Physical Assets, Sometimes Called Wealth, of the United States*). Since the data are on a cost basis and no allowance is made for depreciation, according to that report, the increase from year to year reflects actual expenditures. From 1923 the estimate is extrapolated back to 1919 with expenditures on improvements as index; from 1933 it is extrapolated forward to 1938 by the same index.

LINES 9-13: The data are taken directly from Terborgh's tables (see the notes to col. 1, lines 2, 3, and 6 for source).

LINE 14: Sum of lines 9-13.

LINE 15: Sum of lines 5, 8, and 14.

COLUMN 3

Sum of col. 1 and 2.

COLUMN 4

For the coverage of these estimates and comparability with the data on expenditures see the notes to Table IV 9, col. 4.

LINE 1: Sum of annual estimates prepared by the BAE (*Income Parity for Agriculture*, Part II, Sec. 3 and 5). To allow for business use, it includes 40 percent of depreciation on automobiles.

LINES 2, 3, AND 14: The total for these groups, agriculture, and residential property is derived from the annual series (Table I 16, col. 1). The residual after deducting agriculture (line 1) and residential (line 4) is distributed among the three groups on the basis of the industrial distribution of depreciation and depletion charges, reported for 1919-35 in terms of accounting measures by Fabricant in *Capital Consumption and Adjustment*, Tables 17 and III, and estimated by similar methods for 1936-38. For their conversion to charges in 1929 prices see the notes to Table IV 9, col. 4. The annual data in 1929 prices are multiplied by Fabricant's price index (*ibid.*, Table 32, for 1919-35, and estimated by similar methods for 1936-38) to yield the current price series by which the total is distributed.

LINE 4: Sum of the annual data underlying Table I 16, col. 1.

Table IV 8 concluded:

COLUMN 4 (*concl.*)

LINE 5: Sum of lines 1-4.

LINE 8: Sum of the annual data in Table I 16, col. 2.

LINE 15: Sum of lines 5, 8, and 14.

COLUMN 5

Col. 3 minus col. 4.

TABLE IV 9

Value of Additions to Improvements and Equipment, Gross and Net
1929 Prices, 1919-1938 (millions of dollars)

	IMPROVE-MENTS Gross (1)	EQUIP-MENT Gross (2)	IMPROVE-MENTS & EQUIP-MENT Gross (3)	CONSUMP-TION OF IMPROVE-MENTS & EQUIP-MENT (4)	IMPROVE-MENTS & EQUIP-MENT Net (5)
1 Agriculture	3,666	11,091	14,757	17,603	−2,846
2 Mining & manufacturing	8,170	39,854	48,024	54,011	−5,987
3 Other industrial	12,673	31,830	44,503	30,652	13,851
4 Residential	52,255	. . .	52,255	45,478	6,777
5 Total taxable, excl. public utilities	76,764	82,775	159,539	147,744	11,795
6 Nonprofit institutions	7,003	. . .	. . .	. . .	. . .
7 Public^a	20,586	. . .	. . .	. . .	. . .
8 Tax exempt^a	27,589	3,050	30,639	17,213	13,426
9 Steam railroads	5,658	5,327	10,985	. . .	. . .
10 Transit	1,181	1,193	2,374	. . .	. . .
11 Telephone	2,799	3,946	6,745	. . .	. . .
12 Electric light & power	5,046	4,739	9,785	. . .	. . .
13 Other public utilities^b	3,035	1,491	4,526	. . .	. . .
14 Total public utilities	17,719	16,696	34,415	19,476	14,939
15 Total^a	122,072	102,521	224,593	184,433	40,160

^a Excludes construction of streets and roads, $18,993 million.
^b Includes pipe lines, gas, and telegraph and cables.

COLUMN 1

The preliminary totals for 1919-38 are the sum of the annual data converted to 1929 prices. The final estimates are then derived by the methods described for the current price data. For the methods and the sources of the annual data in current prices see the notes to Table IV 8, col. 1; for the price indexes, see the following notes.

LINES 1, 2, 3, AND 6: The price index is that implicit in 'other private construction' and is derived from Tables I 7 and I 8, col. 2.

LINE 4: The price index is derived from Tables I 7 and I 8, col. 1.

LINE 7: The price index is the Aberthaw index of construction costs (see the notes to Table I 8, col. 2 for source), assumed applicable to public building.

