APPENDIX A

Annual Estimates, 1919–1955

The Basic Concepts and the Compromise Solutions

NATIONAL income or product totals, since they are expressed quantitatively, convey impressions of precision that tend to conceal debatable underlying assumptions. It is important to recognize these assumptions and state them explicitly in defining the concepts.

National income or net national product (terms used interchangeably in discussing the present series) is the *unduplicated* total of all goods produced by the individual members of the nation and by the capital belonging to them. The major difficulties requiring some criteria for solution may be grouped under three heads: (1) the scope implied by all goods; (2) the elimination of duplication; and (3) the reduction of the diverse items to a common denominator so that they can be added and their total compared from year to year and place to place. Of the three groups of problems (debated at length in the national income literature), the second, elimination of duplication, is of interest here.

In estimating the net product of the economy, we do not wish to count the loaf of bread produced and the flour that goes into it and the grain used in making the flour. Where the production relations are clear, as in the example just given, no difficulty arises: national product includes the loaf of bread, but not the flour and grain consumed in its production. But the output of some activities, particularly those under government auspices, is not easily classifiable as *intermediate* product, i.e., of a type used to produce other goods and hence to be excluded, or as *final* product, and hence to be included. Even consumer goods used by households are regarded as final product only because we view

their consumption as final use, not as means to produce, that is, to maintain and increase the supply of human beings as if they were tools (which may be the case in a slave economy). In short, final product can be distinguished from intermediate only if we agree on the ultimate purpose of economic activity.

The point of view here is that the purpose of economic activity is the satisfaction of wants of the members of society, present and future, regarded as ultimate consumers. This admits into net product all consumption by households, and all net additions to capital—whether located within the country or represented by claims against other countries—such capital constituting provision for the future. But for technical reasons the concept must be changed somewhat. Instead of recording actual consumption by households, we record flow of goods to them, disregarding changes in household inventories. Furthermore, since consumption of durable capital (construction and equipment) is difficult to estimate, we measure not only *net* additions to the stock of durable capital within the country (net of current consumption) but also *gross* additions. It is in allowing or not allowing for consumption of construction and equipment that we differentiate between net and gross national product.

The concepts can be described most easily in terms of the two final product components—flow of goods to consumers, and gross or net capital formation. The former comprises all commodities and services flowing to ultimate consumers (households) at cost to them, and any services rendered directly by governments. Capital formation includes gross or net additions to the stock of goods within the country in the hands of business and governments (as well as residential construction even if owner occupied) and net changes in claims against foreign countries. In passing from gross to net capital formation, the adjustment for consumption of durable capital must take account of replacement cost. The same concepts, in the income-payments approach, are approximated by adding factor payments *excluding* direct taxes, direct services of governments to ultimate consumers, undistributed profits of business (net or gross of depreciation, and properly adjusted for the effects of changes in inventory valuation and of differences between the cost and replacement bases of depreciation charges), and net or gross savings or losses of governments (defined as the difference between their net or gross capital formation and the excess of their expenditures on goods over current income). If these concepts are followed, all government expenditures on commodities and services

cannot be included in final product and treated as if they were flow of goods to consumers or capital formation.

In applying these concepts, particularly to the years of war and disturbance that account for much of the period since 1919, difficult decisions must be made. These decisions, or compromise solutions, are discussed separately for flow of goods to consumers and for capital formation.

FLOW OF GOODS TO CONSUMERS

First, we decided to omit from the services component of the Department of Commerce consumer expenditures series (used either directly or for extrapolation), "services furnished without payment by financial intermediaries except insurance companies." [1] The argument for classifying this item as a final consumer good has always seemed tenuous; and its inclusion as a means of achieving a proper distribution of product by industrial origin is of marginal value, since an industrial distribution of net product is beset with far greater difficulties. The effect of this omission on the estimates is minor: it accounts for only a few percentage points of total services, and for even less of total consumer outlay. Anyone who wishes to retain it can easily reinclude it in the estimates that follow.

A second and far more important and difficult decision is involved in estimating the amount to be added to consumer expenditures to approximate the value of direct services by governments. A proper estimate of this addition would require a functional analysis of all government expenditures on commodities and services and their classification as services to ultimate consumers (health, education, recreation, and the like) or as services to business enterprises and society at large. Such an analysis would also improve the estimate of capital formation under government auspices. But the task is formidable and could be performed only by an agency with full access to government accounts—federal, state, and local. It could not be undertaken here, and for purposes of establishing a national product framework in the study of long-term trends over the last three-quarters of a century, it is not indispensable, since governments have emerged as large producers and spenders only within the last ten to fifteen years. But it is, to my mind, essential to any study of recent changes in national output that attempts to provide fully meaningful results.

[1] Subgroup VII-3, Table 30 of *National Income, 1954 Ed.* (Supplement, *Survey of Current Business,* Department of Commerce) and of *Survey of Current Business,* July 1956.

Appendix A

The rather arbitrary compromise here [2] was to treat direct taxes paid by individuals as a rough approximation to the value of direct services of governments to them (on a nationwide scale, not in the sense of equivalence of direct taxes and services either for any one type of government or for any one group of taxpayers or services recipients). This convention is justified only because, statistically speaking, the relative magnitudes have been small until recent years. Thus, for the 1929–1938 decade, direct taxes and the nontax payments by ultimate consumers were about $2.1 billion per year.[3] For the same decade, total government expenditures on commodities and services were $9.9 billion per year. But we know that of these about $2.6 billion per year was accounted for by gross public construction, and if the 1939 figures are any indication, national security expenditures constituted about one-tenth of total government expenditures.[4] Subtraction of construction and estimated security expenditures alone leaves about $6.3 billion per year in 1929–1938 for other government expenditures on commodities and services. This residual still includes a wide variety of outlays wholly or in part chargeable to business and society at large. Depending upon the interpretation of the dividing line between direct services and outlays representing costs, the volume of direct services of governments to ultimate consumers could have ranged from $1.5 billion to $3.5 billion per year over the 1929–1938 decade. Compared with the crude approximation based on direct tax and nontax payments, a more detailed estimate could make a difference of about $1 billion per year—less than 2 per cent of flow of goods to consumers or slightly more than 1 per cent of national product, gross or net.

The difficulty with this compromise solution arises in its use for years of war and increased direct taxes. Tax payments by ultimate consumers had risen by 1943 to about $18 billion, and by 1955 had climbed to $35 billion.[5] Over the 1946–1955 decade their ratio to total consumer expenditures (Department of Commerce definition) ranged from 10 to 16 per cent, and they loomed large (from 7 to 10 per cent) even as shares in gross national product (Commerce definition). Obviously, this increase in the relative weight of direct taxes does not represent an equivalent increase in the relative importance of direct services of

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2 Adopted originally in Simon Kuznets, *National Income and Its Composition, 1919–1938* (New York, NBER, 1941).

3 *National Income, 1954 Ed.,* Table 3.

4 *Ibid.,* Table 2.

5 *Survey of Current Business,* July 1956, Table 3.

governments to ultimate consumers, unless we consider war a net contribution to consumption or to capital formation. Indeed, the nonmilitary part of government expenditures on commodities and services probably declined relative to total consumer expenditures. In 1939, government expenditures, excluding those on national security, were well over one-sixth of personal consumption expenditures (Commerce definition); by 1955, the share had declined to about one-seventh; and in the war years, 1943 and 1944, it was considerably below one-tenth.[6]

Clearly, to use direct tax payments for the war and postwar years as an approximation to the current value of direct services by governments to ultimate consumers would be misleading. Likewise, in the income-payments approach, we would not be justified in continuing to use factor payments including (i.e. gross of) direct taxes. This simple procedure can be retained only if direct taxes are assumed to be payments for services.

As an easy solution, it seemed best to freeze the ratio of direct taxes to total flow of goods to consumers at the average level prevailing during the immediate prewar years. This ratio, 3.6 per cent for both 1929–1938 and 1929–1940, was applied to flow of goods to consumers (consumer expenditures, as estimated by the Department of Commerce, excluding services imputed to financial intermediaries) for all years beginning with 1941. This estimate exaggerates the relative weight of the services of governments to ultimate consumers, at least in comparison with the 1930's. Consequently, under the concept adopted here, it imparts a slight upward bias to the estimates for the 1940's compared with those for the earlier decades.

CAPITAL FORMATION

Among the problems related to the estimation of capital formation, two deserve comment: the omission of some items of government nonmilitary capital formation; and the treatment of that part of military output which is regarded as capital formation.

The concept calls for the inclusion in government nonmilitary capital formation not only of construction (which is covered) but also of net changes in inventories and of additions to the stock of equipment. Our estimates of producers' durables cover the total flow into domestic consumption without deduction of government purchases. Hence they implicitly include additions to government nonmilitary equipment,

[6] Table 2 of *National Income, 1954 Ed.* and of *Survey of Current Business*, July 1956.

although their estimation for recent years is based on crude assumptions. But for the early years there are no data on government inventories, and the changes in the latter had to be omitted from our estimates of capital formation. However, they are not of appreciable significance even annually (except in the case of military nondurables, discussed below), let alone from the standpoint of longer-term movements.

The treatment of capital formation covered in military output raises more complicated conceptual questions and involves larger amounts statistically. Theoretically, the concept calls for net additions to inventories and gross and net additions to durable military capital (construction and durable munitions). Statistically, the measurement of net changes in nondurable military inventories is difficult. The results would probably display marked gyrations that would overshadow the net changes not only in total inventories but also in total capital formation, and possibly have erratic effects even upon national product. However, although they would show marked rises during the war years and sharp declines immediately thereafter, the long-term effect would be relatively slight. Therefore, it seemed justifiable to resort to the fiction that all nondurable military goods are consumed during the year in which they are produced, and changes in inventories of such goods are zero.

No such assumption can be adopted for durable munitions and military construction. By definition, they are not consumed within the year and are in fact, additions to the stock of capital within the country and may last for a number of years. Even though they are designed for military purposes, their survival beyond the initial year releases capital resources for other purposes, and while their services cannot be considered final product, the capital stock embodied in them, like other types of capital that serve a protective purpose, should be included.

The decision to include gross and net capital formation embodied in military construction and durable military goods raises still further questions. How are they to be distinguished from nondurable goods? What rate of consumption (i.e., what life period and depreciation curve) should be assumed for them? How should their current values be adjusted to a constant price basis comparable with that for other commodities and services?

The present estimates of these items differ from our earlier estimates

on all three counts.[7] First, recent work (largely on the estimation of government wealth) has permitted a much clearer separation between durable and nondurable military output, yielding appreciably lower totals for the former. Thus, in Table R-6 durable munitions are $8.5 billion and $18.4 billion for 1942 and 1943, respectively, whereas the earlier estimates were $30.0 billion and $53.4 billion.[8] There are corresponding reductions in the gross value of durable munitions for preceding years, but the totals are significant only for 1918 and 1919.

Because of this narrower definition of durable munitions, changes in two other aspects of the estimates became advisable and feasible. The exclusion of all but relatively durable munitions warranted the use of a life of nine years (derived largely from a combination of wealth estimates and gross production) rather than the five years for the war periods and the ten years for the nonwar periods set in the earlier study. Also, with the inclusion of additional war and nonwar years, it became exceedingly difficult to adjust the cost of military construction and munitions to levels comparable with normal, peacetime output.[9] Instead, it seemed best to accept the price adjustment used in the Department of Commerce national income accounts.[10]

These changes in the treatment of durable military output may seem arbitrary, and there is no denying a large element of personal judgment in the procedures. Only two extenuating comments can be made here. First, the changes reflect observations over a longer period and bring the present estimates into closer agreement with the Commerce estimates. Second, given the concept, one errs less in making a rough allowance for the inclusion of durable capital designed for military purposes than in either omitting it altogether or including under final product all military outlay by governments.

The Three Variants

The statistical estimation of the totals and components corresponding to the basic concepts just discussed is based partly upon the work on national income carried out originally at the National Bureau of Economic Research and reported in a series of volumes extending back

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[7] See Simon Kuznets, *National Product since 1869* (New York, NBER, 1946).

[8] *Ibid.*, Table I-9, p. 42.

[9] Originally attempted in Simon Kuznets, *National Product in Wartime* (New York, NBER, 1945).

[10] See *National Income, 1954 Ed.*, p. 157.

to the early 1920's and forward to the most recent, *National Product since 1869*. It also relies heavily upon the national income work of the Department of Commerce, which has provided an increasingly valuable and detailed set of estimates for the years since 1929. These source materials, used in different combinations, yielded three sets of continuous and comparable estimates, each corresponding to the basic concepts followed here. The detailed results will be of interest only to investigators for whom we provide the reference tables and notes at the end of each appendix. However, the three sets of estimates, called Variants I, II, and III, are briefly described here.

There are three variants of flow of goods to consumers, of net national product (national income), and of gross national product. But in all the variants of national product, capital formation and its components (gross and net) are identical. The variants differ, therefore, only in the measure of flow of goods to consumers. Variant I is based on the original estimates of national income derived by the income-payments method in *National Income and Its Composition, 1919–1938*. It approximates services (and hence total flow of goods to consumers) by subtracting from national income independently derived estimates of cost of commodities to consumers and of net capital formation, and it is extrapolated forward from the 1930's by appropriate items in the Commerce national income accounts. Variant II retains all the commodity flow series of Variant I but measures the services component directly, to yield a new total of flow of goods to consumers. Variant III takes as its base the Commerce commodity flow and services estimates for the years beginning with 1929 but uses only those components that reflect the concepts underlying Variants I and II. These components of flow of goods to consumers are then extrapolated back to 1919 by the commodity components of Variant I and the services component of Variant II.

These three measures are *statistical* variants of what is intended to be one and the same concept of flow of goods to consumers and of net and gross national product. The discrepancies among them are to be ascribed to differences in estimating procedure. In considering these purely statistical discrepancies, we deal with the estimates in current prices, averaged for decades. Since identical indexes are applied to the three in adjusting for price changes, the differences among the variants in 1929 prices are similar, and since our interest is in long-term movements, decade averages will suffice. Furthermore, the annual

movements of many of the series are identical for all variants because they are based on the same estimates, either incorporated directly or used as extrapolators.

Table A-1 groups all commodity flows to consumers together. It properly emphasizes the services component, which is derived differently for each variant. Two questions are of interest. What is the relative difference in level among the three variants? More important,

TABLE A-1

Comparison of the Three Variants, Decennial Averages,
Current Prices, 1919–1955

	Absolute Figures (billions of dollars)				Indexes (Variant I = 100)			
	1919–1928	1929–1938	1939–1948	1946–1955	1919–1928	1929–1938	1939–1948	1946–1955
Commodity flow to consumers								
Variant I	42.3	37.7	78.7	137.6	100.0	100.0	100.0	100.0
Variant II	42.3	37.7	78.7	137.6	100.0	100.0	100.0	100.0
Variant III	40.6	36.1	75.2	132.6	96.2	95.7	95.6	96 4
Services								
Variant I	21.4	22.1	33.9	61.0	100.0	100.0	100.0	100.0
Variant II	26.5	27.3	42.8	76.2	123.6	123.6	126.0	124.8
Variant III	25.5	26.1	40.9	73.4	119.1	118.3	120.5	120.3
Flow of goods to consumers								
Variant I	63.7	59.8	112.6	198.7	100.0	100.0	100.0	100.0
Variant II	68.8	65.0	121.5	213.8	107.9	108.7	107.8	107.6
Variant III	66.2	62.2	116.1	206.0	103.9	104.1	103.1	103.7
Net national product (national income)								
Variant I	72.2	61.3	121.5	214.2	100.0	100.0	100.0	100.0
Variant II	77.2	66.5	130.3	229.3	107.0	108.5	107.3	107.1
Variant III	74.6	63.7	124.9	221.6	103.4	104.0	102.9	103.4
Gross national product								
Variant I	82.1	71.1	144.0	260.0	100.0	100.0	100.0	100.0
Variant II	87.2	76.3	152.9	275.1	106.2	107.3	106.1	105.8
Variant III	84.6	73.5	147.5	267.3	103.0	103.4	102.4	102.8

Because of rounding, detail will not necessarily add to total.

Source: Calculated from Tables R-1, R-3, and R-9.

what is the difference among them in the broad movements over the three and a half decades since 1919?

In general, the direct estimates of services are higher than the estimate derived as a residual (compare Variants II and III with Variant I). This accords with the general finding that national product estimates derived by the flow-of-income approach are somewhat lower than those obtained by the final-product approach. Consequently, the estimate of services derived as a residual will be lower than that derived directly. But while the excess of the direct estimates is a fairly substantial proportion of the lower estimate of services, the difference is only between 7 and 8.5 per cent of net national product and somewhat less of gross national product in Variant II, and about 6 per cent of net national product and 5 per cent of gross national product in Variant III. The estimate of services in Variant II is larger because the Commerce ratio of services to consumer commodity flow is applied to the National Bureau's somewhat higher estimate of the latter. Variants I and III are preferable to Variant II because the latter is somewhat hybrid, and hence its over-all levels are likely to be more affected by inconsistency in component structure.

For the present purposes, it is the comparative *movement* of the three variants over time that is more relevant. The movement of the decade averages in Variants II and III is not significantly different from that in Variant I. The similarity between Variants I and II is to be expected in view of their predominantly common structure. But even Variants I and III, estimated independently, reflect reliance on a common set of basic data for an overwhelming proportion of the over-all totals.

The discrepancies in movement over the decades among the variants would have to be large indeed to affect the secular trends materially. From 1919–1928 to 1946–1955, the national product totals about tripled. A difference of a few percentage points in a rise of over 200 per cent can hardly be significant, in view of the general margin of error that attaches to the estimates.

One may conclude that the statistical discrepancies among the three variants (in terms of decennial averages) are of little significance in an analysis of long-term movements. That conclusion would clearly be true for shorter-period averages for the two variants of most interest here—I and III.

Appendix A

Comparison with the Department of Commerce Totals, 1929 to 1955

The concepts underlying the three variants differ from those underlying the Commerce estimates. We therefore compare our estimates with those of the Commerce Department to demonstrate the effects of the conceptual differences on the level of the two sets of series and, particularly, on their movement during the recent decades.

In this comparison we use Variant III, in which the flow of goods to consumers is essentially the Commerce estimate. Using Variant III rather than I or II minimizes the statistical differences and reveals the conceptual differences more clearly.

GROSS NATIONAL PRODUCT

Table A-2 provides an indication of the major sources of difference between the two sets of estimates of gross capital formation.

First, our estimates of gross construction totals are consistently larger than the Commerce estimates because they include public construction. In fact, the difference between columns 1 and 2, entered in column 3, is exactly equal to the volume of public construction. Since public construction (including military) increases appreciably in the 1940's and early 1950's, the shortage in the Commerce estimates grows accordingly.

Second, our series on gross producers' durables is consistently larger than the Commerce series—also to be expected. Our series includes durable munitions as well as other types of durable equipment sold to governments; the Commerce series is limited to private durable equipment. In the World War II years and most later years, durable munitions account for the dominant proportion of the difference (compare columns 6 and 7). But there is always a residual difference assignable partly to statistical discrepancies, partly to the inclusion here of nonmilitary producers' durables purchased by governments.

It would be comforting to be able to assert that this residual difference (i.e., the difference between columns 6 and 7) represents a fair approximation to the annual flow of nonmilitary producers' durables to governments. But this cannot be claimed even for 1929 to 1933 for which years we have independent estimates of total producers' durables by the National Bureau and of private producers' durables by the Department of Commerce. All that can be said is that the average level seems reasonable. Thus, for 1929–1938 the residual difference

TABLE A-2

Gross Capital Formation: Major Sources of Difference between NBER Estimates and Department of Commerce Estimates, Current Prices, 1929–1955

(billions of dollars)

	Construction			*Producers' Durables*			*Durable Munitions, Included in (4), Excluded from (5) (7)*
	NBER (total) (1)	Commerce (private) (2)	Shortage, Commerce: Public, Signs Reversed, Included in (1), Excluded from (2), (2) − (1) (3)	NBER (total) (4)	Commerce (private) (5)	Shortage, Commerce (5) − (4) (6)	
1929	11.2	8.7	−2.5	7.5	5.8	−1.6	0.2
1930	9.0	6.2	−2.9	5.8	4.5	−1.3	0.2
1931	6.6	4.0	−2.7	3.7	2.8	−0.9	0.3
1932	3.7	1.9	−1.9	2.1	1.6	−0.5	0.3
1933	3.1	1.4	−1.6	2.2	1.6	−0.6	0.2
1934	3.9	1.7	−2.2	3.3	2.3	−1.0	0.3
1935	4.5	2.3	−2.2	4.2	3.1	−1.1	0.4
1936	6.8	3.3	−3.5	5.9	4.2	−1.7	0.5
1937	7.5	4.4	−3.1	6.6	5.1	−1.5	0.5
1938	7.4	4.0	−3.4	5.3	3.6	−1.7	0.5
1939	8.6	4.8	−3.8	5.8	4.2	−1.6	0.4
1940	9.1	5.5	−3.6	7.0	5.5	−1.4	0.3
1941	12.4	6.6	−5.8	10.2	6.9	−3.3	1.9
1942	14.4	3.7	−10.7	14.8	4.3	−10.4	8.5
1943	8.6	2.3	−6.3	23.8	4.0	−19.7	18.4
1944	5.8	2.7	−3.1	26.4	5.4	−20.9	20.2
1945	6.2	3.8	−2.4	21.0	7.7	−13.4	12.8
1946	12.7	10.3	−2.4	14.2	10.7	−3.5	2.7
1947	17.5	14.0	−3.4	19.6	16.7	−2.9	1.8
1948	22.7	17.9	−4.8	22.9	19.1	−3.8	2.2
1949	23.9	17.5	−6.4	22.4	17.8	−4.6	2.5
1950	29.7	22.7	−7.0	26.0	21.1	−4.9	2.5
1951	32.8	23.3	−9.4	32.0	23.2	−8.8	5.9
1952	34.6	23.7	−10.9	35.2	23.1	−12.1	8.9
1953	37.2	25.8	−11.4	37.1	24.3	−12.8	9.4
1954	39.8	27.9	−11.9	33.1	22.4	−10.7	7.0
1955	45.2	32.7	−12.5	33.0	23.7	−9.3	5.6

Because of rounding, detail will not necessarily add to total.

Source, by Column

(1), (4), and (7) Tables R-4 and R-6.
(2) and (5) Tables 2 and 31 in *National Income, 1954 Ed.* (Supplement, *Survey of Current Business*) and in *Survey of Current Business*, July 1956.

averages about $0.85 billion. Its ratio to public construction during that decade (0.85 to 2.6) or to total government outlay on goods and services (0.85 to 9.9) seems quite moderate. However, these are merely plausibilities, and not much weight can be placed on the difference derivable from columns 6 and 7 of Table A-2.

The sum of the shortages in the Commerce series on gross construction and gross producers' durables and of the minor differences in the other two components of gross capital formation (net changes in inventories and in claims against foreign countries) is shown in Table A-3 (column 1). Columns 2 to 4 indicate the two sources of difference between our estimate of the flow of goods to consumers and the Commerce series on consumer expenditures: the latter includes imputed services of financial intermediaries, and excludes the volume of direct services of governments to ultimate consumers. The net difference (column 4) indicates again a shortage in the Commerce estimates, small in the early years but increasing as our estimate of government services to ultimate consumers increases.

All these shortages in capital formation and flow of goods to consumers are more than offset by the inclusion in the Commerce national product series of total government expenditures on commodities and services (column 5). Fairly substantial even in the 1930's, they rise to great heights during the war years of the 1940's and, after a brief contraction in 1946–1948, rise again to levels not much below those of World War II. These expenditures, largely excluded from Variant III, more than outweigh the shortages previously described and produce a consistent excess in the Commerce gross national product total (column 6).

Three aspects of the comparison deserve emphasis. First, columns 6 and 7 indicate that the excess of the Commerce totals over those in Variant III is largely accounted for by the *conceptual* differences in the treatment of government. Second, the excess constitutes a fairly substantial fraction of the total in Variant III even in the 1930's, and rises to as much as 49 per cent in the 1940's and almost 18 per cent in subsequent years (column 8). It follows that the Commerce concept yields a greater rise in gross national product after the 1930's than ours does. Third, the sizable relative excess of the Commerce series is not limited to the World War II years but will persist so long as government expenditures on commodities and services are heavily dominated by those for war and preparation for war, and so long as ultimate con-

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TABLE A-3

Gross National Product: Sources of Difference between Variant III and Department of Commerce Estimates, Current Prices, 1929–1955

(dollar amounts in billions)

	Gross Capital Formation, Shortage, Commerce (1)	Flow of Goods to Consumers			Excess, Commerce: Government Expenditures on Commodities and Services (5)	Total Excess, Commerce (1) + (4) + (5) (6)	Excess, Due to Treatment of Government (7)	(6) as % of GNP Variant III (8)
		Excess, Commerce: Imputed Services of Financial Intermediaries (2)	Shortage, Commerce: Tax and Nontax Payments by Individuals^a (3)	Net Difference (Shortage), Commerce (2) + (3) (4)				
1929	−4.1	1.3	−2.6	−1.4	8.5	3.0	1.7	2.9
1930	−4.2	1.1	−2.5	−1.4	9.2	3.6	2.5	4.1
1931	−3.6	1.0	−1.9	−0.8	9.2	4.8	3.8	6.7
1932	−2.4	0.9	−1.5	−0.6	8.1	5.1	4.3	9.5
1933	−2.4	0.8	−1.5	−0.7	8.0	5.0	4.3	9.7
1934	−3.5	0.8	−1.6	−0.8	9.8	5.5	4.9	9.3
1935	−3.7	0.8	−1.9	−1.1	10.0	5.2	4.8	7.7
1936	−5.6	0.8	−2.3	−1.4	11.8	4.8	4.4	6.2
1937	−4.7	0.9	−2.9	−2.0	11.7	4.9	4.2	5.7
1938	−5.4	0.8	−2.9	−2.0	12.8	5.3	4.9	6.7
1939	−5.7	0.8	−2.4	−1.6	13.3	6.0	5.4	7.1
1940	−5.3	0.8	−2.6	−1.8	14.1	7.0	6.4	7.5
1941	−9.4	0.9	−2.9	−2.1	24.8	13.3	12.8	11.8
1942	−21.3	0.9	−3.2	−2.3	59.7	36.2	35.4	29.4
1943	−26.2	0.9	−3.6	−2.6	88.6	59.7	59.0	45.0
1944	−24.3	1.2	−3.9	−2.7	96.5	69.5	68.6	49.0
1945	−15.9	1.3	−4.3	−3.0	82.9	63.9	62.7	42.7
1946	−5.9	1.5	−5.2	−3.7	30.9	21.3	19.9	11.3
1947	−6.5	1.5	−5.9	−4.4	28.6	17.7	16.4	8.3
1948	−8.8	1.7	−6.3	−4.6	36.6	23.2	21.6	9.9
1949	−11.1	1.9	−6.4	−4.6	43.6	27.9	26.2	12.2
1950	−11.9	2.0	−6.9	−4.9	42.0	25.2	23.3	9.7
1951	−18.3	2.2	−7.4	−5.2	62.8	39.3	37.1	13.6
1952	−23.1	2.5	−7.8	−5.3	77.5	49.1	46.7	16.6
1953	−24.3	2.8	−8.2	−5.4	84.4	54.7	52.0	17.7
1954	−22.7	3.0	−8.4	−5.4	76.5	48.4	45.5	15.5
1955	−21.9	3.4	−8.9	−5.6	76.8	49.3	46.0	14.4

Because of rounding, detail will not necessarily add to total.
^a Through 1940. For description of estimate for 1941–1955, see text.

SOURCE, BY COLUMN

(1) Difference between col. 5 of Table R-4 and the sum of gross private domestic investment and net foreign investment given in Table 2 of *National Income, 1954 Ed.*, and of *Survey of Current Business*, July 1956.

(2) Group VII-3 of Table 30 in the above two sources.
(3) 1929–1940 from *Survey of Current Business*, July 1956, Table 3.
(5) *Ibid.*, Table 2.
(7) Col. 5 minus col. 3, signs reversed, and minus cols. 3 and 6 of Table A-2, with signs reversed.
(8) For gross national product, Variant III, see Table R-1, col. 9.

sumption and capital formation continue to be a smaller proportion of total government expenditures than in the nonwar years before the 1940's.

NET NATIONAL PRODUCT AND NATIONAL INCOME

All the conceptual (and minor statistical) disparities between the gross national product totals in Variant III and in the Commerce series apply also to a comparison of net national product and national income in the two sets of estimates. But there are additional sources of difference, some accentuating and others reducing the difference in *level*, and all contributing to a marked difference in *movement* from the 1930's to the 1940's and later years.

In the concept underlying Variant III, net national product and national income are identical. In the conceptual structure of the Commerce series, the difference between gross and net national product is capital consumption charges, and there is a further difference between net national product and national income in that the latter is net of business taxes and business transfer payments (excluding subsidies to business and the surplus of government enterprises).