LINES 9-14: The price index is that implicit in public utility construction, and is derived from Tables I 7 and I 8, col. 3.

COLUMN 2

Here also the preliminary totals for 1919-38 are the sum of the annual data converted to 1929 prices. The final estimates are then derived by the methods described for the current price data. For the methods and the sources of the annual data in current prices see the notes to Table IV 8, col. 2. The price index is Shaw's for producer durable goods, adjusted by minor groups to the 1929 base.

COLUMN 3

Sum of col. 1 and 2.

COLUMN 4

LINE 1: The annual series in current prices (see the notes to Table IV 8, col. 4, line 1 for source) is converted to 1929 prices by Fabricant's current price index for business capital goods (*Capital Consumption and Adjustment*, Table 32, for 1919-35, and estimated by similar methods for 1936-38).

LINES 2, 3, AND 14: Annual estimates of capital consumption for business use underlie the series in Table I 16, col. 6, but they include a series on agricultural capital consumption. To distribute the total for business use the residual after subtracting line 1 is used.

Accounting measures of depreciation and depletion, given by Fabricant for 1919-35 for mining and manufacturing, other industrial, and public utilities (*Capital Consumption and Adjustment*), are extrapolated to 1936-38 by *Statistics of Income* corporate data. The annual data are converted to 1929 prices by Fabricant's index of prices underlying depreciation charges (*op. cit.*, Table 35, and unpublished estimates for 1936-38 prepared by similar methods). The percentage distribution of the resultant totals for 1919-38 is used in apportioning total consumption among the industrial groups.

Line 3 includes forestry and fishing, service, finance and real estate, construction, trade, and miscellaneous. Differing in coverage from the expenditure data in that it excludes miscellaneous public utilities not estimated separately, it results in an overestimate of the net change in the value of improvements and equipment for this group. Line 14, therefore, suffers from the same lack of comparability between expenditures and consumption.

LINE 4: Sum of annual estimates underlying the series in Table I 16, col. 6.

LINE 5: Sum of lines 1-4.

LINE 8: Sum of annual estimates in Table I 16, col. 7. The data are not comparable with the expenditure estimates since they cover government property only. No estimates are available for consumption of other tax exempt property.

LINE 15: Sum of lines 5, 8, and 14.

COLUMN 5

Col. 3 minus col. 4.

TABLE IV 10

Growth of Reproducible Wealth other than Household
Selected Dates, 1880-1939, 1929 Prices (millions of dollars)

	REAL ESTATE IMPROVEMENTS & EQUIPMENT		INVENTORIES	BALANCE OF FOREIGN CLAIMS	TOTAL REPRODUCIBLE WEALTH	
	(1)	(2)	(3)	(4)	(5)	(6)
	A BASED ON WEALTH ESTIMATES					
1 June 1, 1880	32,190	31,685	11,399	−1,600	41,989	41,484
2 June 1, 1890	60,279	58,644	16,766	−4,800	72,245	70,610
3 June 1, 1900	88,485	87,922	20,963	−4,800	104,648	104,085
4 Dec. 31, 1912	154,397	156,644	29,710	−5,000	179,107	181,354
5 Dec. 31, 1922	158,100	168,423	42,515	5,000	205,615	215,938
	B BASED ON CAPITAL FORMATION DATA					
6 Jan. 1, 1879	29,968		10,554	−1,700	38,822	
7 Jan. 1, 1889	51,157		16,188	−4,700	62,645	
8 Jan. 1, 1899	86,511		20,073	−5,500	101,084	
9 Jan. 1, 1909	132,064		26,063	−5,700	152,427	
10 Jan. 1, 1919	177,299		35,201	2,400	214,900	
11 Jan. 1, 1929	227,744		47,211	8,000	282,955	
12 Jan. 1, 1939	236,454		46,528	4,600	287,582	

COLUMN 1

LINES 1-5: Table IV 5, line 19, plus Table IV 6, line 18.

LINE 6: The value of real estate improvements and equipment is the difference between their estimated values on June 1, 1880 and the flow of each from January 1, 1879 to June 1, 1880, derived by applying to the flow for the decade 1879-88 (given in the form of annual averages in Table II 14, col. 2 and 5) the ratio of the output in 1879 plus one-half the output in 1880 to the total output in 1879-88. All data are in 1929 prices.

LINES 7-12: The sum of line 6 and the flow of producer durables and net construction (Table II 15, col. 6 and 7).

COLUMN 2

LINES 1-5: Table IV 5, line 38, plus Table IV 6, line 36.

COLUMN 3

LINE 1: The value of inventories on June 1, 1880, in current prices, was derived from the wealth data (*Estimated National Wealth,* Table 3). From the total for "Livestock, whether on or off farms, and farming tools and machinery" the value of agricultural equipment (Table IV 3) was subtracted to yield the value of livestock. The value of mining inventories had already been computed (Table IV 2). The Census of Wealth includes "three-quarters of the annual product of agriculture and manufactures and of the annual importation of foreign goods, assumed to be the average supply in the hands of producers or dealers". We reduced this figure one-third, assuming one-half the value of product to be the inventory figure. Finally, we took the value of specie as reported.

Each of these four components of inventories was then converted to 1929 prices. The price index for livestock is based on the weighted average of the price per head of milk cows, other cattle, hogs, sheep, horses, and mules. Averages of the January 1, 1880 and January 1, 1881 data were taken to represent June 1880. The price index for the mining and other commodity inventories is the BLS index of wholesale prices. The value of specie reported was divided into gold and silver on the basis of figures in the *Annual Report* of the Director of the Mint. The value of gold in 1929 prices is the same as in current prices. For silver the price index

is based on the price per fine ounce in New York. The unallocable balance is assumed to be the same in 1929 prices as in current. The value of inventories on June 1, 1880, in 1929 prices, is the sum of the four items.

LINES 2-5: The sum of line 1 and the net change in inventories (Table II 15, col. 8), the annual averages for the decades used being those mentioned in Section 6 of the text.

LINE 6: For January 1, 1879 the value of inventories, in 1929 prices, was estimated by subtracting from the June 1, 1880 figure 1.5 times the annual average of the change in inventories for the 1879-88 decade (Table II 15, col. 8).

LINES 7-12: The sum of line 6 and the net change in inventories (Table II 15, col. 8).

COLUMN 4

Algebraic totals of foreign investments in the United States (—) and of United States investments abroad (+). The net balance is estimated in current prices, then converted to 1929 prices by the BLS wholesale price index. For the years beginning with 1919, the approximations to the net balance in current prices are based upon the estimates in the *United States in the World Economy* (Department of Commerce, Economic Series 23, Washington, D. C., 1943, especially Table 13, p. 123). The estimates in this publication for the end of 1919, 1930, 1933, and 1939 are shifted to the dates in Table IV 10 with the help of the annual balances on all capital transactions (*ibid.,* Table I, following p. 216), adjusted to check with the cumulated differences in the net balance of capital indebtedness. For the years prior to 1919, the approximations are based upon various estimates, chiefly those derived or cited in the Bullock, Williams, and Tucker study (*Review of Economic Statistics,* July 1919) as well as in Cleona Lewis, *America's Stake in International Investments* (Brookings Institution, 1938, especially Ch. XXI, pp. 439-56).

The figures on the net balance in current prices are (in billions of dollars): 1879 and 1880, 1.1; 1889 and 1890, 2.8; 1899 and 1900, 2.8; 1909, 3.9; 1912, 3.7; 1919, 3.4; 1922, 5.4; 1929, 8.0; 1939, 3.7. In deriving the figures for the years before 1899 American investment abroad was set roughly at $0.1 billion in 1879 and 1880 and at $0.2 billion in 1889 and 1890.

COLUMN 5

Sum of col. 1, 3, and 4.

COLUMN 6

LINES 1-5: Sum of col. 2, 3, and 4.