The sources of difference between net national product, Department of Commerce definition, and net national product (or national income), Variant III, lie not only in those already stated above in the comparison of gross national product, but also in the measurement of capital consumption (Table A-4). Our series on capital consumption is consistently and appreciably larger than that recorded in the Commerce income accounts, partly because it includes consumption charges on government construction and munitions, even though as indicated in footnote 1, Chapter 3, it does not allow for depreciation of non-military producers' equipment purchased by governments (column 4). But there are other sources of difference in the capital consumption item. We include depletion charges, excluded by the Department of Commerce on the ground that they do not represent depreciation of reproducible capital. The logic of this exclusion has always seemed doubtful, partly because, with changing technology, reproducibility (and substitutability) is a relative rather than an absolute term; partly because, like much of depreciation proper (on reproducible goods), which represents loss in competitive position because of obsolescence, depletion of natural resources also means loss in competitive position. Finally, a third factor causing shortage in the Commerce estimates of capital consumption in all years except the 1930's is the use of the

Appendix A

TABLE A-4

CAPITAL CONSUMPTION: SOURCES OF DIFFERENCE BETWEEN NBER ESTIMATES AND DEPARTMENT OF COMMERCE ESTIMATES, CURRENT PRICES, 1929–1955

(dollar amounts in billions)

	Total Capital Consumption			Difference (Shortage), Commerce, Due to Scope		Difference Due Largely to Basis of Depreciation Valuation		Price Index, Construction and Producers' Durables (1929 = 100.0) (8)
	NBER (1)	Commerce (2)	Total Difference (Shortage), Commerce (2) − (1) (3)	Depreciation, Public Construction, and Munitions (4)	Depletion (5)	NBER Depreciation (6)	Difference, Commerce (2) − (6) (7)	
1929	11.1	8.6	−2.5	−1.4	−0.5	9.2	−0.6	100.0
1930	10.6	8.5	−2.1	−1.3	−0.5	8.8	−0.2	96.4
1931	9.8	8.2	−1.6	−1.3	−0.5	8.0	0.2	89.7
1932	8.6	7.6	−1.0	−1.2	−0.4	7.0	0.6	80.8
1933	8.3	7.2	−1.2	−1.4	−0.4	6.5	0.6	78.3
1934	9.1	7.1	−2.0	−1.7	−0.4	7.1	0.1	83.6
1935	9.2	7.2	−1.9	−1.7	−0.4	7.0	0.2	84.2
1936	9.7	7.5	−2.2	−1.9	−0.4	7.4	0.1	84.8
1937	10.8	7.7	−3.0	−2.1	−0.5	8.3	−0.5	93.0
1938	11.1	7.8	−3.3	−2.1	−0.5	8.5	−0.7	94.8
1939	11.2	7.8	−3.4	−2.3	−0.5	8.5	−0.6	93.6
1940	11.8	8.1	−3.6	−2.3	−0.5	8.9	−0.8	96.2
1941	13.6	9.0	−4.5	−2.8	−0.6	10.2	−1.2	103.5
1942	16.5	10.2	−6.4	−3.9	−0.8	11.9	−1.7	112.9
1943	19.6	10.9	−8.7	−5.7	−0.8	13.1	−2.2	120.6
1944	23.2	12.0	−11.2	−7.5	−0.9	14.8	−2.8	126.4
1945	25.5	12.5	−12.9	−9.0	−0.9	15.6	−3.0	129.2
1946	27.5	11.7	−15.8	−11.0	−0.9	15.6	−4.0	141.0
1947	35.4	14.1	−21.3	−13.2	−1.2	21.1	−6.9	165.8
1948	41.4	16.5	−24.9	−14.8	−1.5	25.1	−8.6	182.2
1949	44.0	18.4	−25.6	−15.2	−1.6	27.2	−8.8	185.4
1950	46.9	20.5	−26.4	−15.9	−1.7	29.3	−8.8	190.1
1951	52.5	23.5	−29.1	−16.5	−2.0	34.0	−10.5	205.6
1952	51.2	23.9	−27.3	−15.7	−2.0	33.5	−9.6	209.0
1953	51.9	26.5	−25.4	−13.8	−2.1	36.0	−9.5	214.0
1954	52.1	28.8	−23.4	−12.5	−2.2	37.5	−8.7	213.8
1955	54.9	31.3	−23.6	−12.6	−2.4	40.0	−8.7	217.6

Because of rounding, detail will not necessarily add to total.

SOURCE, BY COLUMN

(1) Table R-8, col. 3.
(2) *Survey of Current Business*, July 1956, Table 4.
(4) Table R-6, col. 6, and annual series underlying Table R-31, cols. 2 and 3.
(5) Estimated by the procedure described in the notes to Table R-8, col. 3.
(6) Col. 1 minus the sum of cols. 4 and 5, with signs reversed.
(8) Arithmetic average of price index of private new construction and of private producers' durable equipment (*Survey of Current Business*, July 1956, Table 41), each shifted to a 1929 base.

original cost rather than the reproduction cost basis in calculating de-
preciation charges (column 7). When current prices are greatly in ex-
cess of original cost, the shortage in the Commerce estimates of capital
consumption is fairly substantial. This is evident in the inverse rela-
tion between the movement of that shortage in column 7 and the
movement of the price index of durable capital goods in column 8
(unweighted average of the Commerce price indexes for construction
and producers' durables, each shifted to a 1929 base).

Since our capital consumption estimates are larger than those of the
Department of Commerce, the reduction in passing from gross to net
national product is larger in Variant III than in the Commerce series.
The shortage in the Commerce estimates of capital consumption must,
therefore, be *added* to the excess of its estimates of gross national
product to derive the total excess of the Commerce estimates of net
national product over those in Variant III. Therefore, the sign of the
entries in column 3 of Table A-4 is reversed in column 2 of Table A-5.
The sum of columns 1 and 2 is, then, the total excess of the Commerce
net national product totals (column 3).

It is not surprising that the relative excess is appreciably greater
than that in gross national product shown in Table A-3. Nor is it sur-
prising that the relative magnitude of the excess rises significantly
from the 1930's to the mid-1940's. What should be emphasized is that
the relative level remains high after World War II. The average excess
for 1946–1955 is almost 27 per cent of the level in Variant III, or more
than twice as large as the average of 11.2 per cent for 1929–1938 (col-
umn 4). For gross national product, the corresponding excess is 12.9
per cent for 1946–1955 and 6.8 per cent for 1929–1938. The relative ex-
cess of the Commerce net national product series increases because
depreciation on government capital is not deducted and because the re-
placement cost basis for business capital is not used. These omissions
form an increasing proportion of gross national product because of the
bulge in government capital that occurred during the war years and
because of the continued inflation of prices of durable capital goods.
As a result, the discussion above concerning the effects of the con-
ceptual structure of the Commerce estimates on the rise in gross na-
tional product totals after the 1930's applies with even greater force
to the rise in the net national product totals.

When the net national product totals in Variant III are compared
with the Commerce national income totals, the level of the discrepancy
is markedly different (columns 5 to 7 of Table A-5). National income,

TABLE A-5

Net National Product and National Income: Sources of Difference between Variant III and Department of Commerce Estimates, Current Prices, 1929–1955

(dollar amounts in billions)

	Gross National Product, Excess, Commerce (1)	Capital Consumption, Shortage (signs reversed) Commerce (2)	Net National Product		National Income			
			Total Excess, Commerce (1) + (2) (3)	(3) as % of NNP, Variant III (4)	Business Taxes, Transfer Payments, and Surplus of Government Enterprises, Commerce (5)	Statistical Discrepancy, Commerce (6)	Excess, Commerce (3) − (5) − (6) (7)	(7) as % of NNP, Variant III (8)
1929	3.0	2.5	5.5	6.1	7.7	0.3	−2.5	−2.8
1930	3.6	2.1	5.7	7.4	7.8	−1.0	−1.1	−1.5
1931	4.8	1.6	6.4	10.3	7.6	0.8	−2.0	−3.3
1932	5.1	1.0	6.1	13.6	7.6	0.8	−2.2	−5.0
1933	5.0	1.2	6.2	14.4	7.7	0.9	−2.5	−5.8
1934	5.5	2.0	7.5	14.9	8.2	0.7	−1.4	−2.7
1935	5.2	1.9	7.1	12.2	8.4	−0.2	−1.1	−1.9
1936	4.8	2.2	7.0	10.2	9.2	1.1	−3.3	−4.9
1937	4.9	3.0	8.0	10.6	9.7	−0.2	−1.5	−1.9
1938	5.3	3.3	8.7	12.6	9.4	0.5	−1.2	−1.8
1939	6.0	3.4	9.4	12.7	9.3	1.2	−1.1	−1.5
1940	7.0	3.6	10.6	13.0	10.0	0.8	−0.2	−0.3
1941	13.3	4.5	17.8	18.0	11.7	0.4	5.8	5.8
1942	36.2	6.4	42.5	39.9	12.1	−0.8	31.2	29.3
1943	59.7	8.7	68.5	60.5	13.1	−1.7	57.2	50.5
1944	69.5	11.2	80.7	68.0	14.0	2.8	63.9	53.9
1945	63.9	12.9	76.8	61.9	15.3	4.5	57.1	46.0
1946	21.3	15.8	37.1	23.1	17.1	0.9	19.1	11.9
1947	17.7	21.3	39.1	21.8	19.6	1.4	18.1	10.1
1948	23.2	24.9	48.1	24.9	21.3	−2.1	28.9	15.0
1949	27.9	25.6	53.6	28.9	22.6	0.1	30.9	16.7
1950	25.2	26.4	51.7	24.3	24.4	0.2	27.1	12.7
1951	39.3	29.1	68.3	28.9	26.4	1.3	40.6	17.2
1952	49.1	27.3	76.4	31.2	29.4	2.0	45.0	18.4
1953	54.7	25.4	80.0	31.2	32.0	2.6	45.4	17.7
1954	48.4	23.4	71.8	27.6	31.8	1.8	38.2	14.7
1955	49.3	23.6	72.9	25.4	33.7	1.8	37.4	13.0

Because of rounding, detail will not necessarily add to total.

SOURCE, BY COLUMN

(1) Table A-3, col. 6.
(2) Table A-4, col. 3, signs reversed.
(4) and (8) For net national product, Variant III, see Table R-1, col. 6.
(5) and (6) *Survey of Current Business*, July 1956, Table 4.

as measured by the Department of Commerce, can best be described as the sum of final products, weighted by factor payments, plus undistributed profits of private enterprise (i.e., return to the factor of enterprise). Final products are defined to include consumer outlay net of direct taxes, private capital formation, and government purchases

of commodities and services. National income, as measured in Variant III, is the sum of final products, weighted by factor incomes. But here final products, while excluding government purchases of commodities and services, include an estimate of direct services of governments to ultimate consumers (approximated by the full total of direct taxes through 1940 and by a constant fraction of total consumer outlay for later years). They also include capital formation by governments. When our estimates of government services to ultimate consumers and public capital formation outweigh government purchases of goods measured at factor cost (i.e., reduced by business taxes, etc.), our estimates of national income are larger than the Commerce totals. This was the case through most of the 1930's, although by only a few percentage points. But in periods of large war and postwar government expenditures, government services to ultimate consumers plus public capital formation fall far short of government purchases even on a factor cost basis. This explains the shift in columns 7 and 8 from small negative entries in the 1930's to large positive ones in the 1940's and later years.

It is particularly to be noted that the upward trend after the 1930's in the excess of the Commerce estimates over those in Variant III is just as conspicuous in the comparison of national income as in the comparison of net national product. The only element that moderates this upward trend is the statistical discrepancy (column 6). Since that tends to rise from the 1930's to the 1940's (although it drops again after 1945), its subtraction tends to reduce, but to only a small degree, the increasing effects of the conceptual differences between the Commerce national income totals and those in Variant III. The average excess of the Commerce national income series over net national product, Variant III, is 14.7 per cent for 1946–1955, compared with an average shortage of 3.2 per cent for 1929–1938 (column 8). If we apply these percentages to the decade averages in Table A-1, we find that, whereas net national product, Variant III, rises from an index of 100 for 1929–1938 to 348 for 1946–1955, the derived rise for the Commerce national income totals would be from an index of 100 to 412.

NATIONAL PRODUCT IN CONSTANT PRICES

The comparisons in Tables A-2 to A-5 are for totals in current prices. With the indexes applied to adjust for changes in prices quite similar for both sets of estimates, the differences between the two and the movement of these differences over time are only slightly affected by

the deflation. There is little need, therefore, to repeat the comparisons in detail.

Yet from many standpoints, the national product totals in constant prices are more meaningful than those in changing current prices. It seemed useful, therefore, to present a brief comparison of the two sets of series in constant prices (Table A-6). Because the Commerce tables show constant price estimates for gross national product alone, and those for other totals can be approximated only roughly, we limit the comparison to gross and net national product.

Three findings can be clearly perceived. First, the Commerce totals show a greater rise from the average level of the 1930's than do the totals in Variant III. This is particularly marked in columns 3 and 4, where the difference in the estimation of capital consumption is added to the difference in treatment of the government sector.

Second, with the Commerce totals in the 1930's already in excess of those in Variant III, the disparity in the trends just observed serves to increase the difference in levels. Thus, for net national product the excess in the Commerce estimates, which is about 7 per cent during 1929–1938, grew to about 22 per cent during 1951–1955.

The third and most interesting finding is the variation in the difference which stems largely from the fluctuations in the proportionate weight of government expenditures, the latter in turn due largely to fluctuations in the relative magnitude of expenditures on defense. The difference in the indexes was moderate in 1939–1941, increased markedly in 1942-1945, the years of heavy military outlays, decreased in 1946–1950 when defense expenditures became relatively moderate, and then rose again in 1951–1955.

These differences in trend and movement are clearly associated with the differences in concept. The concept underlying the Variant III estimates views national product as a contribution either to consumption by ultimate consumers or to capital formation. From this point of view, the great effort during World War II and the defense effort of 1951–1955 was translated into but moderate gains because so much of it went into currently consumed nondurable munitions and into a highly depreciable stock of durable military goods. In the Commerce concept, all government expenditures on goods are final product, and the measures are therefore fully affected by any productive effort that finds its outlet in sales to governments, regardless of whether the product is added to the capital stock of the country or is consumed—in the office or on the battlefield.

Appendix A

TABLE A-6

NATIONAL PRODUCT IN 1929 PRICES: VARIANT III AND
DEPARTMENT OF COMMERCE ESTIMATES COMPARED, 1939–1955

	Gross National Product		Net National Product	
	Variant III (1)	Commerce (2)	Variant III (3)	Commerce (4)
Average value, 1929–1938 (billions of dollars)	87.3	91.4	76.6	82.2
Indexes		(1929–1938 = 100.0)		
1939	118.8	120.6	120.5	122.4
1940	129.4	131.6	132.1	134.3
1941	144.6	151.8	148.0	156.6
1942	140.4	171.3	140.8	178.1
1943	139.6	190.9	137.4	200.1
1944	145.0	205.5	139.9	215.3
1945	149.1	201.5	142.1	210.7
1946	174.0	179.1	171.6	187.8
1947	175.8	177.9	171.0	185.6
1948	181.9	186.9	175.9	194.3
1949	176.4	184.9	168.1	190.7
1950	197.9	202.8	191.4	209.0
1951	204.5	216.8	197.4	223.6
1952	206.4	225.1	201.2	232.7
1953	211.9	233.9	207.5	240.9
1954	213.5	230.5	209.6	235.6
1955	231.6	247.2	229.3	252.6
Averages of indexes				
1939–1941	130.9	134.7	133.5	137.8
1942–1945	143.5	192.3	140.0	201.0
1946–1950	181.2	186.3	175.6	193.5
1951–1955	213.6	230.7	209.0	237.1

SOURCE, BY COLUMN
(1) and (3) For Variant III, see Table R-2, cols. 9 and 6, respectively.
(2) and (4) The current price series, shown for 1929–1948 in Table 4 of *National Income, 1954 Ed.* and for 1949–1955 in Table 4 of *Survey of Current Business*, July 1956, were converted to 1929 prices by the price index implicit in gross national product, Table 41, of the same sources.

Appendix A

TABLE R-1

FLOW OF GOODS TO CONSUMERS, NET NATIONAL PRODUCT, AND GROSS NATIONAL PRODUCT, THREE VARIANTS, CURRENT PRICES, 1919–1955

(billions of dollars)

	Flow of Goods to Consumers			Net National Product			Gross National Product		
	Variant I (1)	Variant II (2)	Variant III (3)	Variant I (4)	Variant II (5)	Variant III (6)	Variant I (7)	Variant II (8)	Variant III (9)
1919	53.6	56.9	54.7	64.2	67.4	65.2	74.0	77.2	75.0
1920	62.2	66.3	63.7	74.2	78.3	75.7	85.3	89.4	86.8
1921	56.6	61.3	58.9	59.4	64.2	61.8	68.7	73.5	71.1
1922	56.1	60.8	58.4	60.7	65.4	63.0	69.5	74.2	71.8
1923	62.2	67.2	64.6	71.6	76.7	74.1	81.2	86.3	83.7
1924	65.5	71.3	68.6	72.1	77.9	75.2	81.8	87.6	85.0
1925	65.7	70.8	68.3	76.0	81.2	78.6	86.0	91.1	88.5
1926	71.0	76.8	74.0	81.6	87.4	84.6	92.0	97.8	95.0
1927	70.8	76.7	73.9	80.1	85.9	83.1	90.4	96.2	93.4
1928	73.2	79.4	76.5	81.7	87.9	85.0	92.2	98.5	95.5
1929	77.2	83.7	80.3	87.2	93.7	90.3	98.4	104.9	101.5
1930	72.8	75.9	72.3	77.3	80.4	76.9	87.9	91.0	87.5
1931	60.7	63.5	62.2	60.3	63.0	61.7	70.1	72.8	71.5
1932	48.0	52.5	49.9	42.9	47.3	44.8	51.5	55.9	53.4
1933	46.6	50.7	47.1	42.2	46.2	42.6	50.5	54.6	51.0
1934	51.9	55.1	52.7	49.5	52.8	50.3	58.7	61.9	59.5
1935	53.6	59.9	57.4	54.4	60.7	58.2	63.6	69.8	67.3
1936	58.6	66.7	64.0	62.9	71.0	68.3	72.5	80.7	77.9
1937	64.7	72.2	69.3	70.5	77.9	75.1	81.3	88.7	85.8
1938	63.4	69.6	66.7	65.5	71.7	68.8	76.6	82.8	79.9
1939	66.6	72.2	69.2	71.2	76.8	73.8	82.5	88.1	85.1
1940	70.9	76.8	73.7	79.1	84.9	81.8	90.8	96.7	93.6
1941	81.0	87.4	83.9	96.0	102.4	99.0	109.6	116.0	112.5
1942	89.3	96.6	92.0	103.7	111.0	106.5	120.2	127.5	123.0
1943	100.4	108.6	103.2	110.4	118.6	113.2	130.0	138.2	132.8
1944	109.6	118.6	112.6	115.8	124.8	118.7	138.9	147.9	141.9
1945	121.6	131.4	124.7	121.1	130.8	124.2	146.6	156.3	149.6
1946	146.2	157.2	150.3	156.3	167.4	160.5	183.8	194.9	188.0
1947	164.2	176.4	169.3	174.0	186.1	179.0	209.4	221.5	214.5
1948	176.5	189.7	182.2	187.0	200.2	192.8	228.4	241.6	234.1
1949	178.8	192.3	185.2	178.9	192.4	185.3	222.9	236.5	229.3
1950	191.6	206.0	198.9	205.6	219.9	212.9	252.5	266.8	259.8
1951	205.9	221.5	213.6	228.8	244.4	236.5	281.4	297.0	289.0
1952	215.5	232.0	223.6	237.0	253.6	245.2	288.2	304.8	296.4
1953	226.8	244.4	235.9	247.6	265.1	256.7	299.5	317.0	308.6
1954	232.3	250.5	241.9	250.5	268.7	260.1	302.6	320.9	312.2
1955	248.9	268.2	259.6	276.0	295.3	286.7	331.0	350.2	341.6

Gross and net capital formation are identical for all three variants.

SOURCE, BY COLUMN

(1) Table R-3, sum of cols. 1–4.
(2) Table R-3, cols. 1–3 plus Table R-9, col. 1.
(3) Table R-9, sum of cols. 2–5.
(4) Col. 1 plus Table R-4, col. 7.
(5) Col. 2 plus Table R-4, col. 7.

(6) Col. 3 plus Table R-4, col. 7.
(7) Col. 1 plus Table R-4, col. 5.
(8) Col. 2 plus Table R-4, col. 5.
(9) Col. 3 plus Table R-4, col. 5.

FLOW OF GOODS TO CONSUMERS, NET NATIONAL PRODUCT, AND GROSS NATIONAL PRODUCT,
THREE VARIANTS, 1929 PRICES, 1919–1955

(billions of dollars)

	Flow of Goods to Consumers			Net National Product			Gross National Product		
	Variant I (1)	Variant II (2)	Variant III (3)	Variant I (4)	Variant II (5)	Variant III (6)	Variant I (7)	Variant II (8)	Variant III (9)
1919	49.7	53.8	52.2	58.7	62.8	61.1	67.8	71.9	70.3
1920	51.3	55.8	54.2	59.4	63.8	62.2	68.5	73.0	71.4
1921	54.1	58.9	57.0	56.7	61.5	59.6	65.5	70.3	68.4
1922	56.5	61.2	59.2	61.1	65.8	63.9	70.4	75.1	73.2
1923	61.2	66.3	64.3	70.4	75.5	73.5	80.0	85.0	83.0
1924	65.3	71.0	69.0	71.9	77.6	75.6	81.6	87.3	85.2
1925	64.0	69.0	67.1	74.3	79.3	77.3	84.3	89.3	87.4
1926	68.9	74.6	72.5	79.2	84.9	82.8	89.8	95.5	93.4
1927	70.7	76.5	74.2	80.1	85.9	83.6	90.6	96.4	94.2
1928	72.5	78.6	76.3	81.1	87.2	84.9	91.9	98.0	95.7
1929	76.9	83.4	80.3	86.9	93.4	90.3	98.0	104.5	101.4
1930	74.9	78.0	75.9	79.5	82.6	80.5	90.5	93.7	91.5
1931	69.1	71.9	73.2	69.4	72.2	73.5	80.2	83.0	84.3
1932	62.1	66.9	66.4	56.0	60.8	60.3	66.4	71.2	70.7
1933	62.4	67.2	65.0	55.6	60.4	58.2	65.7	70.5	68.3
1934	65.2	69.2	68.6	61.1	65.0	64.4	71.3	75.2	74.6
1935	66.1	73.7	73.1	68.3	76.0	75.4	78.8	86.4	85.8
1936	71.8	81.6	80.8	76.0	85.8	85.0	86.9	96.7	95.8
1937	76.7	85.4	84.4	85.0	93.7	92.7	96.2	104.9	103.9
1938	77.0	84.3	83.0	79.4	86.6	85.4	90.6	97.9	96.7
1939	81.5	87.9	87.0	86.8	93.2	92.3	98.2	104.6	103.7
1940	85.7	92.4	91.7	95.2	101.9	101.2	107.0	113.7	113.0
1941	91.6	98.6	97.9	107.0	114.1	113.3	119.9	127.0	126.2
1942	89.9	97.5	96.2	101.6	109.2	107.8	116.4	124.0	122.6
1943	92.2	100.3	98.8	98.6	106.7	105.2	115.3	123.4	121.9
1944	95.2	103.7	102.2	100.1	108.6	107.1	119.7	128.1	126.6
1945	101.5	110.4	109.1	101.3	110.2	108.8	122.7	131.6	130.2
1946	113.4	123.1	122.3	122.5	132.2	131.4	143.0	152.7	151.9
1947	115.5	125.4	124.9	121.5	131.4	130.9	144.1	154.0	153.5
1948	117.7	127.9	127.5	124.9	135.1	134.7	149.0	159.2	158.8
1949	120.8	131.0	130.7	118.8	129.0	128.7	144.0	154.2	154.0
1950	127.9	138.5	138.7	135.8	146.4	146.6	162.0	172.6	172.8
1951	128.8	139.9	139.8	140.2	151.3	151.2	167.6	178.7	178.6
1952	132.9	144.3	144.0	143.0	154.4	154.0	169.2	180.6	180.2
1953	138.6	150.1	150.0	147.4	159.0	158.8	173.6	185.1	185.0
1954	140.9	152.6	152.6	148.8	160.6	160.5	174.8	186.5	186.4
1955	150.7	162.9	163.1	163.2	175.3	175.6	189.8	202.0	202.2

Gross and net capital formation are identical for all three variants. The price index used in calculating net changes in claims against foreign countries in 1929 prices is that implicit in gross national product excluding such changes, Variant I. Strictly speaking, for Variants II and III we should have computed the index implicit in those variants. But the difference is negligible and has been disregarded.

SOURCE, BY COLUMN

(1) Table R-3, sum of cols. 5–8.
(2) Table R-3, cols. 5–7, plus Table R-10, col. 1.
(3) Table R-10, sum of cols. 2–5.
(4) Col. 1 plus Table R-5, col. 7.
(5) Col. 2 plus Table R-5, col. 7.

(6) Col. 3 plus Table R-5, col. 7.
(7) Col. 1 plus Table R-5, col. 5.
(8) Col. 2 plus Table R-5, col. 5.
(9) Col. 3 plus Table R-5, col. 5.

TABLE R-3

COMPONENTS OF FLOW OF GOODS TO CONSUMERS, VARIANT I, 1919–1955
(billions of dollars)

	Current Prices				1929 Prices			
	Perish-ables (1)	Semi-durables (2)	Durables (3)	Services (4)	Perish-ables (5)	Semi-durables (6)	Durables (7)	Services (8)
1919	24.4	10.1	5.42	13.7	19.9	7.50	4.98	17.3
1920	26.9	11.7	6.24	17.3	21.0	6.52	4.92	18.9
1921	21.8	9.52	5.05	20.2	21.8	7.84	3.99	20.4
1922	21.1	9.82	5.50	19.7	22.6	8.86	5.08	19.9
1923	22.7	11.1	7.00	21.4	23.5	9.76	6.64	21.3
1924	23.4	10.5	7.02	24.5	25.3	9.03	6.92	24.1
1925	25.0	11.0	7.98	21.7	25.1	9.95	7.78	21.2
1926	26.6	11.5	8.32	24.6	26.3	10.0	8.64	24.0
1927	26.3	11.7	7.94	24.9	26.8	11.2	8.20	24.5
1928	26.9	11.8	8.15	26.4	26.7	11.2	8.40	26.2
1929	28.0	12.1	8.77	28.4	28.0	11.8	8.76	28.4
1930	25.9	10.5	6.76	29.6	27.5	10.6	6.93	29.9
1931	21.2	8.80	5.17	25.6	26.2	10.5	5.73	26.6
1932	17.8	6.54	3.44	20.3	25.9	9.51	4.28	22.4
1933	17.8	6.35	3.49	19.0	26.9	8.65	4.20	22.6
1934	20.9	7.38	4.02	19.6	27.5	8.92	4.92	23.9
1935	23.2	7.85	4.88	17.7	28.8	9.65	6.07	21.6
1936	26.1	8.64	6.02	17.8	32.2	10.6	7.49	21.5
1937	28.2	9.06	6.61	20.9	33.7	10.6	7.88	24.5
1938	27.1	8.89	5.43	21.9	34.4	10.7	6.46	25.4
1939	27.8	9.47	6.37	23.0	35.7	11.8	7.64	26.4
1940	29.5	9.95	7.42	24.0	37.4	12.2	8.77	27.3
1941	34.0	11.8	9.22	25.9	39.8	13.1	10.1	28.5
1942	39.8	14.8	6.65	28.1	40.6	13.5	6.52	29.4
1943	45.2	17.9	6.30	31.1	41.3	14.6	5.61	30.7
1944	49.7	19.8	6.46	33.6	44.0	14.4	5.12	31.7
1945	55.5	22.5	7.74	36.0	47.8	15.0	5.79	32.8
1946	64.9	24.9	15.2	41.2	50.9	15.3	11.2	36.1
1947	73.0	25.8	19.7	45.8	50.2	14.5	13.3	37.5
1948	77.8	26.9	21.2	50.6	50.5	14.3	13.8	39.2
1949	77.1	25.5	22.5	53.7	51.5	14.3	14.5	40.4
1950	80.5	25.8	27.3	58.0	53.0	14.5	17.6	42.8
1951	89.8	27.7	25.9	62.6	54.5	14.3	15.7	44.3
1952	94.5	28.2	25.4	67.3	56.1	15.0	15.5	46.2
1953	97.5	28.2	28.5	72.7	58.3	15.1	17.3	48.0
1954	99.5	28.0	28.0	76.7	59.1	15.0	17.4	49.4
1955	103.7	29.4	34.0	81.7	62.2	15.8	21.0	51.7

Appendix A

Source, by Column

(1–3) 1919–1933: Simon Kuznets, *National Product since 1869* (New York, NBER, 1946), Table I-5.

1934–1951: The 1929–1933 ratio of the given series to the Commerce series in *National Income, 1954 Ed.* (Supplement, *Survey of Current Business*, Department of Commerce), Table 30, applied to the Commerce series for 1934 to 1951. Of the nondurable commodities, subgroups II-1, II-3, II-4, V-5, IX-3, and one-half of XII-2 were considered semidurable and the balance perishable.

(4) 1919–1938: Net national product, given in Simon Kuznets, *National Income and Its Composition, 1919–1938* (New York, NBER, 1941), Table 1, minus cols. 1–3 and Table R-4, col. 7.

1939–1951: The 1929–1938 ratio of the given series to the Commerce series in *National Income, 1954 Ed.*, Table 30, excluding subgroup VII-3, applied to the Commerce series for 1939 to 1951.

(5–7) 1919–1933: *National Product since 1869*, Table I-5.

1934–1951: The procedure is the same as that for cols. 1–3. The Commerce series for the major groups are given in *National Income, 1954 Ed.*, Table 40; those for the subgroups were obtained by letter.

(8) 1919–1938: Col. 4 divided by the price index given in *National Product since 1869*, Table I-4B, col. 4.

1939–1951: The procedure is the same as that for col. 4; the source is the same as that for cols. 5–7.

(1–8) 1952–1955: Estimated by the procedure indicated for 1951, from data in *Survey of Current Business*, July 1956, or (for cols. 5 and 6) obtained by letter from the Department of Commerce.

TABLE R-4

GROSS AND NET CAPITAL FORMATION, CURRENT PRICES, 1919–1955

(billions of dollars)

	Gross Construction (1)	Gross Producers' Durables (2)	*Net Changes in:* Inventories (3)	Claims against Foreign Countries (4)	Gross Capital Formation (1)+(2)+ (3)+(4) (5)	Net Producers' Durables and Construction (6)	Net Capital Formation (3)+(4)+(6) (7)
1919	6.40	6.19	3.95	3.82	20.4	2.78	10.6
1920	6.73	6.30	7.27	2.84	23.1	1.92	12.0
1921	6.36	4.02	0.15	1.61	12.2	1.10	2.86
1922	8.02	4.14	0.60	0.64	13.4	3.33	4.57
1923	9.73	5.80	3.05	0.48	19.1	5.92	9.45
1924	10.8	5.44	−0.89	0.99	16.3	6.51	6.62
1925	11.9	5.92	1.75	0.68	20.3	7.89	10.3
1926	12.6	6.40	1.55	0.44	21.0	8.52	10.5
1927	12.4	5.92	0.45	0.72	19.5	8.06	9.22
1928	12.0	6.35	−0.34	1.01	19.0	7.78	8.45
1929	11.2	7.48	1.70	0.77	21.1	7.53	10.0
1930	9.04	5.76	−0.35	0.69	15.1	4.19	4.53
1931	6.63	3.73	−1.24	0.20	9.32	0.60	−0.44
1932	3.74	2.09	−2.51	0.17	3.48	−2.77	−5.12
1933	3.08	2.19	−1.52	0.15	3.89	−3.08	−4.45
1934	3.92	3.35	−0.93	0.43	6.77	−1.86	−2.36
1935	4.53	4.17	1.28	−0.05	9.93	−0.45	0.78
1936	6.80	5.86	1.35	−0.09	13.9	2.97	4.23
1937	7.50	6.61	2.37	0.06	16.5	3.34	5.77
1938	7.38	5.31	−0.59	1.11	13.2	1.59	2.11
1939	8.57	5.81	0.62	0.89	15.9	3.14	4.65
1940	9.08	6.95	2.40	1.51	19.9	4.24	8.15
1941	12.4	10.2	4.69	1.27	28.6	9.06	15.0
1942	14.4	14.8	1.72	0.08	30.9	12.6	14.4
1943	8.65	23.8	−0.96	−1.87	29.6	12.8	9.98
1944	5.78	26.4	−1.16	−1.69	29.3	8.99	6.14
1945	6.23	21.0	−1.28	−1.07	24.9	1.81	−0.55
1946	12.7	14.2	5.95	4.84	37.6	−0.66	10.1
1947	17.5	19.6	−0.81	8.94	45.2	1.59	9.72
1948	22.7	22.9	4.25	1.96	51.9	4.32	10.5
1949	23.9	22.4	−2.68	0.53	44.2	2.26	0.12
1950	29.7	26.0	7.40	−2.20	60.9	8.76	14.0
1951	32.8	32.0	10.5	0.23	75.4	12.2	22.9
1952	34.6	35.2	3.05	−0.16	72.8	18.7	21.6
1953	37.2	37.1	0.37	−2.02	72.6	22.4	20.8
1954	39.8	33.1	−2.12	−0.41	70.4	20.8	18.2
1955	45.2	33.0	4.29	−0.47	82.0	23.3	27.1

Because of rounding, detail will not necessarily add to total.
The series are identical for all three variants.

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(1) 1919–1951: In all years the estimates are the sum of (1) the cost of oil and gas wells drilled, and (2) all other new construction.

    1. 1919–1928: Estimated by multiplying the 1929 price series described in the notes to Table R-5 by the price index for petroleum pipe lines. The latter is calculated from *Construction and Building Materials, Statistical Supplement, May 1954* (Department of Commerce), pp. 33 and 82, and adjusted to a 1929 base.

    1929–1951: *Ibid.*, Table 24.

    2. 1919 and 1920: Sum of (a) new private nonfarm residential construction including additions and alterations and excluding nonhousekeeping, and (b) other new construction. (a) is from Leo Grebler, David M. Blank, and Louis Winnick, *Capital Formation in Residential Real Estate: Trends and Prospects* (Princeton for NBER, 1956), Appendix B, Table B-6; (b) is from *Construction and Building Materials, Statistical Supplement, May 1954*, Tables 2 and 3.

    1921–1951: *Ibid.*

    1952–1955: *Survey of Current Business*, July 1956, Table 31.

(2) 1919–1933: Kuznets, *National Product since 1869*, Table I-6. Excludes munitions produced in government owned plants.

    1934–1951: Sum of (1) munitions, (2) private producers' durables, and (3) government purchases of producers' durables, excluding munitions. (1) is from Table R-6, col. 4; (2) is the Commerce series for private producers' durables given in *National Income, 1954 Ed.*, Table 2; (3) was extrapolated from 1933 by applying to public construction excluding military (series underlying Table R-30, col. 2) the 1929–1933 ratio of (3) to the latter. For 1929 to 1933, (3) was estimated by subtracting from col. 2 the series described under (1) and (2).

    1952–1955: Estimated by the procedure indicated for 1934–1951, (2) being taken from *Survey of Current Business*, July 1956, Table 2.

(3) 1919–1928: *National Product since 1869*, Table I-11.

    1929–1951: Sum of (1) the Commerce series on net changes in business inventories, and (2) net changes in monetary metals. (1) is from *National Income, 1954 Ed.*, Table 2, and (2) is the sum of the changes in gold and silver stocks. For 1897 to 1932, the series on gold, excluding imports and exports, is from Raymond W. Goldsmith, *A Study of Saving in the United States*, Vol. I (Princeton, 1955), Table K-3, col. 11; and for 1933 to 1951, from *Federal Reserve Bulletin* (Board of Governors of the Federal Reserve System, February 1954), p. 221, or *Survey of Current Business*, 1942 Supplement, p. 72. The stocks of silver bullion and coin are from appropriate years of the *Annual Report of the Director of the Mint* (Bureau of the Mint), and changes in them are derived by the procedure described in Simon Kuznets, *Commodity Flow and Capital Formation*, Volume I (New York, NBER, 1938), Note A to Table VII-11.

    1952–1955: Estimated by the procedure indicated for 1929–1951. (1) is from *Survey of Current Business*, July 1956, Table 2. For (2) the series on gold is from *Federal Reserve Bulletin*, August 1956, p. 905, and the stocks of silver bullion and coin are from the *Annual Report of the Director of the Mint*, 1952, 1953, 1954, and 1955. Where calendar year figures for 1955 were not available for the latter, fiscal year figures were used.

(4) Balance on goods and services, and net unilateral transfers.

    1919–1944: From *Balance of International Payments of the United States, 1946–1948* (Bureau of Foreign and Domestic Commerce), Table XXIII.

    1945–1952: From *National Income, 1954 Ed.*, Table 11, adjusted for United States territories and possessions.

    1953–1955: From *Survey of Current Business*, July 1956, Table 2.

(6) Col. 1 plus col. 2 minus Table R-8, col. 3.

GROSS AND NET CAPITAL FORMATION, 1929 PRICES, 1919–1955

(billions of dollars)

	Gross Construc- tion (1)	Gross Producers' Durables (2)	Net Changes in:		Gross Capital Formation (1)+(2)+ (3)+(4) (5)	Net Producers' Durables and Con- struction (6)	Net Capital Formation (3)+(4)+(6) (7)
			Inven- tories (3)	Claims against Foreign Countries (4)			
1919	6.30	5.45	2.82	3.50	18.1	2.61	8.93
1920	5.41	5.31	4.21	2.28	17.2	1.55	8.05
1921	6.34	3.55	−0.04	1.54	11.4	1.10	2.60
1922	8.77	4.18	0.31	0.65	13.9	3.65	4.62
1923	9.65	5.78	2.82	0.47	18.7	5.90	9.20
1924	10.8	5.44	−0.93	0.98	16.2	6.53	6.58
1925	12.1	5.96	1.60	0.67	20.3	8.01	10.3
1926	12.8	6.54	1.18	0.44	20.9	8.68	10.3
1927	12.7	6.09	0.42	0.72	19.9	8.25	9.38
1928	12.3	6.50	−0.38	1.01	19.4	7.97	8.60
1929	11.2	7.47	1.70	0.77	21.1	7.52	9.99
1930	9.35	6.08	−0.52	0.71	15.6	4.40	4.59
1931	7.46	4.12	−0.67	0.23	11.1	0.79	0.34
1932	4.84	2.47	−3.22	0.22	4.31	−3.08	−6.09
1933	3.67	2.70	−3.24	0.20	3.33	−3.76	−6.80
1934	4.21	3.88	−2.60	0.52	6.02	−2.09	−4.17
1935	5.03	4.86	2.88	−0.07	12.7	−0.53	2.28
1936	7.30	6.83	1.04	−0.11	15.0	3.29	4.22
1937	7.54	7.18	4.70	0.07	19.5	3.52	8.29
1938	7.38	5.58	−0.63	1.31	13.6	1.68	2.37
1939	8.68	6.10	0.88	1.06	16.7	3.32	5.26
1940	9.06	7.14	3.32	1.78	21.3	4.42	9.51
1941	11.6	9.36	5.97	1.40	28.4	8.12	15.5
1942	12.1	12.0	2.17	0.08	26.4	9.40	11.6
1943	6.93	19.1	−1.18	−1.66	23.2	9.28	6.43
1944	4.65	22.5	−1.18	−1.46	24.5	7.56	4.93
1945	4.84	18.7	−1.47	−0.90	21.2	2.14	−0.23
1946	8.49	11.2	6.13	3.76	29.6	−0.83	9.06
1947	9.67	13.5	−0.68	6.15	28.6	0.55	6.02
1948	11.3	14.6	4.13	1.28	31.3	1.76	7.16
1949	12.0	13.6	−2.74	0.34	23.3	0.41	−1.99
1950	14.4	15.4	5.62	−1.41	34.0	3.64	7.85
1951	14.7	17.7	6.28	0.14	38.8	4.99	11.4
1952	15.0	19.5	1.81	−0.10	36.3	8.36	10.1
1953	15.7	20.6	−0.16	−1.17	35.0	10.2	8.86
1954	16.9	18.2	−0.95	−0.24	33.9	9.10	7.91
1955	18.6	17.8	3.02	−0.27	39.1	9.73	12.5

Because of rounding, detail will not necessarily add to total.

The series are identical for all three variants. The price index used in calculating net changes in claims against foreign countries in 1929 prices is that implicit in gross national product excluding such changes, Variant I. Strictly speaking, for Variants II and III, we should have computed the index implicit in those variants. But the dif- ference is negligible and has been disregarded.

Appendix A

SOURCE, BY COLUMN

(1) 1919–1952: In all years the estimates are the sum of (1) the cost of oil and gas wells drilled, and (2) all other new construction.

    1. 1919–1928: Extrapolation of estimate for 1929 by the series on cost in 1935 prices, described in Kuznets, *National Income and Its Composition, 1919–1938,* p. 645.

    1929–1952: Series in current prices (see notes to Table R-4) divided by the price index for petroleum pipe lines calculated from *Construction and Building Materials, Statistical Supplement, May 1954,* pp. 33 and 82, and adjusted to a 1929 base.

    2. 1919–1920: Sum of (a) new private nonfarm residential construction including additions and alterations and excluding nonhousekeeping, and (b) other new construction. (a) is from Grebler, Blank, and Winnick, *Capital Formation in Residential Real Estate,* Appendix B, Table B-6; (b) is from *Construction and Building Materials,* Tables 15 and 16, adjusted to a 1929 base.

    1921–1952: *Construction and Building Materials,* Tables 15 and 16, adjusted to a 1929 base.

    1953–1955: In all years the estimates are the sum of (1) private construction including the cost of oil and gas wells drilled, and (2) public construction.

    1. Current price series (see notes to Table R-4) converted to 1929 prices by the price index implicit in the series in current and 1947 prices given in the *Economic Report of the President,* January 1956, pp. 165 and 168, adjusted to a 1929 base.

    2. Extrapolation of the estimate for 1952 by the 1947–1949 price series in *Construction Review,* October 1956, p. 18.

(2) 1919–1933: Kuznets, *National Product since 1869,* Table I-6.

    1934–1951: Sum of (1) munitions, and (2) producers' durables, excluding munitions. (1) is from Table R-7, col. 2; for (2) the sum of the series described under (2) and (3) in the notes to Table R-4, col. 2, was divided by the price index calculated by extrapolating that implicit in producers' durables excluding munitions (computed for 1929 to 1933 from Tables R-4 through R-7) by that implicit in the Commerce series on private producers' durables given in *National Income, 1954 Ed.,* Table 41.

    1952–1955: Estimated by the procedure indicated for 1934–1951, the price index for (2) being extrapolated by that given in *Survey of Current Business,* July 1956, Table 41.

(3) The series in current prices (see notes to Table R-4, col. 3) converted to 1929 prices. For (1) the Commerce series in 1947 prices (Table 41 of *National Income, 1954 Ed.* or of the *Survey of Current Business,* July 1956) were adjusted to a 1929 price base. For (2) constant price series of silver were estimated by the procedure described in Kuznets, *Commodity Flow and Capital Formation,* Vol. I, Note A to Table VII-11; those for gold for 1934 and later years were estimated by multiplying changes in current prices by 0.59057, the ratio of the price of gold in 1929 to that in the given year.

(4) Table R-4, col. 4 divided by the price index implicit in gross national product excluding changes in claims against foreign countries (Table R-1, col. 7 minus Table R-4, col. 4, divided by Table R-2, col. 1 plus Table R-5, cols. 1–3).

(6) Col. 1 plus col. 2 minus Table R-8, col. 6.

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TABLE R-6

MILITARY GOODS: GROSS OUTPUT AND CONSUMPTION, CURRENT PRICES, 1914–1955
(billions of dollars)

	Gross Military Output (1)	Durable Military Output (2)	Gross Construction (3)	Gross Munitions (4)	Consumption of:	
					Construction (5)	Munitions (6)
1914	0.32	0.12	0.02	0.10	a	0.01
1915	0.32	0.11	0.02	0.09	a	0.02
1916	0.46	0.19	0.02	0.17	a	0.03
1917	6.13	1.52	0.61	0.91	0.02	0.10
1918	16.5	3.80	1.56	2.25	0.08	0.32
1919	9.68	2.42	1.09	1.33	0.16	0.56
1920	2.04	0.53	0.16	0.36	0.24	0.68
1921	1.27	0.38	0.05	0.33	0.20	0.69
1922	0.58	0.14	0.02	0.12	0.19	0.62
1923	0.45	0.09	0.02	0.08	0.21	0.63
1924	0.46	0.10	0.01	0.10	0.21	0.62
1925	0.49	0.11	0.01	0.10	0.20	0.60
1926	0.48	0.10	0.01	0.09	0.21	0.53
1927	0.48	0.11	0.01	0.10	0.20	0.36
1928	0.58	0.17	0.02	0.16	0.19	0.20
1929	0.62	0.19	0.02	0.17	0.19	0.14
1930	0.63	0.19	0.03	0.16	0.18	0.12
1931	0.79	0.29	0.04	0.25	0.17	0.12
1932	0.78	0.29	0.03	0.26	0.15	0.13
1933	0.65	0.23	0.04	0.20	0.16	0.14
1934	0.85	0.35	0.05	0.30	0.17	0.17
1935	0.95	0.39	0.04	0.36	0.17	0.19
1936	1.20	0.53	0.03	0.50	0.18	0.23
1937	1.19	0.51	0.04	0.47	0.18	0.29
1938	1.33	0.58	0.06	0.52	0.12	0.34
1939	1.25	0.50	0.12	0.38	0.06	0.54
1940	2.21	0.70	0.38	0.32	0.05	0.55
1941	13.8	3.50	1.62	1.88	0.10	0.66
1942	49.4	13.5	5.02	8.48	0.28	1.10
1943	79.7	21.0	2.55	18.4	0.50	2.50
1944	87.5	21.0	0.84	20.2	0.57	4.32
1945	73.8	13.5	0.69	12.8	0.61	5.74
1946	18.5	2.90	0.19	2.71	0.74	7.30
1947	10.9	2.00	0.20	1.80	0.92	8.78
1948	11.0	2.40	0.16	2.24	1.03	9.79
1949	13.2	n.a.	0.14	2.46	1.02	10.1
1950	14.0	n.a.	0.18	2.49	1.04	10.7
1951	33.4	n.a.	0.89	5.90	1.15	10.7
1952	46.1	n.a.	1.39	8.88	1.24	9.44
1953	48.9	n.a.	1.31	9.37	1.32	7.16
1954	40.7	n.a.	1.03	6.95	1.38	5.54
1955	38.6	n.a.	1.30	5.58	1.47	5.05

The output of military goods before 1914 is considered negligible.
n.a. = not available except as sum of cols. 3 and 4.
a Less than $5 million.

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(1) 1914–1938: Kuznets, *National Product since 1869*, Table I-9, and an unpublished extension of that table for 1914 to 1918.

1939–1951: *National Income, 1954 Ed.*, Table 2. Government sales were deducted.

1952–1955: *Survey of Current Business*, July 1956, Table 2. Government sales were deducted.

(2) 1914–1938: Estimated by the following steps:

1. For 1941 to 1945, *The Budget of the United States Government*, 1947 (79th Cong., 2d sess., H.Doc. 411), Table B, p. 752, shows expenditures on nonmunitions, and total expenditures for military activities. From these the ratio of nonmunitions to total expenditures was calculated for each year.

2. For 1914 to 1948, the ratio of military pay to gross military output (col. 1) was calculated. Military pay for 1914 to 1918 is from Willford Isbell King, *The National Income and Its Purchasing Power* (New York, NBER, 1930), Table CXXIII, p. 364; for 1919 to 1938, from Kuznets, *National Income and Its Composition, 1919–1938*, Table G-2, p. 812; and for 1939 to 1948, from *National Income, 1951 Ed.*, Table 14.

3. For 1941 to 1945, the ratio of military pay (see step 2) to nonmunitions (see step 1) was calculated.

4. Since the ratio in step 2 is almost identical for 1919 and 1941, it was assumed that the ratio of military pay to nonmunitions is the same for both years. Hence, dividing military pay in 1919 by the 1941 ratio of military pay to nonmunitions yielded the estimate of nonmunitions for 1919. (The revision of the Department of Commerce series on military pay, shown in *National Income, 1954 Ed.*, raises the 1941 ratio from 43.3 per cent to 43.4 per cent, but the difference seemed too slight to warrant recalculation of our estimates.)

5. The ratio of nonmunitions to gross military output was calculated for 1919, and for 1941 to 1945. For 1918, the year of biggest military output in World War I, the ratio was assumed the same as for 1944, the year of biggest military output in World War II. For 1917, it was assumed to be at the 1919 level. Gross military output in 1917 and 1918 was then multiplied by these ratios to yield nonmunitions in those years.

6. Munitions in 1917–1919 were calculated by subtracting nonmunitions from gross military output.

7. For 1941 to 1945, the ratio of expenditures on durable military assets (see notes to 1939–1950) to munitions was calculated. For 1941 to 1944, there is little change in this ratio, it being identical in 1941 and 1944. The level for these years was assumed to apply in each year, 1917 to 1919. Multiplying munitions by this ratio yielded the estimate of expenditures on durable military assets in these years.

8. The ratio of expenditures on durable military assets to gross military output excluding military pay was calculated annually for 1917 to 1919, and for 1939 to 1948, when it declined from 58 per cent in 1939 to 26 per cent in 1945. For all the years from 1938 back to 1922, and for 1914 to 1916, it was assumed to be 60 per cent (slightly higher than in 1939). For 1921 and 1920, when military output was at somewhat higher levels, the ratio was assumed to be lower. For those years, it was interpolated along a straight line between 1919 and 1922. Multiplying gross military output excluding military pay by these ratios yielded the estimates of expenditures on durable military assets for 1920 to 1938, and 1914 to 1916.

Appendix A

(2) 1939–1948: Expenditures on durable military assets given by Raymond W. Goldsmith, "The Growth of Reproducible Wealth of the United States of America from 1805 to 1950," *Income and Wealth, Series II* (International Association for Research in Income and Wealth, Cambridge, England, Bowes and Bowes, 1952), Table III, col. 1, p. 312. This series was not used beyond 1948 because it seemed out of line with the Commerce series on munitions purchased.

(3) 1914: *Historical Statistics of the United States, 1789–1945* (Dept. of Commerce, 1949), Series H-28, p. 169. Calendar year estimate is the average of two fiscal year figures.

1915–1953: *Construction and Building Materials, Statistical Supplement, May 1954*, Table 3.

1954–1955: *Survey of Current Business*, July 1956, Table 31.

(4) 1914–1948: Col. 2 minus col. 3. Includes munitions produced in government owned plants, not covered in Table R-4.

1949–1955: The Commerce series on munitions purchased in 1948–1953, obtained by letter, was related to col. 1. Its percentage in 1954 and 1955 was estimated by inspection of the movement in prior years in relation to the movement in col. 1. Durable munitions were then estimated as a percentage of munitions purchased, the level and movement of the percentage being assumed to follow that in prior years in relation to the changes in the volume of munitions purchased.

(5) Table R-7, col. 3 multiplied by the implicit price index for military construction (col. 3 divided by Table R-7, col. 1).

(6) Table R-7, col. 4 multiplied by the implicit price index for munitions (col. 4 divided by Table R-7, col. 2).

DURABLE MILITARY GOODS: GROSS OUTPUT AND CONSUMPTION,
1929 PRICES, 1914–1955

(billions of dollars)

| | Gross Construction (1) | Gross Munitions (2) | Consumption of: | |
			Construction (3)	Munitions (4)
1914	0.03	0.17	a	0.01
1915	0.03	0.15	a	0.03
1916	0.03	0.25	a	0.05
1917	0.77	1.11	0.02	0.13
1918	1.71	2.14	0.09	0.31
1919	1.05	1.17	0.15	0.49
1920	0.12	0.31	0.18	0.57
1921	0.05	0.29	0.19	0.61
1922	0.02	0.12	0.19	0.63
1923	0.01	0.08	0.19	0.63
1924	0.01	0.10	0.19	0.62
1925	0.01	0.10	0.19	0.61
1926	0.01	0.09	0.19	0.54
1927	0.01	0.10	0.19	0.37
1928	0.02	0.16	0.19	0.21
1929	0.02	0.17	0.19	0.14
1930	0.03	0.17	0.20	0.13
1931	0.05	0.28	0.20	0.13
1932	0.05	0.30	0.20	0.15
1933	0.05	0.24	0.20	0.17
1934	0.06	0.35	0.20	0.19
1935	0.04	0.41	0.20	0.23
1936	0.03	0.58	0.21	0.27
1937	0.04	0.51	0.19	0.32
1938	0.07	0.54	0.13	0.36
1939	0.14	0.26	0.06	0.38
1940	0.41	0.22	0.05	0.38
1941	1.59	1.23	0.09	0.43
1942	4.14	6.40	0.24	0.83
1943	1.97	14.3	0.39	1.95
1944	0.67	17.0	0.45	3.65
1945	0.55	11.6	0.48	5.18
1946	0.13	2.18	0.50	5.88
1947	0.11	1.23	0.50	6.01
1948	0.08	1.40	0.51	6.11
1949	0.07	1.52	0.51	6.25
1950	0.09	1.48	0.51	6.33
1951	0.40	3.42	0.52	6.18
1952	0.61	5.18	0.55	5.51
1953	0.57	5.72	0.58	4.37
1954	0.45	4.18	0.60	3.33
1955	0.55	3.30	0.62	2.98

a Less than $5 million.

(Notes on following page)

Appendix A

(1) 1914: Derived by dividing the current price figure (Table R-6, col. 3) by an index obtained by extrapolating that implicit in the estimate for 1915 by the cost of construction index described in Kuznets, *National Product since 1869*, Table IV-4, notes to line 1.

1915–1953: From *Construction and Building Materials, Statistical Supplement, May 1954*, Table 16, converted to a 1929 base.

1954 and 1955: Extrapolated from 1953 by the series in 1947–1949 prices in *Construction Review*, October 1956, p. 18.

(2) Table R-6, col. 4 divided by the following price index: The munitions price index for 1939 to 1953 described in *National Income, 1954 Ed.*, p. 157, was provided by the Department of Commerce, together with an extension through 1955. For 1929 to 1938 it was assumed to be the same as that for private producers' durables (*ibid.*, Table 41). It was adjusted to a 1929 base and extrapolated back to 1919 by the index implicit in producers' durables (Table R-4, col. 2 divided by Table R-5, col. 2). It was extrapolated from 1919 to 1914 by the price index for producers' durables given by William H. Shaw in *Value of Commodity Output since 1869* (New York, NBER, 1947), p. 294, adjusted to include passenger cars for business use and converted to a 1929 base (see notes on the adjustment of consumers' durables, Table R-13, cols. 1–3 and 5–7).

(3) Estimated from col. 1, assuming a twenty-year life terminating at the middle of the given year.

(4) Estimated from col. 2, assuming a nine-year life terminating at the middle of the given year.

TABLE R-8

CAPITAL CONSUMPTION, 1919–1955
(billions of dollars)

	Current Prices			1929 Prices		
	Non-military (1)	Military (2)	Total (1) + (2) (3)	Non-military (4)	Military (5)	Total (4) + (5) (6)
1919	9.09	0.72	9.81	8.50	0.64	9.14
1920	10.2	0.92	11.1	8.42	0.76	9.18
1921	8.40	0.88	9.29	7.99	0.79	8.79
1922	8.02	0.81	8.83	8.47	0.82	9.29
1923	8.77	0.84	9.62	8.71	0.82	9.53
1924	8.89	0.83	9.72	8.85	0.81	9.66
1925	9.12	0.80	9.93	9.22	0.80	10.0
1926	9.72	0.74	10.5	9.89	0.74	10.6
1927	9.74	0.57	10.3	9.97	0.57	10.5
1928	10.2	0.39	10.6	10.4	0.40	10.8
1929	10.8	0.34	11.1	10.8	0.34	11.1
1930	10.3	0.31	10.6	10.7	0.32	11.0
1931	9.47	0.29	9.76	10.5	0.33	10.8
1932	8.32	0.28	8.60	10.0	0.35	10.4
1933	8.05	0.30	8.34	9.76	0.37	10.1
1934	8.78	0.34	9.12	9.79	0.40	10.2
1935	8.78	0.37	9.15	9.98	0.43	10.4
1936	9.27	0.41	9.68	10.4	0.48	10.8
1937	10.3	0.47	10.8	10.7	0.50	11.2
1938	10.6	0.46	11.1	10.8	0.48	11.3
1939	10.6	0.60	11.2	11.0	0.45	11.5
1940	11.2	0.60	11.8	11.4	0.43	11.8
1941	12.8	0.75	13.6	12.4	0.53	12.9
1942	15.1	1.38	16.5	13.7	1.06	14.8
1943	16.6	3.00	19.6	14.4	2.33	16.7
1944	18.3	4.89	23.2	15.5	4.10	19.6
1945	19.1	6.35	25.5	15.7	5.66	21.4
1946	19.5	8.04	27.5	14.2	6.38	20.5
1947	25.7	9.70	35.4	16.1	6.52	22.6
1948	30.5	10.8	41.4	17.5	6.62	24.1
1949	32.9	11.2	44.0	18.5	6.76	25.3
1950	35.2	11.7	46.9	19.3	6.85	26.2
1951	40.7	11.8	52.5	20.7	6.70	27.4
1952	40.5	10.7	51.2	20.1	6.05	26.2
1953	43.4	8.48	51.9	21.2	4.94	26.1
1954	45.2	6.92	52.1	22.0	3.93	26.0
1955	48.4	6.52	54.9	23.0	3.60	26.6

Because of rounding, detail will not necessarily add to total.