TABLE IV 11

Value of Real Estate Improvements and Equipment
Selected Dates, 1880-1939, 1929 Prices (millions of dollars)

	REAL ESTATE IMPROVEMENTS		EQUIPMENT		TOTAL	
	(1)	(2)	(3)	(4)	(5)	(6)
	A BASED ON WEALTH ESTIMATES					
1 June 1, 1880	27,480	27,059	4,710	4,626	32,190	31,685
2 June 1, 1890	48,642	47,109	11,637	11,535	60,279	58,644
3 June 1, 1900	68,510	67,595	19,975	20,327	88,485	87,922
4 Dec. 31, 1912	116,329	118,240	38,068	38,404	154,397	156,644
5 Dec. 31, 1922	117,405	127,899	40,695	40,524	158,100	168,423
	B BASED ON CAPITAL FORMATION DATA					
6 Jan. 1, 1879	25,766		4,202		29,968	
7 Jan. 1, 1889	42,470		8,687		51,157	
8 Jan. 1, 1899	73,866		12,645		86,511	
9 Jan. 1, 1909	109,052		23,012		132,064	
10 Jan. 1, 1919	140,725		36,574		177,299	
11 Jan. 1, 1929	175,164		52,580		227,744	
12 Jan. 1, 1939	180,864		55,590		236,454	

COLUMN 1

LINES 1-5: Table IV 5, line 19.

LINES 6-12: See the notes to Table IV 10, col. 1, lines 6-12.

COLUMN 2

LINES 1-5: Table IV 5, line 38.

COLUMN 3

LINES 1-5: Table IV 6, line 18.

LINES 6-12: See the notes to Table IV 10, col. 1, lines 6-12.

COLUMN 4

LINES 1-5: Table IV 6, line 36.

COLUMN 5

Sum of col. 1 and 3.

COLUMN 6

Sum of col. 2 and 4.

TABLE IV 12

Value of Real Estate Improvements and Equipment, by Industry
Selected Dates, 1880-1938, 1929 Prices (millions of dollars)

		JUNE 1			DECEMBER 31	
	1880	1890	1900	1912	1922	1938
	(1)	(2)	(3)	(4)	(5)	(6)
A ADJUSTED BY CURRENT COST (FOR MARKET VALUATION) AND PAST COST (FOR BOOK VALUATION)						
1 Agriculture	5,533	7,486	9,975	15,815	14,627	8,631
2 Mining	421	834	1,626	3,184	3,825	
3 Manufacturing	1,827	5,019	8,957	18,657	30,242	
4 Mining & manufacturing	2,248	5,853	10,583	21,841	34,067	25,995
5 Steam railroads	8,266	14,307	19,236	27,794	26,056	
6 Street railways	264	746	3,202	8,372	6,608	
7 Pullman, express, etc.	65	140	203	218	542	
8 Telephone	34	142	867	2,058	2,687	
9 Telegraph	166	304	351	424	439	
10 Shipping & canals	579	835	1,225	2,332	1,893	
11 Electric light & power	0	141	804	3,729	5,092	
12 Waterworks	491	514	577	561	536	
13 Irrigation	63	137	230	699	817	
14 Pipe lines	25	96	337	695	743	
15 Other industrial	4,743	9,749	12,081	18,596	15,394	25,826
16 Residential	7,964	16,271	22,522	39,685	34,603	40,682
17 Tax exempt	1,749	3,558	6,292	11,578	13,996	25,127
18 Total	32,190	60,279	88,485	154,397	158,100	184,261
Major categories						
19 Private industrial (1 + 4 + 15)	12,524	23,088	32,639	56,252	64,088	60,452
20 Residential (16)	7,964	16,271	22,522	39,685	34,603	40,682
20a Total private (19 + 20)	20,488	39,359	55,161	95,937	98,691	101,134
21 Public utilities (5 through 14)	9,953	17,362	27,032	46,882	45,413	58,000
22 Tax exempt (17)	1,749	3,558	6,292	11,578	13,996	25,127
Major business categories						
23 Agriculture (1)	5,533	7,486	9,975	15,815	14,627	8,631
24 Electric light & power (11)	0	141	804	3,729	5,092	
25 Mining & manufacturing (4)	2,248	5,853	10,583	21,841	34,067	25,995
26 Transportation (5, 6, 7, 10, & 14)	9,199	16,124	24,203	39,411	35,842	
27 Communication (8 & 9)	200	446	1,218	2,482	3,126	
28 Other industrial (12, 13, 15)	5,297	10,400	12,888	19,856	16,747	
29 Total	22,477	40,450	59,671	103,134	109,501	118,452

Table IV 12 concluded:

		JUNE 1			DECEMBER 31	
		1880	1890	1900	1912	1922	1938
		(1)	(2)	(3)	(4)	(5)	(6)