(Notes on following page)

Appendix A

Source, by Column

(1) Sum of estimates for (1) nonfarm residential construction, (2) government non-military construction, and (3) business construction and equipment.

   1. Grebler, Blank, and Winnick, *Capital Formation in Residential Real Estate*, Appendix E, Table E-2, extended through 1955 by the procedure indicated in notes 4 and 5 to that table.

   2. Sum of separate estimates for sewer and highway construction, and all other government nonmilitary construction, derived by multiplying the series in 1929 prices (see notes to col. 4) by the price index for the given type of construction. The latter, shown through 1952 in *Construction and Building Materials, Statistical Supplement, May 1954*, Table 10 or p. 82, and calculated for 1953–1955 from the current price series in *Survey of Current Business*, July 1956 and the constant price series in *Construction Review*, May and October 1956, were adjusted to a 1929 base.

   3. Sum of estimates for (a) business construction (including farm residential, which cannot be segregated from farm business), (b) depletion, and (c) business equipment, including capital outlays charged to current expense.

      a. The series in 1929 prices, described in the notes to col. 4, multiplied by the price index implicit in gross construction excluding nonfarm residential and government construction calculated from the series underlying Table R-30, cols. 4 and 9.

      b. The series in 1929 prices (see notes to col. 4) multiplied by the price index implicit in producers' durables excluding munitions, calculated from Tables R-4 through R-7.

      c. From total capital consumption by business, in 1929 prices (see notes to col. 4), were deducted the estimated depreciation on business construction, in 1929 prices (see item a, above), and estimated depletion in 1929 prices (see item b, above). The balance was multiplied by the price index implicit in producers' durables excluding munitions, calculated from Tables R-4 through R-7.

(2) Table R-6: col. 5 plus col. 6.

(4) Sum of estimates for (1) nonfarm residential construction, (2) government non-military construction, and (3) business construction and equipment.

   1. Estimates underlying col. 1 converted to 1929 prices by the index implicit in gross construction, for which see notes to Table R-30, col. 6.

   2. Sum of separate estimates for sewer and highway construction, and all other government nonmilitary construction. The life of sewers and highways was assumed to be twenty-five years, that of other government construction, fifty years. Depreciation, therefore, was calculated for each year as the average of gross construction for the twenty-five or fifty years terminating at the middle of the given year. The construction series, except that for sewers, are those given for 1915–1952 in *Construction and Building Materials, Statistical Supplement, May 1954*, Table 16, and for 1953–1955 in *Construction Review*, October 1956, Table 4, adjusted to a 1929 base. Sewer construction is the current price series given for 1915–1952 in *Construction and Building Materials, Statistical Supplement, May 1954*, Table 3, and for 1953–1955 in *Construction Review*, May and October 1956, converted to 1929 prices by the price index indicated for sewers and water supply (see notes to col. 1, item 2). The construction series for prior years are described in the notes to Table R-30.

(4) 3. Sum of estimates of (a) depreciation charges including accidental damage to fixed capital, (b) depletion, and (c) capital outlays charged to current expense.

    a. From the Commerce series given for 1929–1951 in *National Income, 1954 Ed.*, Table 4, and for 1952–1955 in *Survey of Current Business*, July 1956, Table 4, we deducted the estimate of depreciation on account of persons other than unincorporated enterprises (shown for 1933 and later years in the same sources, Table 6), most of which is depreciation on nonfarm residences. The 1933–1935 ratio of the resulting series to Solomon Fabricant's series on accounting measures of business depreciation, provision for fire and marine losses, and depreciation charges on farm dwellings, given in *Capital Consumption and Adjustment* (New York, NBER, 1938), Table 29, p. 160, and Table 26, p. 145, was calculated and applied to the latter annually back to 1919, yielding annual estimates on an original cost basis for the entire period. To convert to 1929 prices we used Fabricant's price index given for 1919 to 1935 (*ibid.*, Table 35, p. 183), and extended through 1955 by the price index implicit in preliminary estimates of business depreciation, on original cost and 1929 price bases. These estimates, calculated separately for business construction and for business equipment, are described below.

        Preliminary Estimate of Depreciation on Business Construction. Depreciation was calculated for each year as the average of the annual construction for the fifty years terminating at the middle of the given year. The calculation was carried through in current prices (original cost basis) and in 1929 prices. The construction series underlying these calculations are those described in the notes to Table R-30, cols. 4 and 9.

        Preliminary Estimate of Depreciation on Business Equipment. Depreciation was calculated for each year as the average of the annual flow for the thirteen years terminating at the middle of the given year. The calculation was carried through in current prices (original cost basis) and in 1929 prices. The flow series for 1919 to 1955 are those for producers' durables in Tables R-4 and R-5, minus munitions, Tables R-6 and R-7. For our constant price series on flow for the years before 1919, we used Shaw's series on output in 1913 prices in *Value of Commodity Output since 1869*, recomputed to a 1929 base, adjusted to include passenger cars for business use, and raised by the ratio described in Kuznets, *National Product since 1869*, Table II-4, notes to col. 3 (see also notes to col. 1). This series does not take account of changes in finished inventories, but the depreciation estimates based on it differ only slightly, at least for 1919–1928, from those based on the flow after inventories. For our current price series on flow for these years we multiplied the constant price series by the price index implicit in the series on output.

    b. Estimated at 8 per cent of the series calculated under (a). This is the average percentage for 1919–1935 that depletion is of business depreciation (including fire and marine losses and depreciation charges on farm dwellings) derived from Fabricant, *Capital Consumption and Adjustment*, Table 30, p. 166.

    c. For each year, 1929 to 1955, capital outlays charged to current expense (Table 4 of *National Income, 1954 Ed.*, or of *Survey of Current Business*, July 1956) were calculated as a per cent of private producers' durables (same sources, Table 2). The percentages range from 8 to 16, being low in prosperous years and high in depression years. Similar percentages and fluctuations in them were assumed for the years before 1929. These percentages, applied to producers' durables in 1929 prices, excluding munitions (Table R-5, col. 2 minus Table R-7, col. 2) yielded the estimates of capital outlays charged to current expense, in 1929 prices.

(5) Table R-7: col. 3 plus col. 4.

TABLE R-9

			Variant III		
	Variant II Services (1)	Perish-ables (2)	Semi-durables (3)	Durables (4)	Services (5)
1919	16.9	23.9	8.72	5.72	16.3
1920	21.4	26.4	10.1	6.58	20.6
1921	25.0	21.3	8.21	5.33	24.1
1922	24.4	20.6	8.47	5.81	23.5
1923	26.4	22.2	9.59	7.38	25.5
1924	30.3	23.0	9.05	7.41	29.2
1925	26.8	24.5	9.51	8.42	25.9
1926	30.4	26.1	9.94	8.77	29.3
1927	30.8	25.7	10.1	8.37	29.7
1928	32.6	26.3	10.2	8.60	31.4
1929	34.8	27.2	10.4	9.21	33.4
1930	32.7	25.1	8.91	7.16	31.2
1931	28.3	21.2	7.70	5.48	27.7
1932	24.7	17.1	5.64	3.65	23.5
1933	23.0	17.0	5.21	3.47	21.4
1934	22.8	20.3	6.32	4.21	21.8
1935	24.0	22.6	6.73	5.11	23.0
1936	25.9	25.4	7.40	6.30	24.9
1937	28.3	27.4	7.76	6.92	27.2
1938	28.2	26.4	7.61	5.69	27.0
1939	28.6	27.0	8.11	6.67	27.4
1940	29.9	28.7	8.52	7.77	28.7
1941	32.3	33.1	10.1	9.66	31.1
1942	35.4	38.7	12.6	6.97	33.8
1943	39.3	43.9	15.3	6.60	37.3
1944	42.6	48.4	17.0	6.76	40.4
1945	45.7	54.0	19.3	8.10	43.4
1946	52.2	63.2	21.3	15.9	49.9
1947	58.0	71.0	22.1	20.6	55.7
1948	63.8	75.7	23.1	22.2	61.3
1949	67.2	75.0	21.9	23.6	64.7
1950	72.4	78.3	22.1	28.6	69.9
1951	78.2	87.4	23.7	27.1	75.4
1952	83.9	91.9	24.2	26.6	80.9
1953	90.2	94.9	24.2	29.8	87.1
1954	94.9	96.9	24.0	29.4	91.7
1955	101.0	100.9	25.2	35.7	97.7

Appendix A

Source, by Column

(1) 1919–1928: To the decade average given in Table R-18, col. 1, we applied the ratios of the annual estimates in Variant I (Table R-3, col. 4) to their decade average.

1929–1955: The flow of commodities to consumers (Table R-3, cols. 1–3) multiplied by the ratio of services in Variant III (col. 5) to the Commerce series on consumer expenditures on commodities (Table 30 of *National Income, 1954 Ed.,* or of *Survey of Current Business,* July 1956).

(2–4) 1919–1928: The 1929–1931 ratio of the given series to Table R-3, col. 1, 2, or 3, applied to the latter for 1919 to 1928.

1929–1955: From same sources as col. 1; for the distribution of nondurables between perishables and semidurables, see the notes to Table R-3, cols. 1–3.

(5) 1919–1928: The 1929–1931 ratio of the given series to col. 1 applied to the latter for 1919 to 1928.

1929–1955: Sum of the Commerce series on services excluding subgroup VII-3 (same sources as col. 1) and estimated services of governments. For 1929 to 1940, the latter is assumed equal to personal tax and nontax payments (Table 3 of same sources). For 1941 and the later years, it is estimated at 3.6 per cent of personal consumption expenditures excluding subgroup VII-3 (Table 30 of same sources). This constant percentage is the average for the years 1929–1940 (and also for the shorter period, 1929–1938).

SERVICES, VARIANT II, AND COMPONENTS OF FLOW OF GOODS
TO CONSUMERS, VARIANT III, 1929 PRICES, 1919–1955
(billions of dollars)

	Variant II Services (1)	Variant III			
		Perish-ables (2)	Semi-durables (3)	Durables (4)	Services (5)
1919	21.4	19.6	6.62	5.37	20.7
1920	23.4	20.6	5.75	5.30	22.5
1921	25.2	21.5	6.92	4.29	24.3
1922	24.7	22.2	7.82	5.47	23.8
1923	26.4	23.1	8.61	7.15	25.4
1924	29.8	24.9	7.97	7.45	28.7
1925	26.2	24.7	8.78	8.38	25.2
1926	29.7	25.8	8.83	9.30	28.6
1927	30.3	26.3	9.91	8.83	29.2
1928	32.3	26.2	9.89	9.04	31.2
1929	34.8	27.2	10.4	9.21	33.4
1930	33.0	26.5	9.36	7.45	32.6
1931	29.5	26.5	9.27	6.40	31.0
1932	27.3	24.8	8.22	4.86	28.5
1933	27.4	24.7	7.44	4.72	28.2
1934	27.9	26.5	7.81	5.38	28.9
1935	29.3	27.7	8.44	6.63	30.3
1936	31.3	31.0	9.29	8.18	32.2
1937	33.3	32.5	9.27	8.60	34.0
1938	32.7	33.2	9.37	7.05	33.4
1939	32.8	34.5	10.3	8.35	33.9
1940	34.0	36.1	10.7	9.57	35.3
1941	35.6	38.4	11.5	11.0	36.9
1942	37.0	39.1	11.8	7.12	38.1
1943	38.7	39.8	12.8	6.13	40.0
1944	40.2	42.5	12.6	5.59	41.5
1945	41.7	46.1	13.2	6.32	43.4
1946	45.7	49.1	13.4	12.2	47.6
1947	47.4	48.4	12.7	14.6	49.3
1948	49.4	48.7	12.5	15.1	51.3
1949	50.6	49.6	12.6	15.9	52.6
1950	53.4	51.1	12.7	19.2	55.6
1951	55.4	52.6	12.6	17.1	57.5
1952	57.6	54.2	13.2	16.9	59.7
1953	59.5	56.2	13.2	18.9	61.7
1954	61.1	57.1	13.1	19.0	63.3
1955	63.9	60.0	13.8	22.9	66.4

SOURCE, BY COLUMN

(1) Table R-9, col. 1 divided by the price index implicit in services, Variant I, cal-culated from Table R-3, cols. 4 and 8.

(2-4) 1919–1928: The 1929–1931 ratio of the given series to Table R-3, col. 5, 6, or 7 applied to the latter for 1919 to 1928.

1929–1955: The 1947 price series given in Table 40 of *National Income, 1954 Ed.,* or of *Survey of Current Business,* July 1956, and obtained by letter for the subgroups classified as semidurables (see notes to Table R-3, cols. 1–3), converted to a 1929 base.

(5) 1919–1928: Table R-9, col. 5 divided by the price index implicit in services, Variant I, calculated from Table R-3, cols. 4 and 8.

1929–1955: Table R-9, col. 5 divided by the price index implicit in the Com-merce series on services (given in Table 41 of the sources indicated in the notes to cols. 2–4), and adjusted to a 1929 base.

APPENDIX B

Estimates for Overlapping Decades, 1869–1953

HERE, the estimates in the three variants presented in Appendix A for 1919–1955 are carried back to 1869 in the form of averages for decades overlapping at five-year intervals. These decade series merit presentation because they constitute the basis for the estimates for shorter time intervals in Appendix C, and may be more acceptable to technical purists than the more hazardous estimates in Appendix C. It is at this stage that some basic assumptions underlying their estimation can be most clearly seen and appraised. The comments below deal briefly with selected aspects of the decade estimates and are relevant also to the more continuous series based on them.

Constant Price Valuation Base

The choice of the year to be used as the price base for valuation in constant prices is made early in the procedure and is of wide effect upon the interpretation of the results. The procedure involves the following steps:

1. Securing estimates of flow of finished products, at producers' current prices, by the narrowest categories that production statistics permit
2. Obtaining a price index for each of these categories, with some selected year or period as base
3. Dividing the current price volumes by these price indexes to obtain volumes at producers' constant prices
4. Allowing for transportation and distributive margins (as percentages of the volumes in constant prices under step 3) to obtain flow at final cost to consumers, in constant prices

5. Multiplying the results under step 4 by price indexes to obtain flow to consumers (at cost to them) in current prices

The series for steps 1 and 2 are taken from William H. Shaw for the most part,[1] but whereas he used 1913 as the base year for his constant price volumes, we use 1929. As will be seen below, differences in base years can significantly affect the volumes in constant prices. The effect of the choice of the base year can best be demonstrated by a simple arithmetical illustration quoted here, with minor changes, from an earlier discussion of the problem: [2]

Assume that at point I, say 1869, and at point II, say 1929, national product consists of two finished products, A and B, and that their quantities and prices are as follows:

	I	II
1. Quantity of A (units)	1,000	10,000
2. Price per unit of A	$10	$5
3. QPA, (1) × (2)	$10,000	$50,000
4. Quantity of B (units)	2,000	4,000
5. Price per unit of B	$15	$20
6. QPB, (4) × (5)	$30,000	$80,000
7. National product, current prices, (3) + (6)	$40,000	$130,000

The price adjustment corresponding to our procedure, on the assumption that we have complete price information and that the prices listed above reflect quality changes, can be set up as follows:

Price adjustment, using II as base year, complete information

	I	II
1. Price index for A	200.0	100.0
2. QPA, 1929 prices	$5,000	$50,000
3. Price index for B	75.0	100.0
4. QPB, 1929 prices	$40,000	$80,000
5. National product, 1929 prices, (2) + (4)	$45,000	$130,000

Percentage rise from I to II equals 189 or [(900, % rise in quantity production of A, × 0.11, weight of A at I, with quantities weighted by prices of II) + (100, % rise in quantity production of B, × 0.89, weight of B at I, with quantities weighted by prices of II)].

[1] See his *Value of Commodity Output since 1869* (New York, NBER, 1947).

[2] Simon Kuznets, "Long-Term Changes in the National Income of the United States of America since 1870," *Income and Wealth, Series II* (International Association for Research in Income and Wealth, Cambridge, England, Bowes and Bowes, 1952), pp. 44–46.

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If we use I (i.e., the earlier year) as the base for the price indexes, the rise in national product in constant prices is appreciably greater.

Price adjustment, using I as base year, complete information

	I	II
1. Price index for A	100.0	50.0
2. QPA, 1869 prices	$10,000	$100,000
3. Price index for B	100.0	133.3
4. QPB, 1869 prices	$30,000	$60,000
5. National product, 1869 prices, (2) + (4)	$40,000	$160,000

Percentage rise from I to II equals 300 or [(900 × 0.25, weight of A at I, with quantities weighted by prices of I) + (100 × 0.75, weight of B at I, with quantities weighted by prices of I)].

The choice of the base year has this effect so long as the implicit assumption of the illustration is kept, viz., that there is a negative correlation between the proportional changes in quantities and the proportional changes in prices. Because in the illustration the greater growth in the quantity of A is combined with a price decline in A, whereas the lesser growth of B is associated with a price rise in B, the percentage rise in national product in prices of II is much smaller than that in national product in prices of I. Yet this implication is, on the whole, valid: among the several products, greater growth would be exhibited by relatively new products subject to rapid technical improvement and, correspondingly, to a rapid downward (or lesser upward) price movement.

The effects of the shift from the 1913 to the 1929 price base can be most easily measured by comparing the Shaw series and our recalculation of his constant price series to a 1929 price base, before our adjustments for scope. The current price volumes are identical, and so are the minor group price indexes. The only difference is that in converting the minor groups to constant prices, Shaw used the minor group price indexes on a 1913 price base, whereas we used them on a 1929 price base.

The results in Table B-1 are illuminating. For every major group, the volumes in 1929 prices tend, on the whole, to rise less than the volumes in 1913 prices. This tendency is not observed or is quite minor in the early years. The divergence becomes marked in the last decade, 1919–1928. For this decade, the rise from 1869 in the 1929 price-based series is almost 4 per cent less than that in the 1913 price-based series for perishable commodities, over 20 per cent less for semidurable

Appendix B

TABLE B-1

(amounts in millions of dollars, at producers' prices)

	1869 (1)	1879 (2)	1889 (3)	1889–1898 (4)	1899–1908 (5)	1909–1918 (6)	1919–1928 (7)
Perishables							
Absolute figure							
1. Current prices	1,594	1,996	2,906	3,043	5,124	9,338	16,529
2. 1913 prices	1,129	2,304	3,291	3,868	6,058	7,943	10,469
3. 1929 prices	1,769	3,629	5,143	6,030	9,451	12,356	15,775
Index (1869 = 100)							
4. 1913 prices	100	204	291	343	537	704	927
5. 1929 prices	100	205	291	341	534	698	892
Semidurables							
Absolute figure							
6. Current prices	665	828	1,133	1,139	1,810	3,288	6,967
7. 1913 prices	420	810	1,185	1,345	2,014	2,770	4,152
8. 1929 prices	757	1,425	2,093	2,356	3,536	4,640	5,842
Index (1869 = 100)							
9. 1913 prices	100	193	282	320	480	660	989
10. 1929 prices	100	188	276	311	467	613	772
Consumers' durables							
Absolute figure							
11. Current prices	263	304	499	511	872	1,821	4,997
12. 1913 prices	220	366	609	699	1,029	1,858	4,430
13. 1929 prices	335	630	1,074	1,233	1,816	2,629	4,751
Index (1869 = 100)							
14. 1913 prices	100	166	277	318	468	845	2,014
15. 1929 prices	100	188	321	368	542	785	1,418
Producers' durables							
Absolute figure							
16. Current prices	291	313	543	534	1,100	2,238	4,297
17. 1913 prices	178	328	615	678	1,227	1,853	2,907
18. 1929 prices	318	591	1,103	1,231	2,208	3,140	4,100
Index (1869 = 100)							
19. 1913 prices	100	184	346	381	689	1,041	1,633
20. 1929 prices	100	186	347	387	694	987	1,289

Source: Calculated from William H. Shaw, *Value of Commodity Output since 1869* (New York, NBER, 1947), by procedure described in the text.

commodities, almost 30 per cent less for consumers' durables, and over 20 per cent less for producers' durables. The reason for these differences is that the rapidly growing commodities, whose prices declined particularly markedly from 1913 to 1929, are assigned lower weights when 1929 prices are used than when multiplied by 1913 prices. The major conclusion is that the rates of growth of volumes in constant prices can be affected substantially by a shift in the price base. Over long periods and for categories within which technological advances produce substantial differential price changes, the use of more recent year bases yields lower rates of growth than does the use of earlier year bases.

In other words, if we use an early year price base, we assign to the rapidly growing *new* goods, which in the course of time become cheaper mass-production necessities, the prices of earlier years when these goods may have been rare, high-priced, luxury products (although quite inefficient by modern standards). For instance, if we multiply the number of automobiles by the prices of 1900, their fast increasing number will be assigned enormous weights, and the rate of growth in the resulting total will be far greater than in a total in which the number is assigned the much lower relative prices of current years. (The same can be said of household electrical appliances, radio and television sets, and much of producers' durable equipment.)

But in the nature of the case, recent year price weights should be used, since our historical records, insofar as they involve measurement, necessarily represent an observer of today looking backward rather than an observer of a century ago looking forward. Only the observer of today has weights to apply to the goods that were not in existence a century or half a century ago. Any judgment of growth must be made from the standpoint of a later phase, because in the earlier phase of the economy the subsequent stages cannot be seen even in embryo. There is no need to defend the use of the 1929 price base rather than of the 1913. Our only justification for retaining the 1929 price base (instead of shifting to a later one) is that the limitations of the price data and the relatively minor price-differential trends since 1929 make recalculation to a more recent year base seem hardly worth while.[8]

8 Actually, a more recent year base is used when we employ the Commerce totals in constant prices to extrapolate our series. A comparison of the effect of the 1939 and the 1947 price bases in the two price adjustment calculations by the Department of Commerce (see *National Income, 1951* and *1954 Eds.*) does not reveal the expected shifts. The more recent year price base yields a somewhat lower rate of growth

None of these comments touches upon the effect of omissions of new products from the price data or of the failure of prices to allow for quality changes. In general, if prices of older commodities are used as substitutes for prices of new commodities (at least to represent trends), price declines are underestimated and price rises overestimated. Hence the rate of growth in volumes in constant prices is underestimated. The failure of prices to reflect quality changes also results in a downward bias in the rate of growth. This downward bias is naturally greater for goods in which quality improvements have been more substantial, and here again it is the newer commodities that are subject to more pronounced technological changes. But the bias associated with quality changes exists only to the extent that newer commodities enter the comparison. In comparing two points of time in which the newer goods exist only at one point, their inclusion at the later point is based upon current or recent relations between the newer and older goods—for already established qualities of the newer goods. Therefore, the quality bias is, by its nature, limited: quality change is small in the older goods that exist throughout the period of comparison; and the weight of quality changes in the newer goods is limited for any long-term comparison because at the earlier terminus of the period such new goods were either nonexistent or quite small in relative volume.

Long after the calculations used in this volume had been completed, it became possible to check the price indexes used in converting flow of goods to consumers to 1929 prices with the consumer price indexes computed by Clarence Long and by Albert Rees in their studies dealing with movement of real wage rates from the 1870's to World War I.[4] In Table B-2 we compare the quinquennial and decennial arithmetic means of the price indexes implicit in our conversion of the annual estimates of flow of goods to consumers from current to 1929 prices (Variant I) with the averages of the consumer price indexes computed by Long and by Rees for purposes of adjusting current wage rates for changes in purchasing power. The Long and Rees indexes, to the base of 1860 and 1914 respectively, have been

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from 1929 to 1949 in producers' durable equipment and in nondurable consumer commodities, but not in consumers' durable commodities (due allowance being made for the slight revisions in the current price totals).

[4] See Clarence D. Long, *Wages and Earnings in the United States, 1860–1890* (Princeton for NBER, 1960); and Albert Rees, *Real Wages in Manufacturing, 1890–1914* (Princeton for NBER, 1961).

TABLE B-2

PRICE INDEX IMPLICIT IN FLOW OF GOODS TO CONSUMERS (VARIANT I) COMPARED
WITH LONG AND REES CONSUMER PRICE INDEXES, 1869–1913

	Implicit Price Index, Kuznets (1929 = 100) (1)	Consumer Price Indexes, Long and Rees (1929 = 100) (2)	Difference between (1) and (2) as % of (2) (3)
	AVERAGES FOR SUCCESSIVE QUINQUENNIA		
1. 1869–1873	78.7	74.4	+5.8
2. 1874–1878	65.8	64.6	+1.9
3. 1879–1883	59.6	58.8	+1.4
4. 1884–1888	53.9	55.3	−2.5
5. 1889–1893	52.7	52.7	0
6. 1894–1898	46.8	48.6	−3.7
7. 1899–1903	50.5	49.3	+2.4
8. 1904–1908	55.5	52.6	+5.5
9. 1909–1913	61.5	55.2	+11.4
	AVERAGES FOR OVERLAPPING DECADES		
10. 1869–1878	72.2	69.5	+3.9
11. 1874–1883	62.7	61.7	+1.6
12. 1879–1888	56.8	57.1	−0.5
13. 1884–1893	53.3	54.0	−1.3
14. 1889–1898	49.8	50.7	−1.8
15. 1894–1903	48.7	49.0	−0.6
16. 1899–1908	53.0	51.0	+3.9
17. 1904–1913	58.5	53.8	+8.7

Averages are calculated from annual series.

SOURCE, BY COLUMN

(1) Calculated from series underlying Tables R-25 and R-26.

(2) Annuals for 1869–1890 are the estimates (on an 1860 price base) by Ethel D.
Hoover, as given in Clarence D. Long, *Wages and Earnings in the United States,
1860–1890* (Princeton for NBER, 1960), Table B-1, p. 156. Annuals for 1890–
1913 are the estimates (on a 1914 price base) by Albert Rees, *Real Wages in Manu-
facturing, 1890–1914* (Princeton for NBER, 1961), Table 43. The Rees series was ex-
tended back through 1889 by the movement in the Hoover index, which was ex-
tended forward through 1893 by the movement in the Rees series. The two series
were spliced at 1889–1893, the mid-point of the period covered. On the basis of the
movement in this spliced series, the entry in col. 1 for 1889–1893 was extended
backward and forward.

shifted to a 1929 base, by a simple splicing with the 1889–1893 quin-quennium.

The new consumer price indexes show less decline from the 1870's to the 1890's, and consequently less rise from the 1890's to World War I than the price index implicit in our estimates of flow of goods to consumers. But the differences are relatively minor. In particular, the long-term trends in the flow of goods to consumers in constant prices would be relatively little affected by the substitution of the Long and Rees indexes for ours. Thus from 1869–1878 to 1904–1913, the use of the Long and Rees indexes would mean a reduction in the total growth of less than 5 per cent (the difference between +3.9 in line 10 and +8.7 in line 17); and if, for the purpose of gauging long-term trends, we use averages for three decades, as we do in Chapters 3 and 4, the effect of the differences in the two sets of price indexes would be even smaller.

The effect on rates of growth over shorter periods is more marked. But with specific reference to the long swings discussed in Chapter 7, it should be noted that in many of the components studied, the am-plitude of alternations in the rate of growth is far wider than the differences in the movements of price indexes for the corresponding periods. In particular, there is no association between the price dif-ferentials in Table B-2 and the swings in flow of goods to consumers in constant prices observed in Chapter 7. One may, therefore, assume that differences between the price indexes in Table B-2 would not have a significant effect on the analysis in the substantive chapters. Thus even if the new price indexes turned out to be preferable for our purposes (and this would depend upon their availability for price adjustment of the separate components of flow of goods to consumers), the resulting revisions would be relatively minor.

Freight Charges and Distributive Margins

The estimates in Variant I in Tables R-11 through R-19 (at the end of this appendix) differ little from the decade averages previously published.[5] For the flow of goods to consumers they are almost identi-cal, and for national product they are slightly larger primarily be-cause of the upward revision in the basic series on construction. But the differences are quite minor, which means that, for the decades before 1919–1928, the previously published series and the present

[5] Simon Kuznets, *National Product since 1869* (New York, NBER, 1946).

estimates in all three variants are similar, because the basic component series employed in Variant I are also used to extrapolate Variants II and III back of 1929. The discussion in the earlier source is fully applicable here, not only to the decade estimates, their derivation, and their limitations, but also to the comparison with Martin's estimates of realized national income and with general indexes of output.[6]

Most of the new work in the field (largely in the National Bureau's studies of productivity) starts with the 1900's and cannot be used for testing the estimates for earlier periods. There is, however, one important exception: Harold Barger's study of productivity in distribution yields results that, however approximate, are of great value in testing the validity of some major crude assumptions underlying the extrapolations back from 1919–1928.[7]

To pass from the flow of commodities into domestic consumption at producers' prices to the cost to ultimate users we assume a constant spread for freight charges and distributive margins. These constant percentage markups are applied to the volumes in constant prices, but the resulting estimates of cost to ultimate users are then converted back to current prices by means of essentially wholesale or producers' prices, for lack of others. In effect, a constant relative spread is assumed for commodity flows in both constant and current prices. Whatever error is thus introduced into the commodity flow totals also affects the services component, because the latter is based on ratios to the former (trends in such ratios having been derived from budget data).

Barger's study gives the results of a careful sifting of the available data for the past and these should reveal any trends in the ratio of freight charges plus distribution costs to either producers' value or final cost to users. The relevant data are summarized in Table B-3. Column 1 of part A is the percentage of retail value made up of freight charges and value added in distribution (based upon charges and margins derived from samples and related to volumes in current prices). The trend in the percentage is a combination of two factors: movement in the relative charges and margins for individual store types, and movement in the shares of commodities flowing through distributive channels (which rose with urbanization and growth of the country). The percentages can be viewed as affecting the total flow

[6] *Ibid.,* particularly pp. 59–90.

[7] Harold Barger, *Distribution's Place in the American Economy since 1869* (Princeton for NBER, 1955).

TABLE B-3

ESTIMATED EFFECT OF TRENDS IN FREIGHT CHARGES PLUS VALUE ADDED BY DISTRIBUTION, 1869–1929

A. BASED ON COSTS IN CURRENT PRICES

	Freight Charges Plus Value Added, All Consumables, as Per Cent of Retail Value (1)	Trend in (1) (Difference from 1919–1929) (2)	(2) × 0.8 (To apply to GNP) (3)	GNP, Variant I, Current Prices (1919–1928 = 100.0) (4)	(4) Adjusted by (3) (5)
1869–1879	31.9	−5.4	−4.3	8.68	8.31
1879–1889	34.2	−3.1	−2.5	13.2	12.9
1889–1899	35.5	−1.8	−1.4	15.8	15.6
1899–1909	36.5	−0.8	−0.6	27.1	26.9
1909–1919	36.5	−0.8	−0.6	49.2	48.9
1919–1929	37.3	0.0	0.0	100.0	100.0

B. BASED ON NET OUTPUT OF DISTRIBUTION

	Output of Finished Goods (1899 = 100) (1)	Net Output of Distribution (1899 = 100) (2)	(2) as Per Cent of (1) (3)	Trend in (3) (Difference from 1919–1929) × 35% (4)	(4) × 0.8 (To apply to GNP) (5)
1869–1879	37.0	33.0	89	−3.15	−2.5
1879–1889	58.5	55.0	94	−1.4	−1.1
1889–1899	85.0	83.0	98	0.0	0.0
1899–1909	122.5	123.5	101	1.05	0.8
1909–1919	171.0	169.0	99	0.35	0.3
1919–1929	255.5	250.5	98	0.0	0.0

SOURCE, BY COLUMN

Part A

(1) Harold Barger, *Distribution's Place in the American Economy since 1869* (Princeton for NBER, 1955), Table 18, last line, reduced to per cent of retail value.

(4) For gross national product, Variant I, see Table R-11, col. 7.

Part B

(1) and (2) Barger, *op. cit.*, Table 10.

of goods to consumers, because their effect on commodity components of flow of goods to consumers applies also to the services component.

The trend in these percentages (column 2) indicates that in assuming a constant spread we *overestimate* the flow of goods to consumers in current prices by about 5 per cent in 1869–1878, and by rapidly decreasing percentages thereafter, with the result that by the first decade of the twentieth century the overestimate is insignificant. When applied to gross national product, the percentage must be reduced, because much of capital formation does not go through retail channels, and the small segment that does probably has not risen in relative

weight. We therefore multiplied the percentage overstatement in column 2 by 0.8 (the average share of flow of goods to consumers in gross national product) to secure the approximate overstatement in gross national product in the earlier decades (column 3).

The assumption of a constant spread between flow at producers' prices and cost to ultimate users appears to result in an overestimate of gross national product in the earlier decades and a corresponding underestimate in the rate of growth. To gauge the underestimate in the rate of growth, we compared the rate of growth in the index of gross national product in current prices, Variant I (column 4), with that in the index adjusted by the percentages in column 3 (column 5). The unadjusted rate of growth per decade (based on column 4) is 63.0 per cent; the adjusted rate (based on column 5), 64.5 per cent, is only slightly different.

However, the trends in the volumes in constant prices are far more significant, and since the sample margins used by Barger are necessarily related to volumes in current prices, we do not know whether a trend in the margins would be apparent if the numerator (value added in distribution) and the denominator (total product, or product at producers' prices) were both adjusted for relevant price changes. Such an adjustment, if possible, might remove completely any rise in distributive margins (or in margins plus freight charges). This presumption is supported by the fact that distributive costs rose most rapidly from 1869 to 1899 when producers' prices (the denominator) were declining. Whatever the case, one could perhaps get a better approximation to distributive charges in constant prices by allowing only for the change in the proportion of commodities flowing through retail channels. In part B of Table B-2, therefore, we compare Barger's index of net output of distribution (column 2, essentially an index of the volume of commodities sold through retail outlets weighted by constant distributive margins) with the output of finished goods (column 1). The increasing ratio of net output of distribution to output of finished goods (column 3) is some measure of the increasing weight of distribution—changes in unit margins being eliminated. If we multiply the trend in the ratio by the average weight of freight and distributive charges in the final value of commodities (column 1 of part A), we get the approximate effect of this trend on flow of goods to consumers (column 4); and if we multiply it further by 0.8, we get the effect on gross national product (column 5). The results, which reflect the effect of trends in distribution alone, suggest an overstatement of

gross national product of about 2.5 per cent in the earliest decade, which disappears completely by the beginning of the twentieth century.

It is difficult to draw firm conclusions, but any bias in the rates of growth introduced by the assumption of a constant spread between volume in producers' prices and in cost to final users appears to be minor. There is, therefore, no convincing reason for revising our estimates in the light of these findings, particularly since those for the earlier decades probably suffer from a downward bias because of the greater weight of items that had to be omitted for lack of reliable and continuous data.

Omissions and Undercoverage in Earlier Decades

Some discussion of the possible omissions from the estimates for the earlier decades is provided in *National Product since 1869*.[8] It suggests that the undercoverage is in the neighborhood of 5 per cent for 1869–1878, continues at about 4 per cent to the end of the century, and then dwindles to practically zero by 1919–1928. Barger's more recent study contains estimates for some of the omitted items—federal liquor taxes and state gasoline taxes (neither of which has a significant effect on the trend), and firewood.[9]

Firewood is only one of several omitted products that declined rapidly in importance as the economy grew and urbanization proceeded. Their inclusion in our totals would have raised the levels of the earlier decades more than those of the recent decades, and thus would have reduced somewhat the rates of growth. A list of the products omitted should include horses sold to the urban population (which, if used for pleasure, would be an addition to consumers' durables), hay for those horses (an addition to consumers' perishables), various items produced within the household, whether urban or rural, and others.

If it were possible to approximate these items acceptably and continuously, the effort might be warranted. But such an approximation is hardly feasible.[10] Monographs on the pattern of life both in the

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[8] Pp. 59–62.

[9] Barger, *op. cit.*, Table B-1, p. 128.

[10] Barger's series on the value of firewood (based on Shaw's series in *Value of Commodity Output since 1869*, p. 103) requires further checking before it can be accepted. The total for domestic use, at producers' prices, is $587 million for 1869, or 40 per cent of the producers' value of all finished *food* flowing into domestic consumption ($1,372 million, according to Shaw, pp. 30–31). If we add other fuel and

earlier decades and today might yield clues to their relative weights.

Those weights, however, should not be exaggerated, since we accept the current concept of consumers' goods and disregard the fact that many of them offset difficulties of urban life. Hazarding a guess, let us set the maximum allowance for the total value of commodities omitted in the earlier decades at the high level of 20 per cent of gross national product as given. This, added to the possible 5 per cent shortage associated with the 1870 Census, would mean a total shortage of about 25 per cent for 1869–1878. As they now stand, the estimates of gross national product in 1929 prices yield an average rate of increase per decade (from 1869–1878 to 1939–1948) ranging from 42.3 per cent for Variant I to 42.9 per cent for Variant III; if we assume a 25 per cent shortage in the level for 1869–1878, the rate of increase per decade drops to 37 per cent. Even a larger reduction would not change materially the characteristics of the long-term trends. However, it is a qualification that must be borne in mind for any inferences based upon the specific pattern of movement of the rates of growth over time.

The Three Variants Compared

Table B-4 indicates the similarities and divergences among the three variants. The series by which the level for the 1919–1928 decade is extrapolated back for each component of the flow of goods to consumers and of capital formation is the same for the three variants. Hence, differences in level and movement for the decade before 1919–1928 must originate in the sources of difference for recent decades, discussed in Appendix A, i.e., essentially in the estimates of the services component.

The small relative excess of the national product totals in Variants II and III over that in Variant I, in current prices, which ranges in 1919–1928 from 3 to 7 per cent, becomes still smaller as we go back; in 1869–1878 it ranges from 1 to 5 per cent. The reason is the more rapid rise in the services component from 1869–1878 to 1919–1928 than in the over-all totals. Since the services component accounts for the excess of Variants II and III over Variant I in 1919–1928, its ex-

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lighting products ($79 million), the total value of fuel and lighting products in 1869 is almost half the value of food (both at producers' prices). In 1909, the total value of food is $5.7 billion, whereas fuel and lighting products, including firewood, amount to only $526 million, or less than 10 per cent of the value of food.

TABLE B-4

COMPARISON OF THE THREE VARIANTS, DECADE AVERAGES, 1869–1928, AND
RATES OF GROWTH, 1869–1948

	Flow of Goods to Consumers		*Net National Product*		*Gross National Product*	
	Variant II	Variant III	Variant II	Variant III	Variant II	Variant III
A. DECADE AVERAGES AS RELATIVES OF VARIANT I						
(Variant I for each decade = 100)						
Based on Values in Current Prices						
1869–1878	106.1	101.6	105.3	101.4	104.9	101.3
1879–1888	106.4	102.1	105.6	101.8	105.1	101.7
1889–1898	106.7	102.5	105.8	102.2	105.2	101.9
1899–1908	107.3	103.2	106.3	102.8	105.6	102.5
1909–1918	107.3	103.2	106.4	102.8	105.7	102.5
1919–1928	107.9	103.9	107.0	103.4	106.2	103.0
Based on Values in 1929 Prices						
1869–1878	106.8	103.2	105.8	102.7	105.2	102.4
1879–1888	106.5	103.1	105.6	102.6	105.0	102.4
1889–1898	106.5	103.1	105.4	102.6	104.8	102.3
1899–1908	107.1	103.6	106.0	103.1	105.4	102.8
1909–1918	107.6	104.2	106.6	103.6	105.8	103.2
1919–1928	108.4	105.2	107.4	104.6	106.5	104.0
B. RATE OF GROWTH PER DECADE, BASED ON VALUES IN 1929 PRICES						
(per cent)						
1869–1878 to 1919–1928:						
Variant I		50.2		48.8		49.8
Variant II		50.7		49.3		50.2
Variant III		50.8		49.4		50.3
1869–1878 to 1939–1948:						
Variant I		43.1		41.2		42.3
Variant II		43.4		41.6		42.5
Variant III		43.9		42.0		42.9

SOURCE: Calculated from Tables R-11 and R-12.

trapolation back by a trend more strongly marked than those for the other components carries it to relatively lower levels in the earlier decades and reduces the percentage excess.

From the standpoint of long-term trends, the most important result is that the totals in Variants II and III show higher rates of growth than those in Variant I, again because of the greater weight assigned to the services component. Therefore we compare the rates of growth in the three variants, for totals in 1929 prices.

For the first five decades, 1869–1878 to 1919–1928, the decade rates of growth are slightly lower for the totals in Variant I than for those in Variants II and III, but the differences are so small that no great significance can be attached to them. Even when the period is extended to seven decades, 1869–1878 to 1939–1948, the differences in the decennial rates of growth for the totals in the three variants are still small.

Since all the estimates for the earlier decades probably suffer from a downward bias, the rates of growth are overstated, although, we hope, not by a wide margin. This suggests that the variant yielding the lowest rate of growth is to be preferred. But there are no compelling reasons for preferring any one of the three variants in the study of long-term trends: they yield almost identical results. To be consistent with earlier publications in the field and lacking convincing reasons to the contrary, we retain Variant I throughout. Since Variant III is linked to the most recent set of historical series (the Commerce series), we retain it also. Variant II, however, being in a sense a hybrid and for our purposes of little additional value, is not used in the analysis or in the later appendixes. But it can easily be refined along the lines in Appendix C by anyone desiring to do so.

TABLE R-11

FLOW OF GOODS TO CONSUMERS, NET NATIONAL PRODUCT, AND GROSS NATIONAL PRODUCT,
THREE VARIANTS, CURRENT PRICES, AVERAGES PER YEAR FOR OVERLAPPING DECADES,
1869–1953

(billions of dollars)

	Flow of Goods to Consumers			Net National Product			Gross National Product		
	Variant I (1)	Variant II (2)	Variant III (3)	Variant I (4)	Variant II (5)	Variant III (6)	Variant I (7)	Variant II (8)	Variant III (9)
1. 1869–1878	5.68	6.03	5.78	6.56	6.90	6.65	7.13	7.48	7.22
2. 1874–1883	7.20	7.65	7.34	8.36	8.81	8.49	9.08	9.54	9.22
3. 1879–1888	8.60	9.15	8.78	9.88	10.4	10.1	10.8	11.4	11.0
4. 1884–1893	9.37	9.98	9.58	10.8	11.5	11.1	12.0	12.7	12.3
5. 1889–1898	9.98	10.6	10.2	11.6	12.3	11.8	13.0	13.7	13.2
6. 1894–1903	12.3	13.2	12.7	14.5	15.4	14.9	16.2	17.1	16.6
7. 1899–1908	17.2	18.4	17.7	19.9	21.2	20.5	22.3	23.5	22.8
8. 1904–1913	22.9	24.7	23.8	26.3	28.0	27.1	29.4	31.1	30.2
9. 1909–1918	31.5	33.8	32.5	35.7	38.0	36.8	40.4	42.7	41.4
10. 1914–1923	47.9	51.4	49.4	54.3	57.8	55.8	62.0	65.5	63.5
11. 1919–1928	63.7	68.8	66.2	72.2	77.2	74.6	82.1	87.2	84.6
12. 1924–1933	65.2	70.1	67.3	70.1	75.1	72.3	80.1	85.0	82.2
13. 1929–1938	59.8	65.0	62.2	61.3	66.5	63.7	71.1	76.3	73.5
14. 1934–1943	70.0	76.5	73.2	76.3	82.8	79.5	88.6	95.0	91.7
15. 1939–1948	112.6	121.5	116.1	121.5	130.3	124.9	144.0	152.9	147.5
16. 1944–1953	173.7	187.0	179.6	185.2	198.5	191.2	225.2	238.4	231.1

Gross and net capital formation are identical for all three variants.

SOURCE

Lines 1–10, by column:
   (1) Table R-13, sum of cols. 1–4.
   (2) Table R-13, cols. 1–3 plus Table 18, col. 1.
   (3) Table R-18, sum of cols. 2–5.
   (4) Col. 1 plus Table R-14, col. 8.
   (5) Col. 2 plus Table R-14, col. 8.
   (6) Col. 3 plus Table R-14, col. 8.
   (7) Col. 1 plus Table R-14, col. 5.
   (8) Col. 2 plus Table R-14, col. 5.
   (9) Col. 3 plus Table R-14, col. 5.
Lines 11–16: Averages of annual estimates in Table R-1.

TABLE R-12

FLOW OF GOODS TO CONSUMERS, NET NATIONAL PRODUCT, AND GROSS NATIONAL PRODUCT, THREE VARIANTS, 1929 PRICES, AVERAGES PER YEAR FOR OVERLAPPING DECADES, 1869–1953

(billions of dollars)

	Flow of Goods to Consumers			*Net National Product*			*Gross National Product*		
	Variant I	Variant II	Variant III	Variant I	Variant II	Variant III	Variant I	Variant II	Variant III
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. 1869–1878	8.02	8.57	8.28	9.49	10.0	9.74	10.5	11.0	10.7
2. 1874–1883	11.6	12.4	12.0	13.7	14.5	14.1	15.1	15.9	15.5
3. 1879–1888	15.2	16.2	15.7	17.8	18.8	18.2	19.7	20.7	20.2
4. 1884–1893	17.6	18.7	18.1	20.8	22.0	21.4	23.4	24.6	24.0
5. 1889–1898	20.2	21.5	20.8	24.0	25.3	24.6	27.3	28.6	27.9
6. 1894–1903	25.2	26.9	26.1	30.0	31.7	30.8	34.0	35.7	34.8
7. 1899–1908	32.1	34.4	33.3	37.6	39.9	38.8	42.4	44.7	43.6
8. 1904–1913	39.0	41.9	40.6	45.0	47.9	46.6	50.8	53.7	52.4
9. 1909–1918	43.8	47.2	45.7	50.2	53.6	52.0	57.2	60.6	59.1
10. 1914–1923	50.4	54.4	52.8	56.8	60.9	59.2	65.2	69.3	67.6
11. 1919–1928	61.4	66.6	64.6	69.3	74.4	72.4	79.0	84.2	82.2
12. 1924–1933	68.7	73.7	72.0	73.4	78.4	76.7	83.9	88.9	87.2
13. 1929–1938	70.2	76.2	75.1	71.7	77.7	76.6	82.5	88.4	87.3
14. 1934–1943	79.8	87.1	86.1	85.9	93.2	92.3	98.1	105.4	104.4
15. 1939–1948	98.4	106.7	105.7	106.0	114.2	113.3	123.5	131.8	130.9
16. 1944–1953	119.2	129.4	128.9	125.5	135.7	135.2	149.5	159.7	159.2

Gross and net capital formation are identical for all three variants. The price index used in calculating net changes in claims against foreign countries in 1929 prices is that implicit in gross national product excluding such changes, Variant I. Strictly speaking, for Variants II and III we should have computed the index implicit in those variants. But the difference is negligible and has been disregarded.

SOURCE

Lines 1–10, by column:
 (1) Table R-13, sum of cols. 5–8.
 (2) Table R-13, cols. 5–7 plus Table R-19, col. 1.
 (3) Table R-19, sum of cols. 2–5.
 (4) Col. 1 plus Table R-15, col. 8.
 (5) Col. 2 plus Table R-15, col. 8.
 (6) Col. 3 plus Table R-15, col. 8
 (7) Col. 1 plus Table R-15, col. 5.
 (8) Col. 2 plus Table R-15, col. 5.
 (9) Col. 3 plus Table R-15, col. 5.
Lines 11–16: Averages of annual estimates in Table R-2.

TABLE R-13

COMPONENTS OF FLOW OF GOODS TO CONSUMERS, VARIANT I, AVERAGES PER YEAR FOR
OVERLAPPING DECADES, 1869–1953

(billions of dollars)

	Current Prices				*1929 Prices*			
	Perish- ables (1)	Semi- durables (2)	Durables (3)	Services (4)	Perish- ables (5)	Semi- durables (6)	Durables (7)	Services (8)
1. 1869–1878	2.57	1.17	0.47	1.47	3.47	1.55	0.69	2.33
2. 1874–1883	3.36	1.38	0.55	1.91	5.24	2.13	0.97	3.26
3. 1879–1888	3.96	1.62	0.68	2.33	6.88	2.76	1.38	4.18
4. 1884–1893	4.22	1.75	0.80	2.60	7.77	3.24	1.75	4.82
5. 1889–1898	4.54	1.77	0.82	2.85	8.98	3.67	1.98	5.53
6. 1894–1903	5.66	2.04	0.97	3.67	11.3	4.41	2.36	7.12
7. 1899–1908	7.64	2.82	1.38	5.32	14.1	5.50	2.91	9.63
8. 1904–1913	10.0	3.66	1.88	7.41	16.6	6.57	3.48	12.4
9. 1909–1918	13.9	5.12	2.66	9.74	18.5	7.30	3.99	14.1
10. 1914–1923	20.0	8.42	4.55	14.9	20.5	7.90	4.70	17.3
11. 1919–1928	24.5	10.9	6.86	21.4	23.9	9.19	6.55	21.8
12. 1924–1933	23.9	10.1	6.70	24.5	26.5	10.3	6.98	25.0
13. 1929–1938	23.6	8.61	5.46	22.1	29.1	10.2	6.27	24.7
14. 1934–1943	30.2	10.6	6.29	23.0	35.1	11.6	7.15	25.9
15. 1939–1948	49.7	18.4	10.6	33.9	43.8	13.9	8.78	32.0
16. 1944–1953	76.0	25.5	20.0	52.2	51.7	14.7	13.0	39.9

Appendix B

Notes to Table R-13

Source

Lines 1–10, columns 1–3 and 5–7: Kuznets, *National Product since 1869*, Table II-8 adjusted for 1899–1908 through 1914–1923 as indicated below.

Perishables. Adjusted to exclude gasoline and lubricating oils for business use of passenger cars. It was assumed that the item was negligible for the years before 1904. For 1904, 1909, 1914, and 1919, the percentage that gasoline and lubricating oils constituted of the output of fuel and lighting products (manufactured) in current prices was calculated from Shaw, *Value of Commodity Output since 1869*, Table II-1, p. 112, and for 1919, 1921, and 1923 from Kuznets, *Commodity Flow and Capital Formation*, Vol. I, Table I-4, p. 82. Annual percentages were interpolated along a straight line and applied to the value of fuel and lighting products for domestic consumption (Shaw, Tables I-1 and I-2, pp. 33 and 66) to yield annual estimates of the output of gasoline and lubricating oils for domestic consumption. It was assumed that 30 per cent was for business use of passenger cars (see notes to *National Product since 1869*, Table I-1, col. 2). This was converted to constant prices by the price index for group 5a (Shaw, Table IV-1, pp. 290–291) adjusted to a 1929 base. The average value in 1929 prices was calculated for 1904–1913, 1909–1918, and 1914–1918. Its percentage of the output of all perishable commodities for domestic consumption in 1929 prices (*National Product since 1869*, Table II-1, col. 2) was calculated for these same periods and applied to the series on final flow (*ibid.*, col. 5, that for 1914–1918 being estimated by subtracting from the total for 1914–1923—the average for which is shown in line 14—the total for 1919–1923 as calculated from the annual estimates for those years) to yield the amount by which the latter was adjusted. The adjusted series in 1929 prices was converted to current prices by multiplying by the price index implicit in Shaw's series on the output of perishable commodities for domestic consumption excluding gasoline for business use of passenger cars. The estimates for 1914–1923 were derived by averaging the estimate for 1914–1918 obtained by this procedure with the average of the annual series for 1919–1923 shown in Table R-3.

Semidurables. Adjusted to exclude tires and tubes for business use of passenger cars. It was assumed that the item was negligible for the years before 1904. Of the total destined for domestic consumption in 1929 prices (values in current prices in Shaw, Tables I-1 and I-2, pp. 39 and 67, deflated by the price index for group 11, *ibid.*, Table IV-1, pp. 290–291, adjusted to a 1929 base), 30 per cent was assumed to represent the amount for business use of passenger cars (see notes to *National Product since 1869*, Table I-1, col. 2). The average value was calculated for 1904–1913, 1909–1918, and 1914–1918. Its percentage of the output of all semidurable commodities for domestic consumption in 1929 prices (*ibid.*, Table II-2, col. 2) was calculated for these same periods and applied to the series on final flow (*ibid.*, col. 5, that for 1914–1918 being estimated by subtracting from the total for 1914–1923—the average for which is shown in line 14—the total for 1919–1923 calculated from the annual estimates for those years) to yield the amount by which the latter was adjusted. The adjusted series in 1929 prices was converted to current prices by multiplying by the price index implicit in Shaw's series on the output of semidurable commodities excluding tires and tubes for business use of passenger cars. The estimates for 1914–1923 were derived by averaging the estimate for 1914–1918 obtained by this procedure with the average of the annual series for 1919–1923 shown in Table R-3.

Durables. Adjusted to exclude 30 per cent of the output of passenger cars—the amount assumed to be used for business purposes (see *National Product since 1869*, notes to Table I-1, col. 2). The total value of motor vehicles and accessories for domestic consumption in current prices is shown in Shaw, Tables I-1 and I-2, pp. 47–48 and 68. Thirty per cent of the total was taken, and deflated by the price index for group 20a. *ibid.*, Table IV-1, pp. 292–293, adjusted to a 1929 base. The average value in 1929 prices was calculated for 1899–1908, 1904–1913, 1909–1918, and 1914–1918. Its percentage of the output of all consumers' durable commodities for domestic consumption in 1929 prices (*National Product since 1869*, Table II-3, col. 2) was calculated for those same periods and applied to the series on final flow (*ibid.*, Table II-6, line 6) to yield the amount by which the latter was adjusted. The adjusted series in 1929 prices was converted to current prices by multiplying by the price index implicit in Shaw's series on the output of consumers' durables destined for domestic consumption excluding motor vehicles and accessories used for business purposes. The estimates for 1914–1923 were derived by averaging the estimate for 1914–1918 obtained by this procedure with the average of the annual series for 1919–1923 shown in Table R-3.

Lines 1–10, columns 4 and 8: Extrapolated from 1919–1928 by the procedure described in *National Product since 1869*, notes to Table II-7, cols. 2 and 5.

Lines 11–16: Averages of annual estimates in Table R-3.

GROSS AND NET CAPITAL FORMATION, CURRENT PRICES, AVERAGES PER YEAR
FOR OVERLAPPING DECADES, 1869–1953

(billions of dollars)

	Gross Con-struction (1)	Gross Producers' Durables (2)	Net Changes in: Inven-tories (3)	Net Changes in: Claims against Foreign Countries (4)	Gross Capital Formation (1) + (2) + (3) + (4) (5)	Net Con-struction (6)	Net Producers' Durables (7)	Net Capital Formation (3) + (4) + (6) + (7) (8)
1. 1869–1878	0.80	0.36	0.38	−0.09	1.45	0.45	0.14	0.88
2. 1874–1883	0.97	0.46	0.46	a	1.88	0.51	0.18	1.16
3. 1879–1888	1.33	0.55	0.39	−0.04	2.23	0.72	0.21	1.28
4. 1884–1893	1.89	0.58	0.26	−0.08	2.67	1.12	0.16	1.47
5. 1889–1898	2.14	0.62	0.23	0.02	3.00	1.24	0.13	1.62
6. 1894–1903	2.37	0.84	0.48	0.19	3.88	1.26	0.23	2.16
7. 1899–1908	3.18	1.29	0.40	0.22	5.08	1.70	0.44	2.76
8. 1904–1913	4.11	1.66	0.57	0.08	6.42	2.19	0.46	3.30
9. 1909–1918	4.37	2.77	0.79	0.99	8.91	1.72	0.78	4.28
10. 1914–1923	5.83	4.53	1.82	1.93	14.1	1.52	1.12	6.40
11. 1919–1928	9.69	5.65	1.76	1.32	18.4	3.90	1.48	8.46
12. 1924–1933	9.34	5.13	−0.14	0.58	14.9	3.11	1.42	4.97
13. 1929–1938	6.38	4.66	−0.04	0.34	11.3	−0.22	1.43	1.50
14. 1934–1943	8.32	8.68	1.19	0.33	18.5	0.70	4.04	6.27
15. 1939–1948	11.8	16.6	1.54	1.49	31.4	1.05	4.74	8.82
16. 1944–1953	22.3	25.7	2.56	0.94	51.5	5.76	2.27	11.5

Because of rounding, detail will not necessarily add to total.
a Less than $5 million.
The series are identical for all three variants.

SOURCE, BY COLUMN

(1) Lines 1–8 (and 1864–1873, see notes to Table R-15, col. 1): Sum of (1) the cost of oil and gas wells drilled, and (2) all other new construction.

1. Averages of annual estimates derived by multiplying the 1929 price series described in the notes to Table R-15 by the price index for petroleum pipe lines. The latter was derived for 1915 and later years from *Construction and Building Materials, Statistical Supplement, May 1954*, pp. 33 and 82, and was extrapolated back from 1915 by the cost of construction index described in Kuznets, *National Product since 1869*, Table IV-4, notes to line 1.

2. Estimated by multiplying the 1929 price series described in the notes to Table R-15 by the price index. The latter was derived by extrapolating the price index implicit in the estimate for 1915 (see notes to Table R-30, col. 10) by the cost of construction index indicated under item 1.

Line 9: Average of 1909–1913, derived by the method indicated for lines 1–8, and of 1914–1918, the average of the annual estimates described in the notes to Table R-30, col. 5.

Line 10: Average of annual estimates described in the notes to Table R-30, col. 5.

(2) Lines 1–6: From *National Product since 1869*, Table II-13.

Lines 7–10: Table R-15, col. 2, lines 7–10, multiplied by the price index implicit in Shaw's series on output of producers' durable commodities destined for domestic consumption adjusted to include passenger cars used for business (see notes to Table R-15) and converted to a 1929 base. The estimate for 1914–1923 was derived by averaging that for 1914–1918 obtained by this procedure with the average of the annual series for 1919–1923 shown in Table R-4.

(3) Lines 1–10: From *National Product since 1869*, Table II-15.