B   ADJUSTED BY AN AVERAGE OF CURRENT AND PAST COST (FOR MARKET VALUATION)
AND PAST COST (FOR BOOK VALUATION)

		(1)	(2)	(3)	(4)	(5)	(6)
1	Agriculture	5,374	7,108	9,839	16,264	16,846	11,57
2	Mining	421	834	1,626	3,184	3,825	
3	Manufacturing	1,827	5,019	8,957	18,657	30,242	
4	Mining & manufacturing	2,248	5,853	10,583	21,841	34,067	25,99
5	Steam railroads	8,266	14,307	19,236	27,794	26,056	
6	Street railways	264	746	3,202	8,372	6,608	
7	Pullman, express, etc.	65	140	203	218	542	
8	Telephone	34	142	867	2,058	2,687	
9	Telegraph	166	304	351	424	439	
10	Shipping & canals	570	826	1,261	2,376	1,874	
11	Electric light & power	0	141	804	3,729	5,092	
12	Waterworks	491	514	577	561	536	
13	Irrigation	63	137	230	699	817	
14	Pipe lines	25	96	337	695	743	
15	Other industrial	4,590	9,322	12,087	19,092	16,954	28,55(
16	Residential	7,780	15,450	22,053	40,943	41,166	40,68;
17	Tax exempt	1,749	3,558	6,292	11,578	13,996	25,12'
18	Total	31,685	58,644	87,922	156,644	168,423	190,07;

Major categories

		(1)	(2)	(3)	(4)	(5)	(6)
19	Private industrial (1 + 4 + 15)	12,212	22,283	32,509	57,197	67,867	66,12(
20	Residential (16)	7,780	15,450	22,053	40,943	41,166	40,68;
20a	Total private (19 + 20)	19,992	37,733	54,562	98,140	109,033	106,80;
21	Public utilities (5 through 14)	9,944	17,353	27,068	46,926	45,394	58,14;
22	Tax exempt (17)	1,749	3,558	6,292	11,578	13,996	25,12;

Major business categories

		(1)	(2)	(3)	(4)	(5)	(6)
23	Agriculture (1)	5,374	7,108	9,839	16,264	16,846	11,57;
24	Electric light & power (11)	0	141	804	3,729	5,092	
25	Mining & manufacturing (4)	2,248	5,853	10,583	21,841	34,067	25,99;
26	Transportation (5, 6, 7, 10, & 14)	9,190	16,115	24,239	39,455	35,823	
27	Communication (8 & 9)	200	446	1,218	2,482	3,126	
28	Other industrial (12, 13, 15)	5,144	9,973	12,894	20,352	18,307	
29	Total	22,156	39,636	59,577	104,123	113,261	124,26;

COLUMNS 1-5
LINES 1-18, Parts A & B: Sum of Tables IV 5 and IV 6, col. 1-5 for the respective industries.

COLUMN 6
LINES 1-18: Sum of Table IV 7, col. 3 and 6, and Table IV 9, col. 5 for the respective industries.

TABLE IV 13

Increase in Value of Real Estate Improvements and Equipment,
by Industry, Selected Dates, 1880-1939, 1929 Prices
(millions of dollars)