(4) Lines 1–10: Averages of annual estimates derived as follows:

1869–1896: Based on C. J. Bullock, J. H. Williams, and R. S. Tucker, "The Balance of Trade of the United States," *Review of Economic Statistics*, July 1919. We distributed the totals given there for fiscal periods ending June 30, 1850–1873, 1874–1895, and 1896–1914, by calendar years.

(4) Four components were estimated separately and then summated: (1) the net balance of goods, to which freight charges, commissions, fees for ships chartered, etc. were added, (2) investment income, (3) tourists' expenditures, and (4) immigrants' funds and remittances.

1. *Net Balance of Goods.* To distribute this item annually, we used the export-import balance for merchandise and silver. The annual merchandise balance is the calendar year total of monthly figures reported in various issues of *Monthly Summary of Foreign Commerce* (Dept. of Commerce). The annual silver balance is the average of the balance for pairs of fiscal years given in *Historical Statistics of the United States, 1789–1945*, Series M-50 .

2. *Investment Income.* Bullock, Williams, and Tucker give estimates for the periods 1870–1873 and 1874–1895, and annual estimates for 1869, 1878, 1883, 1890, and 1895 (*op. cit.*, pp. 223 and 226). Annual figures for the intervening years were interpolated along a straight line and adjusted by the ratio of the given total for the period to the sum of the preliminary annual estimates. The estimate for 1896 was derived by the same procedure: interpolating annual figures along a straight line between those given for 1895, 1900, 1908, and 1913 (*ibid.*, pp. 230 and 251), and adjusting by the ratio of the total given for 1896–1914 to the sum of the preliminary annual estimates for that period.

3. *Tourists' Expenditures.* These were carried at $37 million annually, 1869–1873 (Bullock, Williams, and Tucker, p. 223) and $35 million annually, 1874–1895 (*ibid.*, p. 227). For 1896–1914 a preliminary annual series was derived by multiplying the number of American citizens returning to the United States (given for fiscal years in *Statistical Abstract, 1916*, Dept. of Commerce, p. 111, and averaged for calendar years) by an average expenditure of $500 (see Bullock, Williams, and Tucker, p. 230). The preliminary figure for 1896 was adjusted by the ratio of the given total for 1896–1914 (*ibid.*, p. 231) to the sum of the preliminary annual estimates for that period.

4. *Immigrants' Funds and Remittances.* Funds brought in were estimated annually by multiplying the number of immigrants (given for fiscal years in *Statistical Abstract, 1916*, p. 727, and averaged for calendar years) by $50 for 1869–1873 (Bullock, Williams, and Tucker, p. 223); $20 for 1874–1895 (*ibid.*, p. 227); and $25 for 1896 (*ibid.*, p. 232). Immigrants' remittances in 1869–1873 were negligible; in 1874–1895 they were carried at $20 million per year (*ibid.*, p. 227); for 1896 they were extrapolated from the 1907 figure (*ibid.*, p. 231) by annual data on international money orders (given for fiscal years in *Statistical Abstract, 1916*, p. 726, and averaged for calendar years). In every case the annual estimates were adjusted to the given totals for the periods.

1897–1918: From Goldsmith, *A Study of Saving*, Vol. I, Table K-1, p. 1079.

(1–4) Lines 11–16: Averages of annual estimates in Table R-4.

(6) Col. 1 minus Table R-16, col. 3.

(7) Col. 2 minus Table R-16, col. 6.

TABLE R-15

GROSS AND NET CAPITAL FORMATION, 1929 PRICES, AVERAGES PER YEAR
FOR OVERLAPPING DECADES, 1869–1953

(billions of dollars)

		Gross Con-struction (1)	Gross Producers' Durables (2)	*Net Changes in:* Inven-tories (3)	Claims against Foreign Countries (4)	Gross Capital Formation (1) + (2) + (3) + (4) (5)	Net Con-struction (6)	Net Producers' Durables (7)	Net Capital Formation (3) + (4) + (6) + (7) (8)
1.	1869–1878	1.67	0.48	0.44	−0.14	2.46	0.98	0.18	1.46
2.	1874–1883	2.15	0.75	0.62	ª	3.52	1.19	0.31	2.11
3.	1879–1888	2.98	1.03	0.56	−0.07	4.50	1.70	0.39	2.58
4.	1884–1893	4.36	1.24	0.40	−0.15	5.84	2.65	0.35	3.25
5.	1889–1898	5.25	1.42	0.39	0.04	7.10	3.08	0.30	3.81
6.	1894–1903	5.67	1.82	0.84	0.40	8.73	3.06	0.48	4.78
7.	1899–1908	6.68	2.56	0.60	0.42	10.3	3.61	0.86	5.49
8.	1904–1913	7.82	3.06	0.80	0.13	11.8	4.20	0.86	5.99
9.	1909–1918	7.32	3.79	0.91	1.40	13.4	3.07	1.01	6.40
10.	1914–1923	6.81	4.64	1.33	2.03	14.8	1.88	1.15	6.40
11.	1919–1928	9.70	5.48	1.20	1.23	17.6	3.98	1.45	7.85
12.	1924–1933	9.71	5.34	−0.41	0.59	15.2	3.10	1.43	4.72
13.	1929–1938	6.80	5.12	−0.06	0.38	12.2	−0.37	1.54	1.50
14.	1934–1943	7.99	8.20	1.66	0.44	18.3	0.41	3.63	6.13
15.	1939–1948	8.74	13.4	1.81	1.15	25.1	0.53	4.04	7.53
16.	1944–1953	11.1	16.7	1.77	0.66	30.2	2.11	1.77	6.31

Because of rounding, detail will not necessarily add to total.

ª Less than $5 million.

The series are identical for all three variants. The price index used in calculating net changes in claims against foreign countries, in 1929 prices, is that implicit in gross national product excluding such changes, Variant I. Strictly speaking, for Variants II and III we should have computed the index implicit in those variants. But the difference is negligible and has been disregarded.

SOURCE, BY COLUMN

(1) Lines 1–8 (and 1864–1873, see below): Sum of (1) the cost of oil and gas wells drilled, and (2) all other new construction.

1. Averages of annual estimates extrapolated from the 1919 figure (see notes to Table R-5, col. 1) by the number of wells drilled. The latter series is given or estimated as follows:

1859–1869 (years before 1869 are not used in this table but are needed to extend total construction back to 1864, see notes to Table R-30, col. 1): The number of producing wells drilled in 1859 and 1869 is given in *Petroleum and Natural Gas Production* (Works Progress Administration, July 1939), p. 321. Annual estimates were interpolated between those for 1859 and 1869 by production, as reported in *Mineral Resources of the United States, 1912* (Geological Survey), Pt. II, p. 367. While the WPA figures fail to cover dry wells and thus lead to an underestimate, the use of production as an interpolator tends to overestimate the series in the intervening years since a rise in production may be due in part to increased production of old wells. But the annual estimates are used primarily to establish the level for the decade and it has been assumed that the averaging of the annuals cancels whatever error may attach to the estimate for a given year.

1870: Straight-line interpolation between estimates for 1869 and 1871.

1871–1888: The number of oil wells completed in Pennsylvania, New York, and Northern West Virginia in 1872–1888, as reported in *Mineral Resources of the United States, 1892*, p. 627, was assumed to be the total, since activity in other fields was negligible. For 1871 the number was estimated by the change from 1871 to 1872 in the number of drilling wells in the Pennsylvania and New York oil fields, *ibid., 1889 and 1890*, p. 307. To the number of oil wells was added the number of gas wells. The latter was estimated by straight-line interpolation be-

Appendix B

(1)   tween the figure for 1884 (assumed to be zero, since it was negligible before 1885) and the WPA figure for 1889 (see below).

1889–1898: The number of producing wells drilled in 1889 is given in *Petroleum and Natural Gas Production*, pp. 321 and 322. The number of dry wells is not given. But, since the WPA series on the number of natural gas wells drilled in 1902 is much higher than that shown by Barger (see below), it was assumed that the overstatement in the former would offset the omission of dry wells. Annual interpolation between the WPA figure for 1889 and Barger's for 1899 was by the number of wells completed in the Appalachian Field as reported for 1892–1899 in *Census of Mines and Quarries, 1902* (Special Reports of the Census Office), p. 733, and extended from 1889 to 1892 by the number of wells completed in Pennsylvania, New York, and Northern West Virginia as reported in *Mineral Resources of the United States, 1892*, p. 627.

1899–1913: Given in *The Mining Industries, 1899–1939*, by Harold Barger and Sam H. Schurr (New York, NBER, 1944), Table 18, p. 195.

1914–1918: Given in *Mineral Resources of the United States, 1922*, Part II, p. 416.

2. 1864–1873 (not used in this table, but necessary for the estimate of total construction for that decade—see notes to Table R-30, col. 1): Extrapolation of estimate for 1869–1878 by procedure described in Kuznets, *National Product since 1869*, Table II-14, notes to col. 4.

1869–1913: Estimated by the procedure described in Table II-5, notes to col. 7, *ibid.*; the revised ratio of new construction in 1919–1933 to cost of materials consumed is 1.54056.

Line 9: Average of 1909–1913, derived by the method indicated for lines 1–8, and of 1914–1918, the average of the annual estimates described in the notes to Table R-30, col. 10.

Line 10: Average of the annual estimates described in the notes to Table R-30, col. 10.

(2) Lines 1–10: *National Product since 1869*, Table II-4, col. 5 adjusted for 1899–1908 through 1914–1923 to include passenger cars used for business. The average output of the latter for domestic consumption in 1929 prices (see notes to estimates of consumers' durables, Table R-13) for 1899–1908, 1904–1913, 1909–1918, and 1914–1918 as a percentage of the output of producers' durable commodities for domestic consumption (*ibid.*, col. 2) was calculated for these same periods and applied to the series on final flow (*ibid.*, Table II-6, line 10) to yield the amount by which the latter was adjusted. The estimate for 1914–1923 was derived by averaging that for 1914–1918 obtained by this procedure, with the average of the annual series for 1919–1923 shown in Table R-5.

(3) Lines 1–10: From *National Product since 1869*, Table II-13.

(4) Lines 1–10: Table R-14, col. 4 divided by the index implicit in gross national product excluding net changes in foreign claims (Table R-11, col. 7 minus Table R-14, col. 4, divided by Table R-12, col. 1 plus Table R-15, cols. 1–3).

(1–4) Lines 11–16: Averages of annual estimates in Table R-5.

(6) Col. 1 minus Table R-17, col. 3.

(7) Col. 2 minus Table R-17, col. 6.

TABLE R-16

CAPITAL CONSUMPTION, CURRENT PRICES, AVERAGES PER YEAR FOR OVERLAPPING DECADES,
1869–1953

(billions of dollars)

		Construction			Producers' Durables			Total
		Non-military (1)	Military (2)	Total (1) + (2) (3)	Non-military (4)	Military (5)	Total (4) + (5) (6)	*Total* (3) + (6) (7)
1.	1869–1878	0.35		0.35	0.22		0.22	0.57
2.	1874–1883	0.45		0.45	0.28		0.28	0.73
3.	1879–1888	0.61		0.61	0.34		0.34	0.95
4.	1884–1893	0.78		0.78	0.42		0.42	1.20
5.	1889–1898	0.90		0.90	0.48		0.48	1.39
6.	1894–1903	1.11		1.11	0.61		0.61	1.72
7.	1899–1908	1.48		1.48	0.85		0.85	2.33
8.	1904–1913	1.92		1.92	1.20		1.20	3.11
9.	1909–1918	2.64	0.01	2.65	1.94	0.05	1.99	4.64
10.	1914–1923	4.21	0.11	4.32	3.04	0.36	3.40	7.72
11.	1919–1928	5.58	0.20	5.79	3.62	0.55	4.17	9.96
12.	1924–1933	6.04	0.19	6.23	3.42	0.30	3.71	9.94
13.	1929–1938	6.44	0.17	6.60	3.04	0.19	3.22	9.83
14.	1934–1943	7.44	0.18	7.62	3.98	0.66	4.64	12.3
15.	1939–1948	10.3	0.49	10.7	7.69	4.13	11.8	22.6
16.	1944–1953	15.6	0.96	16.5	15.0	8.40	23.4	39.9

Because of rounding, detail will not necessarily add to total.

The series are identical for all three variants.

SOURCE, BY COLUMN

(1) Lines 1-10: Averages of annual estimates for (1) nonfarm residential construction, (2) government construction excluding military, and (3) business construction.

1. 1869–1888: The annual series in 1929 prices underlying Table R-17, col. 1, multiplied by the index of the cost of nonfarm residential construction. The latter was calculated for 1889 (from the annual series underlying Table R-30, cols. 1 and 6) and extrapolated back to 1869 by the cost of construction index described in Kuznets, *National Product since 1869*, Table IV-4, notes to line 1.

1889–1923: Given in Grebler, Blank, and Winnick, *Capital Formation in Residential Real Estate*, Appendix E, Table E-2, pp. 384–385.

2. Estimated separately for (a) sewer and highway construction and (b) all other government construction. For both (a) and (b) the annual estimates in 1929 prices underlying Table R-17, col. 1 were multiplied by the price index calculated

(1) for the given type of construction from the estimates described in the notes to Table R-30, col. 2 or col. 7.

3. Sum of (a) estimated depreciation on "other" construction, and (b) depletion. For both (a) and (b) the annual estimates in 1929 prices underlying Table R-17, col. 1 were multiplied by the appropriate price index. For (a) the price index was calculated from the annual series underlying Table R-30, cols. 4 and 9; for (b) the price index is that implicit in output of producers' durables (see notes to Table R-14, col. 2) excluding munitions (Tables R-6 and R-7).

Lines 11–16: Averages of annual estimates derived by deducting from Table R-8, col. 1, annual estimates of consumption of business equipment and of capital outlays charged to current expense described in the notes to Table R-8, col. 1.

(2) Lines 9–16: Averages of annual estimates given in Table R-6, col. 5. The volume of military construction before 1909–1918 is considered negligible.

(4) Lines 1–10: Averages of annual estimates of consumption of business equipment and of capital outlays charged to current expense derived by multiplying the series underlying Table R-17, col. 4 by the price index for producers' durables (see notes to Table R-14, col. 2) excluding munitions (Tables R-6 and R-7).

Lines 11–16: Averages of annual estimates of consumption of business equipment and of capital outlays charged to current expense described in the notes to Table R-8, col. 1.

(5) Lines 9–16: Averages of annual estimates given in Table R-6, col. 6. The volume of munitions before 1909–1918 is considered negligible.

CAPITAL CONSUMPTION, 1929 PRICES, AVERAGES PER YEAR FOR OVERLAPPING DECADES,
1869–1953

(billions of dollars)

	Construction			Producers' Durables			Total
	Non-military (1)	Military (2)	Total (1) + (2) (3)	Non-military (4)	Military (5)	Total (4) + (5) (6)	Total (3) + (6) (7)
1. 1869–1878	0.69		0.69	0.30		0.30	0.99
2. 1874–1883	0.96		0.96	0.45		0.45	1.41
3. 1879–1888	1.28		1.28	0.64		0.64	1.93
4. 1884–1893	1.71		1.71	0.89		0.89	2.59
5. 1889–1898	2.17		2.17	1.12		1.12	3.29
6. 1894–1903	2.61		2.61	1.34	.	1.34	3.95
7. 1899–1908	3.08		3.08	1.69		1.69	4.77
8. 1904–1913	3.62		3.62	2.20		2.20	5.82
9. 1909–1918	4.23	0.01	4.24	2.72	0.05	2.78	7.02
10. 1914–1923	4.82	0.10	4.92	3.14	0.34	3.49	8.41
11. 1919–1928	5.54	0.19	5.72	3.50	0.53	4.03	9.76
12. 1924–1933	6.41	0.20	6.60	3.60	0.31	3.91	10.5
13. 1929–1938	6.98	0.19	7.17	3.36	0.21	3.57	10.7
14. 1934–1943	7.41	0.18	7.58	4.04	0.53	4.57	12.2
15. 1939–1948	7.88	0.33	8.21	6.30	3.08	9.37	17.6
16. 1944–1953	8.46	0.51	8.97	9.42	5.55	15.0	23.9

Because of rounding, detail will not necessarily add to total.
The series are identical for all three variants.

SOURCE, BY COLUMN

(1) Lines 1–9: Averages of annual series for (1) nonfarm residential construction,
(2) government construction excluding military, and (3) business construction.

1. 1869–1888: Depreciation for 1889 (see below) is 2.167 per cent of the value of
structures in 1929 prices as of the middle of the year. It was assumed that this
rate applies for each year back to 1869. The value of structures at the end of
1889 is given in Grebler, Blank, and Winnick, *Capital Formation in Residential
Real Estate*, Appendix D, Table D-1, p. 360. Subtracting gross construction
and depreciation during the year yields the estimate of value of structures at
the beginning of 1889. Value at the middle of 1889 is estimated by straight-
line interpolation between the value at the beginning and at the end of the
year. Value of structures at the beginning of 1889 and of each prior year is
computed successively as:

$$\frac{2.02167 \text{ (stock at end of year)} - 2 \text{ (gross construction during year)}}{1.97833}$$

For gross construction annually back to 1869, see Table R-30, notes to col. 6.

1889–1918: Grebler, Blank, and Winnick, Appendix E, Table E-2, p. 384.

(1) 2. Estimated by the procedure indicated in the notes to Table R-8, col. 4.

3. Sum of (a) estimated depreciation on other construction, and (b) depletion.

a. 1869–1876: For 1879–1888, depreciation on nonfarm residential construc-
tion is 37.8 per cent of depreciation on other construction, both in 1929
prices. Depreciation on nonfarm residential construction in 1929 prices for
1869–1878 divided by this percentage yielded a preliminary estimate of de-
preciation on other construction in 1929 prices for that decade. Interpo-
lating between (or extrapolating from) the log of the decade average of this
estimate and that of the estimate for 1877–1886, both centered at their mid-
points, gave a preliminary series of annuals for 1869–1881. The ratio of the
decade estimate for 1869–1878 to the sum of the annuals for those years and
the ratio of the final figures for 1877–1879 (see below) to those just calcu-
lated were computed and centered at the mid-points of the respective periods.
Annual ratios were interpolated between (or extrapolated from) them and
applied to the preliminary annual series on depreciation for 1869–1876 to
yield the final annuals for those years.

1877–1918: Average depreciation per year for 1919–1928 (see below) is
3.898 per cent of the value of real estate improvements excluding residential
and tax exempt for December 31, 1922, as shown in Kuznets, *National
Product since 1869*, Table IV-5, Part B, p. 218. This percentage was applied
to the corresponding wealth series shown (*ibid.*) for June 1 of 1880, 1890,
and 1900, to yield estimates of the average annual depreciation for the
decades ending June 1 of 1886, 1896, and 1906, respectively. (The wealth
estimate for 1912 was not used in these computations because of the rela-
tively small increase between it and the estimate for 1922.) Preliminary
annual estimates of depreciation (on a calendar year basis) were derived by
extrapolating from or interpolating between the logs of these decade esti-
mates centered at their mid-points. The ratios of the decade estimates for
1877–1886, 1887–1896, 1897–1906 and of the final figures for 1919–1921 to
averages of the preliminary annuals for those periods were calculated and
centered at the mid-point of the given periods. Annual ratios were then
extrapolated from or interpolated between these points along a straight line.
The preliminary annuals were adjusted by these ratios and checked against
the series derived directly from the wealth estimates. Since the average of
the adjusted annuals for 1877–1886 constituted a higher percentage of the
wealth estimate for 1880 than the averages for 1887–1896 and 1897–1906
constituted of the wealth estimates for 1890 and 1900, respectively, the 1877–
1886 average was adjusted to the percentage for those later decades, and
the annuals for 1877–1891 were recomputed.

b. 7.016 per cent of the sum of the estimates under (a) and those underlying
col. 4. This is the average percentage calculated from the corresponding
series for 1919–1928.

(1) Lines 10–16: Average of annual estimates underlying the series in Table R-31,
cols. 6, 7, and 9, and described in the notes to lines 1–9, above, or to Table R-8,
col. 4.

(2) Averages of annual estimates in Table R-7, col. 3.

(4) Depreciation on business equipment plus capital outlays charged to current expense
as estimated for 1919 and later years (see notes to Table R-33, col. 5) extrapolated
by applying to a preliminary series on depreciation of business equipment the 1919–
1921 ratio of the final to the preliminary series. The latter was calculated by the
procedure outlined in the notes to Table R-8, col. 4.

(5) Averages of annual estimates in Table R-7, col. 4.

TABLE R-18

Services, Variant II, and Components of Flow of Goods to Consumers, Variant III, Current Prices, Averages Per Year for Overlapping Decades, 1869–1953

(billions of dollars)

			Variant III		
	Variant II Services (1)	Perish- ables (2)	Semi- durables (3)	Durables (4)	Services (5)
1. 1869–1878	1.82	2.52	1.01	0.50	1.75
2. 1874–1883	2.36	3.29	1.19	0.58	2.28
3. 1879–1888	2.88	3.88	1.39	0.72	2.78
4. 1884–1893	3.21	4.13	1.51	0.85	3.10
5. 1889–1898	3.52	4.44	1.53	0.86	3.39
6. 1894–1903	4.54	5.54	1.76	1.02	4.37
7. 1899–1908	6.58	7.49	2.43	1.46	6.34
8. 1904–1913	9.16	9.80	3.16	1.98	8.82
9. 1909–1918	12.0	13.7	4.41	2.81	11.6
10. 1914–1923	18.4	19.6	7.26	4.80	17.8
11. 1919–1928	26.5	24.0	9.39	7.24	25.5
12. 1924–1933	29.4	23.3	8.67	7.05	28.3
13. 1929–1938	27.3	23.0	7.37	5.72	26.1
14. 1934–1943	29.5	29.4	9.05	6.59	28.2
15. 1939–1948	42.8	48.4	15.7	11.1	40.9
16. 1944–1953	65.4	74.0	21.9	20.9	62.9

Source, by Column

(1) Lines 1–11: The flow of commodities to consumers, Table R-13, cols. 1–3, multiplied by the ratio of services to flow of commodities. The ratio was calculated for 1929–1938 from Table R-9, col. 1, and Table R-3, cols. 1–3, and extrapolated by the ratio underlying Table R-13, cols. 1–4.

Lines 12–16: Averages of annual estimates in Table R-9, col. 1.

(2–4) Lines 1–10: Table R-13, cols. 1–3, respectively, multiplied by the 1929–1931 ratio of the series in Variant III (Table R-9, cols. 2–4, respectively) to that in Variant I (Table R-3, cols. 1–3, respectively).

Lines 11–16: Averages of annual estimates in Table R-9, cols. 2–4, respectively.

(5) Lines 1–10: Col. 1 multiplied by the 1929–1931 ratio of the series in Variant III to that in Variant II (Table R-9, cols. 5 and 1, respectively).

Lines 11–16: Averages of annual estimates in Table R-9, col. 5.

TABLE R-19

SERVICES, VARIANT II, AND COMPONENTS OF FLOW OF GOODS TO CONSUMERS,
VARIANT III, 1929 PRICES, AVERAGES PER YEAR FOR OVERLAPPING
DECADES, 1869–1953

(billions of dollars)

		Variant II Services (1)	*Variant III* Perish- ables (2)	Semi- durables (3)	Durables (4)	Services (5)
1.	1869–1878	2.87	3.41	1.36	0.74	2.77
2.	1874–1883	4.03	5.16	1.88	1.05	3.88
3.	1879–1888	5.18	6.76	2.43	1.48	4.99
4.	1884–1893	5.96	7.64	2.86	1.88	5.74
5.	1889–1898	6.83	8.83	3.24	2.13	6.58
6.	1894–1903	8.81	11.1	3.90	2.54	8.48
7.	1899–1908	11.9	13.9	4.86	3.14	11.5
8.	1904–1913	15.3	16.3	5.80	3.75	14.7
9.	1909–1918	17.4	18.1	6.44	4.29	16.8
10.	1914–1923	21.4	20.1	6.97	5.06	20.6
11.	1919–1928	26.9	23.5	8.11	7.06	25.9
12.	1924–1933	30.0	25.8	9.01	7.56	29.7
13.	1929–1938	30.7	28.1	8.89	6.85	31.3
14.	1934–1943	33.3	33.9	10.1	7.80	34.3
15.	1939–1948	40.2	42.3	12.1	9.59	41.7
16.	1944–1953	50.1	49.9	12.8	14.2	52.0

SOURCE, BY COLUMN

(1) Lines 1–11: Table R-18, col. 1 divided by the price index implicit in services, Variant I, calculated from Table R-13, cols. 4 and 8.

Lines 12–16: Averages of annual estimates in Table R-10, col. 1.

(2–4) Lines 1–10: Table R-13, cols. 5–7, respectively, multiplied by the 1929–1931 ratio of the series in Variant III (Table R-10, cols. 2–4, respectively) to that in Variant I (Table R-3, cols. 5–7, respectively).

Lines 11–16: Averages of annual estimates in Table R-10, cols. 2–4, respectively.

(5) Lines 1–10: Table R-18, col. 5 divided by the price index implicit in services, Variant I (see note to col. 1).

Lines 11–16: Averages of annual estimates in Table R-10, col. 5.

APPENDIX C

Annual Estimates and Quinquennial Moving Averages for the Years before 1919

A CLOSE study of long-term trends in many aspects of the economy, in this and several other countries, reveals alternations in the rate of growth that extend over periods much longer than those associated with business cycles, and yet short enough so that several can be observed within the total period covered in our series (a span of over eight decades). These long swings in the rate of secular growth, which in this country averaged somewhat over twenty years in length, are naturally of considerable interest in any analysis of secular movements. Yet overlapping decade averages, like those in Appendix B, while revealing such swings, do not permit adequate study of them. For this purpose we need annual estimates, or at least measures that represent the changing level of economic performance over shorter periods and in more continuous succession.

We therefore devoted much effort to deriving annual estimates for the period before 1919, the initial year of the annual series in Appendix A. The effort was only partly successful. For the early years of the period, 1869–1888, the derived annual series, even for the comprehensive aggregates—gross and net national product—did not seem sufficiently reliable as *annual* measures to warrant presentation. For the next twenty years, 1889–1908, acceptable annual estimates could be derived only for the broad aggregates—national product, capital formation, and flow of goods to consumers.

For the specific uses of our study of secular trends in capital formation and financing these annual estimates are of interest only as raw

material in the calculation of five-year or more complicated moving averages, which serve to cancel the short-term fluctuations while still revealing the underlying secular movements and any longer swings in them with sufficient accuracy. The limitations of the annual series are greatly reduced by the averaging process and therefore have only minor bearing upon the moving averages. We discuss these five-year moving averages in the last section of this appendix and give them fully in the reference tables following it, since they constitute the basis for much of the analysis of long-term movements in the economy at large, and in capital formation. But it seemed unwarranted to publish the annual estimates themselves, except for the aggregates in those years for which the estimates were within margins of tolerance as *annual* estimates.[1]

We present the annual estimates for 1889–1908 alone, and only for the wider aggregates. These estimates, if acceptable, together with those in Appendix A, provide an annual series on national product, flow of goods to consumers, and capital formation, extending from 1889 through 1955. Their derivation and reliability are now discussed briefly.

Extension of the Annual Estimates to 1909

The first and quite distinct step in deriving the annual estimates for the years before 1919 was the utilization of the earlier work of the National Bureau covering the years back to 1909. This was possible only for the most aggregative totals—gross and net national product. Table R-20 summarizes the results of this effort, and provides a description of the procedure.

Table R-20 shows gross national product only in 1929 prices, because annual estimates for the earlier years are based essentially upon the relation of annual flow of finished commodities to gross national product in constant prices. And we needed the extension to 1909 to widen the period over which the relation could be studied.

The calculations in Table R-20 and, more particularly, the detailed notes describing their derivation, indicate that the estimates used here for 1909–1918 are probably subject to a wider margin of error than those for the years beginning with 1919. Yet it seemed preferable to make full use of the earlier work at the National Bureau on the *direct*

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[1] Annual estimates underlying the published five-year moving averages are available in mimeographed form in the files of the National Bureau of Economic Research.

estimates of national income for 1909–1918 rather than substitute in-directly derived annual estimates.

Derivation of the Annual Estimates by Regression

The procedure involved the following steps:

1. In Shaw's *Value of Commodity Output since 1869* and the work embodied in Kuznets' *National Product since 1869* we have *annual* series from 1869 through the recent years on the output of finished commodities and construction materials destined for domestic consumption. These are available in both current and constant prices, but we thought the relation to the national product aggregates would be more stable if the two variables were expressed in constant prices. At least, the difference in short-term movements between the prices of finished commodities (at producers' door) and prices of other components of national product would not complicate the relation.

2. As indicated above, the series described under step 1 (see Table R-21, column 1) covers output destined for domestic consumption. Since the balance of commodity foreign trade enters the national product totals, we added this item, also in constant prices, to the annually estimated output of finished commodities. This gave us the independent variable in the regression (Table R-21, column 6).

3. We accepted the levels of national product indicated by the averages for overlapping decades in Appendix B, and used the annual series of total output of finished commodities for what it revealed concerning the year-to-year fluctuations, not the interdecade movements. For 1909–1938, the period for which they were compared in regression analysis, both variables were expressed in terms of annual deviations from the lines connecting the successive overlapping decade averages. Thus the dependent variable—the annual ratio of the output of finished commodities to gross national product—was expressed as the absolute deviation from the ratio calculated from the lines connecting the successive overlapping decades (1909–1918, 1914–1923, etc.); and the independent variable—the actual annual value of output of finished commodities—was expressed as the percentage deviation from the annual value estimated from the lines connecting the successive overlapping decades.

4. The period for which the regression could be examined extended beyond 1938. But it seemed best to exclude the years of World War II and its aftermath, characterized by exceptional conditions, and there

was some advantage in limiting the regression to the thirty years closest to the period for which it was to be extrapolated.

5. The scatter of the two variables described under step 3 was studied separately for Variants I and III, and a smooth freehand regression curve drawn for each. The relationship could not be effectively described by a simple mathematical function, and there was no sufficient advantage in trying to find and fit a more complicated one.

The relation suggested by the regression curves can be seen clearly from Table C-1, which shows, for selected values of X (deviations of

TABLE C-1

SELECTED VALUES, REGRESSION OF GROSS NATIONAL PRODUCT (*Y*) ON INDEX OF FINISHED COMMODITY OUTPUT (*X*), BOTH VARIABLES IN 1929 PRICES AND IN TERMS OF ANNUAL PERCENTAGE DEVIATIONS FROM LINES CONNECTING OVERLAPPING DECADE AVERAGES, BASED ON 1909–1938

Selected Values of X (1)	Corresponding Values of *Y*	
	Variant I (2)	Variant III (3)
−23.5	−21.5	−21.5
−20.0	−18.1	−18.2
−12.5	−11.2	−11.1
−10.0	−8.9	−8.8
−7.5	−6.6	−6.6
−5.0	−4.4	−4.4
−2.5	−2.2	−2.2
−1.5	−1.3	−1.3
−1.0	−0.9	−0.9
−0.5	−0.4	−0.4
0.0	0.0	0.0
0.5	0.4	0.4
1.0	0.9	0.9
1.5	1.3	1.3
2.5	2.1	2.1
5.0	4.0	4.2
7.5	5.8	6.1
10.0	7.7	7.9
12.5	9.9	10.2
20.0	16.3	17.5

For derivation, see text.

finished commodity output from its interdecade lines), the estimated values of *Y* (deviations of gross national product from its interdecade lines). The relation is, of course, positive, and is progressively damped

as the deviation from the interdecade lines increases—either positively or negatively. Thus when the deviation of X is within the range of 1.0 per cent, that for Y is one decimal point less, i.e., within the range of 0.9 per cent. When the deviation of X is around 20 per cent, that for Y is reduced somewhat more sharply, to between 16 and 18 per cent. Finally, the damping of the percentage deviations is somewhat more conspicuous for large *positive* deviations than for large *negative* deviations (compare the reduction from $+20$ to either $+16.3$ or $+17.5$ with that from -20 to -18.1 or -18.2). These results accord with expectations. The commodity part of aggregate output is somewhat more sensitive to short-term changes, particularly those associated with business cycles, than the services component. This differing sensitivity of the two broad components of national product is more marked when the short-term fluctuations are of wider amplitude. The difference in the extent of damping between the large positive and large negative deviations may be due to the historical peculiarities of the period, perhaps to what happened in the depression of the 1930's compared with the more prosperous decades. The effect of the depression on all components of national product may have been more widespread than the effect of the better times.

Given the regression function of Y and X, and given the annual series of finished commodity output back to 1869, we estimated annual values of gross national product in 1929 prices back to 1869 in Variants I and III. But before using these annual estimates, we tested them for reliability. We know in advance, from the derivation of the series on finished commodity output, that the estimates for the years before 1889 are on a much weaker basis than those for 1889 and later years, so that there is a prima facie case against placing too much reliance upon the *annual* estimates of national product for 1869–1888. But how much confidence can we place in the estimates of national product for the years beginning with 1889?

A Test of the Regression Estimates

To test the regression relation we calculated the *estimated* annual values of gross national product for 1909–1938 and compared them with the *actual* annual values (Table C-2). A study of columns 3 to 6 leads us to some broad conclusions.

1. The average difference over the period between the estimated and actual values of gross national product is somewhat over 2 per

TABLE C-2

ANNUAL VALUES ESTIMATED BY REGRESSION COMPARED WITH ACTUAL VALUES, GROSS NATIONAL PRODUCT, 1929 PRICES, 1909–1938

(amounts in billions of dollars)

	Estimated Values (1)	Actual Values (2)	Percentage Difference $\frac{(1)-(2)}{(2)} \times 100$ (3)	5-Year Moving Average of (3) (4)	Year-to-Year Percentage Change in:	
					Estimated Values in (1) (5)	Actual Values in (2) (6)
			A. VARIANT I			
1909	50.3	52.1	−3.45			
1910	52.0	52.8	−1.35		+3.4	+1.2
1911	53.4	52.6	1.54	0.97	+2.6	−0.3
1912	55.8	53.4	4.54	1.75	+4.6	+1.6
1913	58.4	56.4	3.56	1.63	+4.6	+5.6
1914	55.5	55.2	0.43	1.68	−5.1	−2.1
1915	58.0	59.1	−1.92	0.77	+4.6	+7.1
1916	65.4	64.2	1.77	1.12	+12.7	+8.7
1917	64.8	64.8	ª	1.21	−0.9	+0.9
1918	65.0	61.8	5.31	1.07	+0.3	−4.7
1919	68.4	67.8	0.87	0.81	+5.2	+9.8
1920	66.7	68.5	−2.60	1.02	−2.4	+1.1
1921	65.8	65.5	0.48	−0.32	−1.5	−4.5
1922	71.1	70.4	1.03	−0.88	+8.1	+7.5
1923	78.9	80.0	−1.38	−0.51	+10.9	+13.6
1924	80.0	81.6	−1.95	−0.97	+1.4	+2.0
1925	83.7	84.3	−0.73	−1.59	+4.6	+3.3
1926	88.2	89.8	−1.82	−1.31	+5.4	+6.5
1927	88.8	90.6	−2.07	−1.25	+0.6	+0.9
1928	91.9	91.9	0.03	−1.85	+3.5	+1.3
1929	96.4	98.0	−1.63	−2.11	+5.0	+6.7
1930	87.1	90.5	−3.78	−1.98	−9.7	−7.6
1931	77.7	80.2	−3.10	−1.43	−10.8	−11.4
1932	65.4	66.4	−1.41	−0.17	−15.8	−17.3
1933	67.5	65.7	2.77	0.79	+3.2	−1.0
1934	74.6	71.3	4.66	1.95	+10.5	+8.5
1935	79.6	78.8	1.04	1.82	+6.7	+10.5
1936	89.2	86.9	2.69	0.81	+12.1	+10.3
1937	94.2	96.2	−2.05		+5.6	+10.7
1938	88.6	90.6	−2.29		−6.0	−5.8

ª Less than +0.005.

(continued)

TABLE C-2 (concluded)

	Estimated Values (1)	Actual Values (2)	Percentage Difference $\frac{(1)-(2)}{(2)} \times 100$ (3)	5-Year Moving Average of (3) (4)	*Year-to-Year Percentage Change in:* Estimated Values in (1) (5)	Actual Values in (2) (6)
			B. VARIANT III			
1909	51.8	53.8	−3.61			
1910	53.6	54.4	−1.44		+3.4	+1.1
1911	55.1	54.3	1.50	0.94	+2.8	−0.2
1912	57.6	55.1	4.47	1.76	+4.6	+1.6
1913	60.4	58.2	3.78	1.70	+4.8	+5.5
1914	57.2	57.0	0.51	1.85	−5.2	−2.1
1915	60.0	61.1	−1.76	1.04	+4.8	+7.2
1916	67.8	66.3	2.25	1.46	+13.1	+8.6
1917	67.2	66.9	0.40	1.56	−1.0	+0.8
1918	67.4	63.7	5.88	1.33	+0.4	−4.8
1919	71.0	70.3	1.06	0.93	+5.3	+10.3
1920	69.3	71.4	−2.95	1.06	−2.4	+1.6
1921	68.5	68.4	0.28	−0.36	−1.1	−4.2
1922	73.9	73.2	1.02	−1.06	+7.8	+7.0
1923	82.0	83.0	−1.24	−0.48	+10.9	+13.5
1924	83.2	85.2	−2.42	−0.92	+1.5	+2.7
1925	87.3	87.4	−0.06	−1.53	+5.0	+2.5
1926	91.6	93.4	−1.92	−1.29	+5.0	+7.0
1927	92.3	94.2	−2.02	−0.81	+0.7	+0.8
1928	95.7	95.7	−0.02	−0.80	+3.7	+1.7
1929	101.4	101.4	−0.03	−1.07	+6.0	+6.0
1930	91.5	91.5	−0.03	−1.20	−9.8	−9.8
1931	81.6	84.3	−3.24	−0.32	−10.8	−7.9
1932	68.8	70.7	−2.71	0.90	−15.7	−16.2
1933	71.4	68.3	4.42	0.62	+3.8	−3.3
1934	79.1	74.6	6.06	1.02	+10.9	+9.2
1935	84.6	85.8	−1.43	0.84	+6.9	+15.0
1936	94.6	95.8	−1.21	−0.48	+11.9	+11.6
1937	100.2	103.9	−3.61		+5.8	+8.5
1938	94.5	96.7	−2.24		−5.6	−7.0

SOURCE, BY COLUMN

(1) See text for derivation.
(2) Table R-22, col. 1, and Table R-2, col. 7.

cent (2.08 per cent for Variant I and 2.12 per cent for Variant III). This, offhand, does not seem to be a substantial discrepancy, but it must be remembered that the estimated values are based on deviations from decade averages, and as proportions of these deviations, the differences between the estimated and the actual values would loom much larger.

2. The range in the percentage differences is fairly substantial: from about −4 per cent to over +5 per cent for Variant I, and from about −3.5 per cent to over +6 per cent for Variant III. The largest percentage differences are due to the failure of the independent variable (total finished commodity output) to time properly the *turns* in the dependent variable (gross national product). For eleven years gross national product changes the direction of its movement from that in the preceding year (for example, column 6 of Table C-2 shows that 1911 is marked by a decline in gross national product from 1910, whereas 1910 shows an increase over 1909). For Variant I, the average difference for those years between the estimated and the actual values is 2.44 per cent, whereas for the other eighteen years—those in which the change in gross national product is in the same direction as in the preceding year—the average difference is only 1.78 per cent. A similar calculation for Variant III yields an average difference of 2.26 per cent for the eleven years of turns in gross national product and 1.95 per cent for the other eighteen years. The reason is, perhaps, that finished commodity output, being more quickly responsive to short-term changes, particularly those associated with business cycles, may, even in annual series, show a lead over the more comprehensive and less quickly responsive gross national product series. This seems to be the case in 1916–1918, when the decline in the estimated series appears in 1917, but in the actual series not until 1918; and during the 1930's, when the estimated series rises in 1933, but the actual series not until 1934.

3. This suggests the desirability of comparing the successive year-to-year percentage changes in the estimated and actual series (columns 5 and 6). By and large, there is similarity in direction of change: for both Variants I and III, of the twenty-nine pairs of signs, twenty-four are the same in the actual and estimated series, and only five are opposite. But the significance of this finding is greatly reduced by the fact that both series reveal a strong upward secular trend: of the twenty-nine changes, only nine are negative; and agreement of sign is, therefore, accounted for in large part by the identical upward secular

trend, and only in part by similarity of annual fluctuations. If we recognize only those cases where there is close agreement—roughly those in which the percentage change from year to year is of the same sign for both series, and in which the change in the estimated series is not more than about a third larger or smaller than that in the actual series—we find only thirteen in Variant I and only twelve in Variant III.

4. It is important that the percentage differences between the estimated and the actual series still persist, though greatly reduced in amplitude, when expressed as five-year moving averages (column 4). In general, the estimated series are somewhat higher than the actual series from 1911 through about 1919, because during that war-dominated decade commodity output tended to rise more than the services component of gross national product. By contrast, the estimated series are somewhat short of the actual series during the 1920's and the first few years of the 1930's, reflecting the fact that during this period the rise in commodity output was at a somewhat lower rate and the cyclical decline at a somewhat higher rate than the rise and decline in the services component. Again in 1933–1936, the estimated series are somewhat higher than the actual series, suggesting that the recovery was more marked in the commodity component than in the services component. Perhaps if a more flexible regression curve had been fitted, these persistent differences between the estimated and the actual series, which are present even in the five-year moving averages, might have been reduced; but they probably could not have been completely eliminated.

In trying to appraise the significance of this finding for the validity of moving averages of the annual estimates for the years before 1909, we may find some consolation in the fact that the disturbances in prices and other aspects of the economy have been particularly large since World War I, and that in the less disturbed decades between the 1870's and World War I, there was less opportunity for persistent differences between the estimated and the actual series. If such an assumption is warranted, the differences between the moving averages of the estimated series and of the actual series may have been, for those earlier decades, within a somewhat narrower range than the ± 2 per cent shown by the moving averages for 1909–1938 in column 4. But even so, some differences, possibly within a range of ± 1 per cent, should be allowed for.

Another way of testing the reliability of the estimated series as an

indicator of short-term changes is to calculate its fluctuations during business cycles and phases, and compare the results with those for the actual series (Table C-3). Similar measures are shown also for finished commodity output.

TABLE C-3

CHANGE PER YEAR IN ANNUAL ESTIMATES DURING REFERENCE CYCLE PHASES, FINISHED COMMODITY OUTPUT, ESTIMATED AND ACTUAL GROSS NATIONAL PRODUCT, 1929 PRICES, 1911–1938

(percentages of average value for each reference cycle)

Successive Reference Cycles and Phases	Finished Commodity Output (1)	Gross National Product, Variant I		Gross National Product, Variant III	
		Estimated Values (2)	Actual Values (3)	Estimated Values (4)	Actual Values (5)
1. 1911–1914					
Expansion, 1911–1913	+5.2	+4.5	+3.5	+4.6	+3.5
Contraction, 1913–1914	−6.9	−5.3	−2.2	−5.4	−2.2
Differential	−12.2	−9.7	−5.7	−10.0	−5.7
2. 1914–1919					
Expansion, 1914–1918	+3.3	+3.8	+2.6	+3.9	+2.6
Contraction, 1918–1919	+4.8	+5.3	+9.7	+5.5	+10.2
Differential	+1.4	+1.5	+7.1	+1.6	+7.6
3. 1919–1921					
Expansion, 1919–1920	−4.5	−2.5	+1.1	−2.5	+1.6
Contraction, 1920–1921	−2.9	−1.5	−4.5	−1.1	−4.3
Differential	+1.6	+1.0	−5.6	+1.4	−5.9
4. 1921–1924					
Expansion, 1921–1923	+8.7	+8.8	+9.7	+8.7	+9.4
Contraction, 1923–1924	+0.6	+1.5	+2.2	+1.5	+2.9
Differential	−8.1	−7.3	−7.5	−7.1	−6.6
5. 1924–1927					
Expansion, 1924–1926	+5.3	+4.8	+4.7	+4.8	+4.6
Contraction, 1926–1927	−0.1	+0.7	+0.9	+0.7	+0.8
Differential	−5.4	−4.1	−3.8	−4.1	−3.8
6. 1927–1932					
Expansion, 1927–1929	+4.6	+4.5	+4.2	+5.1	+4.0
Contraction, 1929–1932	−14.0	−12.0	−12.0	−12.1	−11.3
Differential	−18.6	−16.5	−16.2	−17.1	−15.3
7. 1932–1938					
Expansion, 1932–1937	+8.1	+7.2	+7.5	+7.4	+7.8
Contraction, 1937–1938	−8.4	−7.0	−7.0	−6.6	−8.5
Differential	−16.5	−14.2	−14.5	−14.0	−16.3

SOURCE, BY COLUMN

(1) Calculated from Table R-21, col. 6.
(2)–(5) Calculated from Table C-2, cols. 1 and 2.

5. In five of the seven complete reference cycles distinguished during the period of comparison, the estimated series shows results that are satisfactorily similar to those for the actual series. In four of them, the series estimated by regression shows a closer approximation to the cyclical behavior of the actual series than is shown by finished commodity output; and in that sense the estimate is a better approximation than the independent variable.

6. In two cases, 1914–1919 and 1919–1921, however, the estimated series does not follow closely the behavior of the actual series during the reference cycles. This is particularly conspicuous in the very short cycle, 1919–1921, which is missed completely by the estimated series.

The Annual Estimates, 1889–1908

Two conclusions emerge from the tests discussed in the preceding section. First, gauged by the short-term changes in the annual series on gross national product, the procedure by which the series was derived for 1869–1908 is only moderately successful. For the test period, 1909–1938, the series misses a few of the turns of the actual series and provides close agreement in year-to-year changes in only about a third of the cases. Second, even when the series is cumulated into five-year moving averages, the percentage differences remain. However, the differences are narrow, and they may be assumed to be even narrower (perhaps within the range of ±1 per cent) for the less disturbed decades preceding World War I.

The regression procedure yielded gross national product in 1929 prices in two variants—I and III. We thought it useful to supplement this series by its counterpart in current prices, and by three other broad aggregates—net national product, flow of goods to consumers, and capital formation. The supplementary series were based upon the alternative series of annual estimates derived by components and used exclusively for the calculation of the moving averages given in the reference tables at the end of this appendix (discussed briefly in the next section). From those series we have an annual estimate of capital consumption (a cumulative series little affected by annual variations) which was applied directly as a subtrahend to gross national product in 1929 prices to obtain net national product, and was added later to net national product in current prices to yield gross national product in current prices. From the component series we also computed the annual ratio of flow of goods to consumers to gross national product in

1929 prices to derive the division of gross national product into flow of goods to consumers and gross capital formation. From the latter we subtracted capital consumption to arrive at net capital formation. And lastly, having derived from the component series the annual implicit price index for flow of goods to consumers and net capital formation, we converted the 1929 price series to current prices. Thus, the annual series in Tables R-22 and R-23 are basically estimates of gross national product derived by regression, but converted to current prices and distributed between the two major components by price indexes and ratios yielded by the component series described below.

The annual series in Tables R-22 and R-23 other than gross national product in 1929 prices are subject to a somewhat wider margin of error than that series. However, this additional qualification is a minor one. If the annual estimates of gross national product are acceptable despite the qualifications suggested by the tests in Tables C-2 and C-3, there is little ground for rejecting the annual estimates of net national product, or such broad components as flow of goods to consumers and capital formation.

The Estimates by Components

The regression procedure used to establish the relation between the total output of finished commodities and gross national product can be extended to components only if: (1) there is an annual index going back to 1869 for some part of the component; (2) the annual measure of the total value of this component, as it enters national product for the years since 1919, is not subject to a wide margin of error; (3) the relation between the two may be expected to be simple and not too variable over time. While requirement (1) would have to be satisfied for any method of securing annual estimates of a component, requirements (2) and (3) would raise much more serious difficulties than were encountered in the regression for gross national product. In view of the limited success of that procedure in estimating gross national product, its laboriousness if applied to the several components of national product, and the obvious doubts about its validity in estimating these narrow groups, we thought it best not to extend the procedure beyond those cases where it promised sufficient advantages over the alternative and cruder method—that of finding annual indexes by which annual values could be directly interpolated as variations around the basic levels provided by the overlapping decade averages in Appendix B.

Appendix C

The procedure in general was to find, for each component of flow of goods to consumers and of capital formation, annual series or indexes which, though limited in their coverage, would provide some indication of annual fluctuations around lines connecting the overlapping decade averages. We realized that the series available as annual interpolators were most frequently the more sensitive indexes and would yield annual values exaggerating the short-term changes compared with those reflected in more comprehensive and hence more accurate measures. It was decided accordingly that, while the resulting annual estimates might be good indicators of the timing of short-term movements (although with some bias toward a lead), they would not be acceptable measures of the amplitude of short-term changes. For this reason, the annual estimates of the various components are not shown. Nevertheless, the five-year moving averages calculated from them should be fairly acceptable approximations to those that would be yielded by the true series, if such were available, and they should be useful, therefore, for the study of the long swings in the rate of secular growth.

The details of the derivation of the annual series that underlie the five-year moving averages will be found in the copious notes to Tables R-25 through R-34, which contain those averages. It is impossible to summarize them here. But we call attention to two aspects of these estimates.

First, we found it desirable to distribute gross construction among three major types: nonfarm residential, government (military and nonmilitary), and all other. This distribution of a major component of capital formation is of value in relating our estimates to those derived for various use sectors (agriculture, manufacturing, etc.—see discussion in Appendix D); and is of obvious utility in apportioning capital formation among the three major groups of users—households, business firms, and governments.

Second, the annual series underlying the moving averages in Tables R-25 through R-34 are directly comparable with the annual series in Tables R-1 through R-10 in Appendix A. Indeed, for the years beginning with 1919 they are identical with the latter, except for the greater detail given for construction. But we did not think it desirable to reconcile the gross national product totals derived by adding the annual estimates of components with those shown for 1909–1918 in column 7 of Table R-20. Such a reconciliation would have distorted the time pattern of movement of the components and introduced breaks between 1909–1918 and the subsequent or preceding years. Therefore,

the gross national product totals derived from components differ from those shown in Table R-20. The differences, however, would not seriously affect the validity of the five-year moving averages.[2]

No real test of the reliability of the annual series underlying the moving averages appears to be at hand. However, two feasible comparisons do convey an impression that the short-term fluctuations in the underlying annual series conform reasonably to what one would expect.

The first comparison is between five-year moving averages of the annual estimates of gross national product derived by regression and those of the annual totals derived by adding components (see Table R-24). The differences between the two sets of averages are minor, mostly well within 1 per cent. But the time pattern reveals a systematic source of the differences. The differences in columns 3 and 6 fluctuate in sign, reflecting the business cycles which both underlying annual series record. Because the totals derived as the sum of components are more sensitive to cyclical fluctuations than the totals derived by regression, the former tend to exceed the latter during reference expansions and to fall short of them during reference contractions. These differences are sufficiently marked to remain even in the five-year moving averages. Thus, the signs are positive from 1871 to 1873, a period of reference expansion, and then decline to negatives in 1876 and 1877, toward the trough point in the reference contraction. Similar movement is found in the 1880's and subsequent decades. In other words, the differences between the annual measures based on components and those derived by regression are largely in cyclical sensitivity; and much of the latter is removed when the annual series are re-

[2] The differences can be seen from the following comparison:

Gross National Product, Variant I, 1929 Prices
(billions of dollars)

	Estimate in Table R-20	Estimate by Adding Components
1909	52.1	52.0
1910	52.8	52.6
1911	52.6	53.7
1912	53.4	56.5
1913	56.4	59.1
1914	55.2	54.0
1915	59.1	55.6
1916	64.2	64.3
1917	64.8	62.5
1918	61.8	61.4

TABLE C-4

CHANGE PER YEAR IN ANNUAL ESTIMATES DURING REFERENCE CYCLE PHASES, GROSS NATIONAL PRODUCT, FLOW OF GOODS TO CONSUMERS, AND GROSS CAPITAL FORMATION, 1929 PRICES, 1870–1919

(percentages of average value for each reference cycle)

SUCCESSIVE REFERENCE CYCLES AND PHASES	VARIANT I				VARIANT III Component Series		
	Gross National Product		Flow of Goods to Consumers		Gross National Product	Flow of Goods to Consumers	Component Series, Gross Capital Formation
	Regression Series (1)	Component Series (2)	Regression Series (3)	Component Series (4)	(5)	(6)	(7)
1. 1870–1878							
Expansion, 1870–1873	+8.9	+8.6	+7.9	+7.7	+8.7	+7.8	+11.8
Contraction, 1873–1878	+6.7	+6.1	+7.0	+6.4	+6.1	+6.4	+5.0
Differential	−2.2	−2.6	−0.8	−1.2	−2.6	−1.4	−6.8
2. 1878–1885							
Expansion, 1878–1882	+6.7	+7.5	+7.1	+7.9	+7.5	+7.8	+6.2
Contraction, 1882–1885	+2.3	+1.8	+3.2	+2.7	+1.8	+2.7	−1.3
Differential	−4.4	−5.7	−3.9	−5.2	−5.6	−5.1	−7.5
3. 1885–1888							
Expansion, 1885–1887	+4.4	+4.4	+2.0	+2.0	+4.3	+2.0	+12.1
Contraction, 1887–1888	−1.3	−1.9	+1.0	+0.4	−1.8	+0.4	−9.5
Differential	−5.7	−6.2	−1.0	−1.6	−6.1	−1.6	−21.6
4. 1888–1891							
Expansion, 1888–1890	+4.8	+5.6	+0.8	+1.6	+5.4	+1.5	+17.3
Contraction, 1890–1891	+5.9	+4.7	+8.4	+7.2	+4.8	+7.2	−2.5
Differential	+1.2	−0.9	+7.6	+5.6	−0.6	+5.7	−19.7
5. 1891–1894							
Expansion, 1891–1892	+7.0	+9.5	+2.1	+4.5	+9.4	+4.5	+22.7
Contraction, 1892–1894	−2.9	−4.5	+0.3	−1.3	−4.4	−1.3	−12.9
Differential	−9.9	−14.1	−1.8	−5.8	−13.8	−5.8	−35.6

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
6. 1894–1896							
Expansion, 1894–1895	+8.8	+11.9	+8.5	+11.6	+11.8	+11.5	+12.6
Contraction, 1895–1896	+2.9	−2.4	+4.8	−0.5	−2.2	−0.3	−8.0
Differential	−5.9	−14.3	−3.7	−12.1	−14.0	−11.8	−20.6
7. 1896–1900							
Expansion, 1896–1899	+5.4	+6.4	+5.7	+6.6	+6.4	+6.7	+5.5
Contraction, 1899–1900	+4.9	+3.4	+2.5	+0.9	+3.4	+1.0	+10.8
Differential	−0.4	−3.0	−3.2	−5.7	−3.0	−5.7	+5.4
8. 1900–1904							
Expansion, 1900–1903	+5.1	+5.5	+5.4	+5.8	+5.5	+5.9	+4.4
Contraction, 1903–1904	−1.2	−1.5	+1.4	+1.1	−1.3	+1.3	−9.4
Differential	−6.3	−7.0	−4.0	−4.7	−6.8	−4.6	−13.8
9. 1904–1908							
Expansion, 1904–1907	+6.2	+6.4	+5.5	+5.7	+6.4	+5.8	+8.5
Contraction, 1907–1908	−7.6	−10.5	−3.8	−6.8	−10.3	−6.7	−21.9
Differential	−13.7	−16.8	−9.3	−12.5	−16.7	−12.5	−30.4
10. 1908–1911							
Expansion, 1908–1910		+6.6		+5.8	+6.7	+5.8	+9.6
Contraction, 1910–1911		+2.1		+5.0	+2.0	+4.8	−7.8
Differential		−4.5		−0.7	−4.6	−1.0	−17.4
11. 1911–1914							
Expansion, 1911–1913		+4.8		+2.9	+4.7	+2.9	+11.3
Contraction, 1913–1914		−9.0		−1.4	−8.7	−1.3	−35.8
Differential		−13.8		−4.3	−13.4	−4.2	−47.1
12. 1914–1919							
Expansion, 1914–1918		+3.1		+1.6	+3.1	+1.8	+7.6
Contraction, 1918–1919		+10.4		+5.1	+10.5	+5.4	+27.8
Differential		+7.4		+3.4	+7.4	+3.6	+20.1

SOURCE, BY COLUMN

(1) and (3) For the annual series underlying the computations, see Table R-22 and its notes. (2), (4), (5), (6), and (7) Calculated from the annual series underlying Tables R-26 and R-29.

duced to five-year averages. The differences between those averages show cycles, but their duration and amplitude are not significant enough to affect materially the study of long swings in the rate of secular growth. One can argue that for the purpose at hand the totals derived by adding components are not much inferior to those derived by regression.

The second comparison is of the changes per year during reference cycles and their phases in the annual series derived by adding components (Table C-4). It is limited to the broader aggregates that we would expect to reflect the occurrence of cycles in general business, an expectation that cannot be entertained with respect to some narrow components (within flow of goods to consumers or within capital formation). For comparative purposes we also show similar measures for two totals derived by regression—gross national product (derived directly) and flow of goods to consumers (derived indirectly).

The consistency with which the annual series record the reference cycles is marked if, in view of the strong upward trend in the series, we consider only the difference between the rate of change in each expansion and subsequent contraction. The World War I cycle is an exception, due to a much earlier downturn of output than the reference chronology allows for. Of the other eleven reference cycles, the various annual series record downturns in ten, and the one instance of an upturn in those cycles—in gross capital formation—is also due to an earlier downturn and can hardly be considered an exception, in view of the tendency of capital formation to lead general business conditions. Only in the short 1888–1891 cycle is there a true exception—the upturn in flow of goods to consumers. This finding is hardly a genuine test, but it does suggest that the annual fluctuations in the underlying series are not erratic, at least with respect to timing.