		June 1, 1880 to June 1, 1900 (1)	June 1, 1900 to Jan. 1, 1919 (2)	June 1, 1880 to Jan. 1, 1919 (3)	Jan. 1, 1919 to Jan. 1, 1939 (4)	June 1, 1880 to Jan. 1, 1939 (5)
	A ADJUSTED BY CURRENT COST (FOR MARKET VALUATION) AND PAST COST (FOR BOOK VALUATION)					
1	Agriculture	4,442	1;502	5,944	−2,846	3,098
2	Mining	1,205	2,504	3,709		
3	Manufacturing	7,130	18,895	26,025		
4	Mining & manufacturing	8,335	21,399	29,734	−5,987	23,747
5	Steam railroads	10,970	5,589	16,559		
6	Street railways	2,938	4,368	7,306		
7	Pullman, express, etc.	138	130	268		
8	Telephone	833	1,340	2,173		
9	Telegraph	185	27	212		
10	Shipping & canals	646	445	1,091		
11	Electric light & power	804	3,346	4,150		
12	Waterworks	86	−44	42		
13	Irrigation	167	530	697		
14	Pipe lines	312	298	610		
15	Other industrial	7,338	−106	7,232	13,851	21,083
16	Residential	14,558	11,383	25,941	6,777	32,718
17	Tax exempt	4,543	5,409	9,952	13,426	23,378
18	Total	56,295	55,616	111,911	40,160	152,071
	Major categories					
19	Private industrial (1 + 4 + 15)	20,115	22,795	42,910	5,018	47,928
20	Residential (16)	14,558	11,383	25,941	6,777	32,718
20a	Total private (19 + 20)	34,673	34,178	68,851	11,795	80,646
21	Public utilities (5 through 14)	17,079	16,029	33,108	14,939	48,047
22	Tax exempt (17)	4,543	5,409	9,952	13,426	23,378
	Major business categories					
23	Agriculture (1)	4,442	1,502	5,944	−2,846	3,098
24	Electric light & power (11)	804	3,346	4,150		
25	Mining & manufacturing (4)	8,335	21,399	29,734	−5,987	23,747
26	Transportation (5, 6, 7, 10, & 14)	15,004	10,830	25,834		
27	Communication (8 & 9)	1,018	1,367	2,385		
28	Other industrial (12, 13, 15)	7,591	380	7,971		
29	Total	37,194	38,824	76,018	19,957	95,975

Table IV 13 concluded:

		June 1, 1880 to June 1, 1900 (1)	June 1, 1900 to Jan. 1, 1919 (2)	June 1, 1880 to Jan. 1, 1919 (3)	Jan. 1, 1919 to Jan. 1, 1939 (4)	June 1, 1880 to Jan. 1, 1939 (5)
B	**ADJUSTED BY AN AVERAGE OF CURRENT AND PAST COST (FOR MARKET VALUATION) AND PAST COST (FOR BOOK VALUATION)**					
1	Agriculture	4,465	4,582	9,047	−2,846	6,201
2	Mining	1,205	2,504	3,709		
3	Manufacturing	7,130	18,895	26,025		
4	Mining & manufacturing	8,335	21,399	29,734	−5,987	23,747
5	Steam railroads	10,970	5,589	16,559		
6	Street railways	2,938	4,368	7,306		
7	Pullman, express, etc.	138	130	268		
8	Telephone	833	1,340	2,173		
9	Telegraph	185	27	212		
10	Shipping & canals	691	551	1,242		
11	Electric light & power	804	3,346	4,150		
12	Waterworks	86	−44	42		
13	Irrigation	167	530	697		
14	Pipe lines	312	298	610		
15	Other industrial	7,497	2,612	10,109	13,851	23,960
16	Residential	14,273	11,852	26,125	6,777	32,902
17	Tax exempt	4,543	5,409	9,952	13,426	23,378
18	Total	56,237	61,989	118,226	40,160	158,386
	Major categories					
19	Private industrial (1 + 4 + 15)	20,297	28,593	48,890	5,018	53,908
20	Residential (16)	14,273	11,852	26,125	6,777	32,902
20a	Total private (10 + 20)	34,570	40,445	75,015	11,795	86,810
21	Public utilities (5 through 14)	17,124	16,135	33,259	14,939	48,198
22	Tax exempt (17)	4,543	5,409	9,952	13,426	23,378
	Major business categories					
23	Agriculture (1)	4,465	4,582	9,047	−2,846	6,201
24	Electric light & power (11)	804	3,346	4,150		
25	Mining & manufacturing (4)	8,335	21,399	29,734	−5,987	23,747
26	Transportation (5, 6, 7, 10, & 14)	15,049	10,936	25,985		
27	Communication (8 & 9)	1,018	1,367	2,385		
28	Other industrial (12, 13, 15)	7,750	3,098	10,848		
29	Total	37,421	44,728	82,149	19,957	102,106

COLUMN 1

LINES 1-18, Parts A & B: Difference between col. 3 and col. 1 of Table IV 12 for the respective industries.

COLUMN 2

LINES 1-18: Difference between the sum of col. 3 and 6 of Table IV 7 and col. 3 of Table IV 12 for the respective industries.

COLUMN 3

Sum of col. 1 and 2.

COLUMN 4

LINES 1-18, 21: Table IV 9, col. 5 for the respective industries.

COLUMN 5

Sum of col. 3 and 4.

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