The second finding—to be expected from our discussion of the two sets of national product totals in Table R-24—is the wider amplitude in response to reference cycles of totals derived by adding components than of totals derived by regression (compare columns 2 and 1; columns 4 and 3). The amplitude of reference cycle changes in a true estimate of gross national product would probably be closer to the amplitude of cycle changes in the series derived by regression than to that of cycle changes in the series derived by adding components. But as already indicated in the discussion of Table R-24, the greater sensitivity of the totals derived by adding components should be reflected in only minor degree in the five-year moving averages.

TABLE R-20

NATIONAL PRODUCT, VARIANTS I AND III, 1929 PRICES, 1909–1918

(amounts in billions of dollars)

	Net National Product, Variant I, Current Prices, 1909–1918, Preliminary (1)	National Income, Current Prices (2)	Price Index, Net National Product, Variant I (1929 = 100) (3)	*Net National Product, Variant I, 1929 Prices* Preliminary (1) ÷ (3) (4)	Final (5)	Capital Consumption, 1929 Prices (6)	Gross National Product, Variant I, 1929 Prices (5) + (6) (7)
			A. VARIANT I				
1909	31.0	30.5	56.1	55.3	46.2	5.92	52.1
1910	32.8	32.3	58.8	55.7	46.6	6.16	52.8
1911	32.3	31.8	58.5	55.2	46.2	6.40	52.6
1912	34.8	34.2	62.2	55.9	46.8	6.64	53.4
1913	36.3	35.7	61.3	59.2	49.5	6.89	56.4
Average, 1909–1918				60.1	50.2		57.2
1914	35.0	34.5	60.9	57.5	48.1	7.12	55.2
1915	38.5	37.9	62.1	62.0	51.8	7.31	59.1
1916	47.0	46.3	69.3	67.8	56.7	7.54	64.2
1917	56.7	55.8	83.2	68.1	56.9	7.88	64.8
1918	60.1	59.2	94.1	63.9	53.4	8.32	61.8
1919	64.2	69.8	109.4				
1920	74.2	69.7	125.1				
1921	59.4	53.8	104.8				
1922	60.7	62.0	99.4				
1923	71.6	69.7	101.7				

(continued)

	Net National Product, Variant III, Current Prices, 1909–1918, Preliminary (1)	National Income, Current Prices (2)	Price Index, Net National Product, Variant III (1929 = 100) (3)	Net National Product, Variant III, 1929 Prices Preliminary (1) ÷ (3) (4)	Final (5)	Capital Consumption, 1929 Prices (6)	Gross National Product, Variant III, 1929 Prices (5) + (6) (7)
			B. VARIANT III				
1909	31.9	30.5	55.2	57.8	47.8	5.92	53.8
1910	33.7	32.3	57.9	58.2	48.2	6.16	54.4
1911	33.2	31.8	57.5	57.8	47.9	6.40	54.3
1912	35.8	34.2	61.1	58.6	48.5	6.64	55.1
1913	37.4	35.7	60.3	62.0	51.3	6.89	58.2
Average, 1909–1918				62.9	52.0		59.1
1914	36.1	34.5	59.9	60.2	49.8	7.12	57.0
1915	39.6	37.9	61.0	64.9	53.7	7.31	61.1
1916	48.4	46.3	68.1	71.0	58.8	7.54	66.3
1917	58.3	55.8	81.8	71.3	59.0	7.88	66.9
1918	61.9	59.2	92.5	66.9	55.4	8.32	63.7
1919	65.2	69.8	106.7				
1920	75.7	69.7	121.7				
1921	61.8	53.8	103.7				
1922	63.0	62.0	98.6				
1923	74.1	69.7	100.9				

Because of rounding, detail will not necessarily add to total.

SOURCE, BY COLUMN (A AND B)

(1) 1909–1918: Col. 2 multiplied by the 1919–1923 ratio of col. 1 to col. 2. The use of 1919 for splicing the series in col. 1 (and col. 3) reduces the average discrepancy for 1909–1918 (from 19.6 to 5.4 per cent for Variant I, with a similar reduction for Variant III), but yields almost identical estimates in cols. 5 and 7.

1919–1923: Table R-1, col. 4 or col. 6.

(2) 1914–1921: Income payments–business savings aggregate in Simon Kuznets, *National Product in Wartime* (New York, NBER, 1945), Appendix Table III-9, p. 141, adjusted to include imputed rent.

1909–1913 and 1922–1923: Unpublished extensions of the series for 1914–1921.

(3) 1909–1918: Series for 1919–1923 extrapolated by a composite index of (1) cost of living (weighted 85), (2) wholesale prices of metals (weighted 7.5), and (3) wholesale prices of building materials (weighted 7.5). (1) is the BLS index back to 1913 (*Historical Statistics of the United States, 1789–1945*, Series L-41), extrapolated to 1909 by the Federal Reserve Bank of New York index (*ibid.*, Series L-36). (2) and (3) are the BLS wholesale price indexes (*ibid.*, Series L-21 and L-22, respectively).

1919–1923: Implicit price index obtained by dividing Table R-1, col. 4 or col. 6 by Table R-2, col. 4 or col. 6.

(4) The figure for 1909–1918 is an average of the annual estimates.

(5) The annual estimates in col. 4 multiplied by the ratio of the final decade average, given in Table R-12, col. 4 or col. 6, to the decade average in col. 4.

(6) Sum of the annual series underlying Table R-31, col. 10 and Table R-33, col. 5.

PRODUCERS' VALUE OF FINISHED COMMODITIES AND CONSTRUCTION MATERIALS
DESTINED FOR DOMESTIC CONSUMPTION, AND BALANCE OF EXPORTS OVER IMPORTS,
1929 PRICES, 1869–1938

(billions of dollars)

	Output Destined for Domestic Consumption, 1929 Prices (1)	Exports, Current Prices (2)	Imports, Current Prices (3)	Balance of Exports over Imports		Finished Commodity Output, 1929 Prices (6)
				Current Prices (4)	1929 Prices (5)	
1869	3.77	0.34	0.44	−0.10	−0.10	3.67
1870	3.76	0.40	0.46	−0.06	−0.06	3.69
1871	3.81	0.46	0.57	−0.11	−0.13	3.68
1872	4.87	0.47	0.66	−0.19	−0.21	4.66
1873	5.08	0.57	0.60	−0.03	−0.03	5.05
1874	5.09	0.57	0.56	0.01	0.01	5.10
1875	5.15	0.51	0.50	0.01	0.01	5.16
1876	5.49	0.59	0.43	0.16	0.22	5.70
1877	5.99	0.62	0.48	0.14	0.20	6.18
1878	6.38	0.74	0.43	0.31	0.47	6.85
1879	7.19	0.77	0.51	0.25	0.41	7.60
1880	8.45	0.89	0.70	0.19	0.28	8.73
1881	8.74	0.83	0.67	0.16	0.24	8.98
1882	9.43	0.77	0.75	0.02	0.02	9.45
1883	9.45	0.80	0.69	0.11	0.16	9.61
1884	9.66	0.75	0.63	0.12	0.19	9.85
1885	9.77	0.69	0.59	0.10	0.17	9.94
1886	10.4	0.71	0.66	0.05	0.08	10.5
1887	10.9	0.72	0.71	0.01	0.01	10.9
1888	10.7	0.69	0.73	−0.03	−0.06	10.7
1889	11.1	0.83	0.77	0.06	0.09	11.2
1890	11.8	0.86	0.82	0.03	0.06	11.9
1891	12.4	0.97	0.83	0.14	0.24	12.7
1892	13.7	0.94	0.84	0.10	0.18	13.8
1893	13.2	0.88	0.78	0.10	0.18	13.3
1894	12.5	0.83	0.68	0.15	0.30	12.8
1895	14.0	0.82	0.80	0.02	0.05	14.1
1896	13.7	1.01	0.68	0.32	0.66	14.4
1897	14.6	1.10	0.74	0.36	0.73	15.4
1898	14.6	1.26	0.64	0.62	1.22	15.9
1899	16.1	1.28	0.80	0.48	0.87	17.0
1900	16.6	1.48	0.83	0.65	1.10	17.7
1901	18.5	1.47	0.88	0.59	1.01	19.5
1902	19.1	1.36	0.97	0.39	0.63	19.7
1903	20.0	1.48	1.00	0.49	0.78	20.8
1904	19.6	1.45	1.04	0.42	0.66	20.3
1905	20.8	1.63	1.18	0.45	0.71	21.5
1906	23.3	1.80	1.32	0.48	0.74	24.1
1907	23.9	1.92	1.42	0.50	0.73	24.6
1908	21.3	1.75	1.12	0.64	0.96	22.2
1909	23.6	1.73	1.48	0.25	0.36	24.0
1910	24.5	1.87	1.56	0.30	0.41	24.9
1911	24.8	2.09	1.53	0.56	0.82	25.6
1912	26.2	2.40	1.82	0.58	0.80	27.0
1913	27.5	2.48	1.79	0.69	0.94	28.5

(continued)

| | Output Destined for Domestic Consumption, 1929 Prices (1) | Exports, Current Prices (2) | Imports, Current Prices (3) | Balance of Exports over Imports | | Finished Commodity Output, 1929 Prices (6) |
				Current Prices (4)	1929 Prices (5)	
1914	26.1	2.11	1.79	0.32	0.45	26.6
1915	25.3	3.55	1.78	1.78	2.44	27.7
1916	28.3	5.48	2.39	3.09	3.45	31.7
1917	28.2			3.28	2.66	30.9
1918	28.3			3.12	2.26	30.6
1919	29.3			4.02	2.76	32.0
1920	28.8			2.95	1.82	30.6
1921	27.8			1.98	1.93	29.7
1922	31.2			0.72	0.71	31.9
1923	35.2			0.38	0.36	35.5
1924	34.8			0.98	0.95	35.7
1925	36.9			0.68	0.63	37.5
1926	39.4			0.38	0.36	39.7
1927	39.0			0.68	0.68	39.7
1928	39.9			1.04	1.02	41.0
1929	42.4			0.84	0.84	43.2
1930	37.3			0.78	0.86	38.2
1931	32.7			0.33	0.44	33.1
1932	26.9			0.29	0.42	27.3
1933	27.9			0.23	0.33	28.2
1934	30.9			0.48	0.61	31.5
1935	33.6			0.24	0.28	33.9
1936	38.6			0.03	0.04	38.6
1937	41.0			0.27	0.29	41.3
1938	37.0			1.13	1.37	38.4

Because of rounding, detail will not necessarily add to total.

SOURCE, BY COLUMN

(1) From Shaw's series, given in *Value of Commodity Output since 1869*, Tables I-1 and I-2, for 1869, 1879, and 1889–1938, interpolated for 1870–1878 and 1880–1888, and converted to 1929 prices as described in the notes to Kuznets, *National Product since 1869*, Tables II-1 to II-5, col. 2.

An additional adjustment was made in the data for 1904–1938 to eliminate the value of gasoline and tires and tubes for passenger cars used for business purposes. The procedure for 1904–1918, described in the notes to Table R-13, cols. 5 and 6, was followed for the later years also, except that for gasoline for 1929–1938 the Commerce estimate of producers' value was used, since there was no NBER series.

(2) and (3) Calendar year totals of monthly figures reported in various issues of *Monthly Summary of Foreign Commerce* (Dept. of Commerce).

(4) 1869–1915: Col. 2 minus col. 3.

1916–1938: From *Historical Statistics of the United States, 1789–1945*, Series M-55, pp. 243–244.

(5) Col. 4 divided by the BLS wholesale price index, Series L-15 (*ibid.*, pp. 233–234), shifted to a 1929 base.

(6) Col. 1 plus col. 5. Since the Shaw series is available only through 1939 and the calculation of the estimates in Table R-22, col. 1 calls for an average for 1934–1943, we estimated the latter by applying to the 1929–1938 decade average the percentage change from 1929–1938 to 1934–1943 in the sum of Table R-13, cols. 5–7 (or Table R-19, cols. 2–4) and Table R-15, cols. 1 and 2.

ANNUAL ESTIMATES OF NATIONAL PRODUCT AND MAJOR COMPONENTS,
VARIANTS I AND III, REGRESSION SERIES, 1929 PRICES, 1889–1918
(billions of dollars)

	Gross National Product (1)	Net National Product (2)	Flow of Goods to Consumers (3)	Gross Capital Formation (4)	Net Capital Formation (5)
A. VARIANT I					
1889	22.9	20.2	17.6	5.25	2.60
1890	24.2	21.4	17.3	6.95	4.14
1891	25.7	22.7	18.8	6.89	3.90
1892	27.5	24.4	19.2	8.37	5.23
1893	26.9	23.6	19.9	7.02	3.74
1894	26.0	22.6	19.3	6.72	3.34
1895	28.5	25.0	21.1	7.40	3.92
1896	29.3	25.7	22.1	7.19	3.60
1897	31.2	27.5	23.2	7.99	4.26
1898	32.4	28.5	24.1	8.21	4.35
1899	34.6	30.6	26.2	8.31	4.31
1900	36.2	32.0	26.9	9.32	5.18
1901	39.5	35.2	29.4	10.1	5.78
1902	40.2	35.7	29.9	10.3	5.85
1903	42.3	37.6	31.8	10.5	5.88
1904	41.8	37.0	32.2	9.58	4.78
1905	44.4	39.4	33.7	10.7	5.77
1906	49.1	43.9	36.8	12.3	7.08
1907	50.5	45.0	38.1	12.4	6.92
1908	46.9	41.2	36.7	10.2	4.49
1909	52.1	46.2	39.7	12.4	6.46
1910	52.8	46.6	40.5	12.2	6.09
1911	52.6	46.2	41.5	11.1	4.66
1912	53.4	46.8	41.1	12.3	5.63
1913	56.4	49.5	42.9	13.5	6.58
1914	55.2	48.1	45.4	9.85	2.73
1915	59.1	51.8	46.3	12.9	5.56
1916	64.2	56.7	47.3	16.9	9.36
1917	64.8	56.9	48.7	16.1	8.21
1918	61.8	53.4	47.6	14.1	5.79
B. VARIANT III					
1889	23.4	20.8	18.2	5.25	2.60
1890	24.8	22.0	17.8	6.96	4.14
1891	26.2	23.3	19.3	6.89	3.91
1892	28.3	25.1	19.8	8.41	5.28
1893	27.5	24.2	20.5	7.02	3.74
1894	26.6	23.2	19.9	6.72	3.34
1895	29.1	25.7	21.7	7.40	3.93
1896	30.0	26.4	22.8	7.19	3.60
1897	32.0	28.2	24.0	7.99	4.27
1898	33.2	29.3	24.9	8.21	4.35
1899	35.4	31.4	27.1	8.31	4.31
1900	37.1	33.0	27.8	9.32	5.18
1901	40.6	36.3	30.5	10.1	5.82
1902	41.2	36.8	30.9	10.3	5.86
1903	43.4	38.8	32.9	10.5	5.89

(continued)

	Gross National Product (1)	Net National Product (2)	Flow of Goods to Consumers (3)	Gross Capital Formation (4)	Net Capital Formation (5)
		B. VARIANT III (concluded)			
1904	42.9	38.1	33.3	9.57	4.77
1905	45.7	40.7	34.9	10.7	5.76
1906	50.7	45.4	38.3	12.3	7.12
1907	52.2	46.7	39.7	12.5	6.96
1908	48.3	42.6	38.1	10.2	4.48
1909	53.8	47.8	41.4	12.4	6.46
1910	54.4	48.2	42.1	12.2	6.07
1911	54.3	47.9	43.2	11.1	4.67
1912	55.1	48.5	42.8	12.3	5.66
1913	58.2	51.3	44.7	13.5	6.61
1914	57.0	49.8	47.1	9.84	2.72
1915	61.1	53.7	48.2	12.9	5.55
1916	66.3	58.8	49.4	16.9	9.36
1917	66.9	59.0	50.8	16.0	8.16
1918	63.7	55.4	49.6	14.1	5.73

Because of rounding, detail will not necessarily add to total.

SOURCE, BY COLUMN

(1) 1869–1873 (not shown): Table R-21, col. 6 divided by its 1869–1878 ratio to Table R-12, col. 7 or col. 9.

1874–1908 (1874–1888 not shown): Derived by the following procedure. For 1909–1938:

1. Decade averages of Table R-21, col. 6 were computed and centered at the middle of the decade, and interpolated logarithmically along a straight line for the intervening years.

2. Percentage deviations of the annuals in Table R-21, col. 6 from those derived in step 1 were computed.

3. The ratios of the decade averages of Table R-21, col. 6 to the decade averages of gross national product in Table R-12, col. 7 or col. 9 were computed, centered at the middle of the decade, and interpolated along a straight line.

4. The ratio of Table R-21, col. 6 to gross national product, Table R-2, col. 7 or col. 9, or Table R-20, col. 7, was computed annually for 1909–1938.

5. Absolute deviations of the annual ratios in step 4 from those derived in step 3 were computed.

6. A freehand smooth curve was fitted to the deviations derived in steps 2 and 5, with those in step 2 as the independent variable.

For 1874–1908, after steps 1–3 had been carried through for these years:

7. Deviations corresponding to those computed in step 5 were read from the curve described in step 6 for the points derived in step 2.

8. These deviations were added to the ratios derived in step 3.

9. The adjusted ratios were then applied to the series in Table R-21, col. 6 to yield annual estimates of gross national product, Variant I or Variant III.

1909–1918: Table R-20, col. 7.

(2) and (5) Cols. 1 and 4, respectively, minus the annual series on capital consumption underlying Table R-29, col. 5.

(3) and (4) Col. 1 distributed between flow of goods to consumers and gross capital formation on the basis of the corresponding distribution of the annual series underlying Table R-26, col. 3 or 6.

ANNUAL ESTIMATES OF NATIONAL PRODUCT AND MAJOR COMPONENTS,
VARIANTS I AND III, REGRESSION SERIES, CURRENT PRICES, 1889–1918
(billions of dollars)

	Gross National Product (1)	Net National Product (2)	Flow of Goods to Consumers (3)	Gross Capital Formation (4)	Net Capital Formation (5)
		A. VARIANT I			
1889	12.0	10.7	9.59	2.43	1.13
1890	12.4	11.1	9.25	3.17	1.86
1891	12.9	11.6	9.91	3.03	1.73
1892	13.3	12.0	9.76	3.57	2.23
1893	13.3	11.9	10.3	2.94	1.56
1894	12.0	10.6	9.30	2.72	1.33
1895	12.9	11.5	9.95	2.98	1.60
1896	12.9	11.5	10.1	2.82	1.43
1897	13.9	12.4	10.7	3.20	1.71
1898	14.8	13.2	11.4	3.42	1.80
1899	16.4	14.5	12.5	3.82	2.00
1900	17.9	16.0	13.5	4.40	2.48
1901	19.4	17.4	14.7	4.70	2.73
1902	20.4	18.3	15.5	4.87	2.79
1903	21.6	19.4	16.6	5.02	2.86
1904	21.7	19.4	17.1	4.54	2.26
1905	23.6	21.2	18.3	5.34	2.88
1906	26.7	24.0	20.2	6.52	3.82
1907	28.6	25.7	21.9	6.75	3.81
1908	26.4	23.4	21.1	5.24	2.28
1909	30.4	27.2	23.6	6.81	3.64
1910	31.6	28.2	24.8	6.78	3.43
1911	31.3	27.7	25.1	6.18	2.61
1912	33.0	29.2	26.0	7.02	3.28
1913	35.0	31.1	27.2	7.88	3.91
1914	34.6	30.5	29.1	5.54	1.44
1915	38.3	33.9	30.6	7.75	3.33
1916	47.2	42.2	35.4	11.9	6.80
1917	59.3	52.8	45.5	13.8	7.31
1918	65.9	57.4	51.2	14.7	6.20
		B. VARIANT III			
1889	12.2	10.9	9.79	2.43	1.12
1890	12.6	11.3	9.45	3.18	1.87
1891	13.2	11.8	10.1	3.03	1.73
1892	13.6	12.3	10.0	3.58	2.25
1893	13.5	12.1	10.6	2.94	1.56

(continued)

TABLE R-23 (concluded)

	Gross National Product (1)	Net National Product (2)	Flow of Goods to Consumers (3)	Gross Capital Formation (4)	Net Capital Formation (5)
		B. VARIANT III (concluded)			
1894	12.3	10.9	9.57	2.72	1.33
1895	13.2	11.8	10.2	2.98	1.60
1896	13.2	11.8	10.4	2.82	1.43
1897	14.2	12.7	11.0	3.20	1.72
1898	15.1	13.5	11.7	3.42	1.80
1899	16.7	14.9	12.9	3.82	2.00
1900	18.3	16.4	13.9	4.41	2.49
1901	19.9	18.0	15.2	4.71	2.75
1902	20.9	18.8	16.0	4.87	2.79
1903	22.1	20.0	17.1	5.03	2.87
1904	22.2	19.9	17.7	4.54	2.26
1905	24.2	21.7	18.9	5.33	2.88
1906	27.5	24.8	20.9	6.54	3.84
1907	29.4	26.5	22.6	6.77	3.84
1908	27.1	24.1	21.9	5.24	2.27
1909	31.3	28.1	24.5	6.81	3.64
1910	32.4	29.0	25.6	6.77	3.42
1911	32.2	28.6	26.0	6.19	2.62
1912	33.9	30.2	26.9	7.04	3.30
1913	36.1	32.1	28.2	7.89	3.93
1914	35.7	31.6	30.2	5.53	1.44
1915	39.6	35.2	31.9	7.75	3.32
1916	48.6	43.5	36.7	11.9	6.81
1917	60.4	53.9	46.6	13.8	7.27
1918	66.7	58.2	52.1	14.6	6.14

Because of rounding, detail will not necessarily add to total.

SOURCE, BY COLUMN

(1) and (4) Cols. 2 and 5, respectively, plus the annual series on capital consumption underlying Table R-29, col. 2.

(2) Col. 3 plus col. 5.

(3) Col. 3 of Table R-22 multiplied by the price index implicit in the annual series underlying col. 1 (or 4) of Tables R-25 and R-26.

(5) Col. 5 of Table R-22 multiplied by the price index implicit in the annual series underlying cols. 3 and 6 of Table R-29.

TABLE R-24

COMPARISON OF FIVE-YEAR MOVING AVERAGES OF GROSS NATIONAL PRODUCT,
VARIANTS I AND III, ESTIMATED BY REGRESSION AND ESTIMATED BY COMPONENTS,
1929 PRICES, 1869–1922

(billions of dollars)

Year on Which Moving Average Is Centered	*Variant I*			*Variant III*		
	Re-gression Series (1)	Com-ponent Series (2)	Difference (2) − (1) (3)	Re-gression Series (4)	Com-ponent Series (5)	Difference (5) − (4) (6)
1871	8.74	8.90	+0.16	8.96	9.11	+0.15
1872	9.34	9.47	+0.13	9.58	9.70	+0.12
1873	9.96	10.1	+0.13	10.2	10.3	+0.12
1874	10.8	10.9	+0.08	11.1	11.2	+0.08
1875	11.4	11.4	+0.01	11.7	11.7	+0.01
1876	12.2	12.1	−0.05	12.4	12.4	−0.05
1877	13.1	13.1	−0.06	13.4	13.4	−0.06
1878	14.5	14.5	a	14.8	14.8	−0.01
1879	15.7	15.7	a	16.1	16.1	−0.02
1880	16.9	17.0	+0.05	17.4	17.4	+0.01
1881	18.0	18.1	+0.09	18.5	18.5	+0.03
1882	18.9	19.0	+0.11	19.4	19.5	+0.05
1883	19.5	19.5	+0.04	20.0	20.0	−0.01
1884	20.1	20.2	+0.07	20.6	20.7	+0.04
1885	20.8	20.8	+0.02	21.3	21.3	a
1886	21.2	21.3	+0.02	21.8	21.8	+0.02
1887	21.8	21.8	−0.02	22.3	22.3	−0.01
1888	22.6	22.6	+0.03	23.1	23.1	+0.04
1889	23.4	23.4	a	23.9	24.0	+0.01
1890	24.5	24.6	+0.13	25.0	25.1	+0.11
1891	25.4	25.6	+0.12	26.0	26.1	+0.09
1892	26.1	26.2	+0.10	26.7	26.7	+0.06
1893	26.9	27.1	+0.17	27.5	27.7	+0.13
1894	27.6	27.6	a	28.3	28.3	−0.03
1895	28.4	28.2	−0.15	29.0	28.9	−0.16
1896	29.5	29.2	−0.29	30.2	29.9	−0.30
1897	31.2	30.9	−0.23	31.9	31.7	−0.25
1898	32.7	32.3	−0.46	33.5	33.0	−0.48
1899	34.7	34.6	−0.19	35.6	35.4	−0.24
1900	36.5	36.4	−0.15	37.5	37.3	−0.19

(continued)

TABLE R-24 (concluded)

Year on Which Moving Average Is Centered	Variant I			Variant III		
	Re-gression Series (1)	Com-ponent Series (2)	Difference (2) − (1) (3)	Re-gression Series (4)	Com-ponent Series (5)	Difference (5) − (4) (6)
1901	38.5	38.6	+0.03	39.6	39.5	−0.02
1902	40.0	40.0	a	41.1	41.0	−0.04
1903	41.6	41.8	+0.15	42.8	42.9	+0.12
1904	43.5	43.8	+0.26	44.8	45.0	+0.24
1905	45.6	45.9	+0.28	47.0	47.2	+0.22
1906	46.5	46.6	+0.04	47.9	47.9	a
1907	48.6	48.6	+0.04	50.1	50.1	−0.02
1908	50.3	50.2	−0.05	51.9	51.8	−0.10
1909	51.0	50.9	−0.03	52.6	52.5	−0.06
1910	51.6	52.1	+0.54	53.2	53.7	+0.54
1911	53.4	54.8	+1.31	55.1	56.4	+1.30
1912	54.1	55.2	+1.09	55.8	56.9	+1.09
1913	55.3	55.8	+0.42	57.1	57.5	+0.39
1914	57.7	57.9	+0.21	59.5	59.7	+0.18
1915	60.0	59.1	−0.87	61.9	61.0	−0.87
1916	61.0	59.6	−1.47	63.0	61.6	−1.41
1917	63.5	62.3	−1.22	65.7	64.5	−1.17
1918	65.4	64.9	−0.51	67.7	67.3	−0.45
1919	65.7	65.1	−0.53	68.1	67.7	−0.45
1920	66.8	66.7	−0.06	69.4	69.4	−0.01

In this and the following tables showing five-year moving averages, the dates in the title cover the earliest and latest years included in the averages.

a Less than $0.005 billion.

SOURCE, BY COLUMN

(1) and (4) Calculated from the annual series described in the notes to Table R-22, col. 1.

(2) and (5) Table R-26, cols. 3 and 6, respectively.

FIVE-YEAR MOVING AVERAGES OF FLOW OF GOODS TO CONSUMERS,
NET NATIONAL PRODUCT, AND GROSS NATIONAL PRODUCT,
VARIANTS I AND III, CURRENT PRICES, 1869–1955
(billions of dollars)

Year on Which Moving Average Is Centered	Variant I			Variant III		
	Flow of Goods to Consumers (1)	Net National Product (2)	Gross National Product (3)	Flow of Goods to Consumers (4)	Net National Product (5)	Gross National Product (6)
1871	5.31	6.13	6.64	5.38	6.20	6.71
1872	5.49	6.34	6.88	5.56	6.41	6.96
1873	5.70	6.59	7.17	5.78	6.67	7.25
1874	5.85	6.82	7.44	5.94	6.92	7.53
1875	5.98	6.90	7.53	6.08	7.00	7.63
1876	6.06	6.95	7.58	6.18	7.06	7.70
1877	6.20	7.14	7.78	6.33	7.27	7.91
1878	6.72	7.77	8.44	6.85	7.91	8.58
1879	7.18	8.34	9.04	7.33	8.48	9.18
1880	7.76	9.02	9.77	7.91	9.17	9.92
1881	8.34	9.66	10.5	8.50	9.81	10.6
1882	8.81	10.1	11.0	8.97	10.3	11.2
1883	8.83	10.1	11.0	9.01	10.3	11.2
1884	8.91	10.1	11.1	9.10	10.3	11.3
1885	8.86	10.1	11.1	9.06	10.3	11.3
1886	8.86	10.0	11.1	9.06	10.2	11.3
1887	8.97	10.1	11.3	9.18	10.3	11.5
1888	9.12	10.5	11.7	9.33	10.7	11.9
1889	9.37	10.8	12.1	9.58	11.0	12.3
1890	9.58	11.2	12.5	9.79	11.4	12.7
1891	9.80	11.5	12.8	10.0	11.7	13.1
1892	9.74	11.5	12.8	9.96	11.7	13.1
1893	9.90	11.6	13.0	10.1	11.9	13.2
1894	9.88	11.5	12.9	10.1	11.8	13.1
1895	10.0	11.5	12.9	10.3	11.8	13.2
1896	10.2	11.7	13.2	10.5	12.0	13.5
1897	10.8	12.5	14.1	11.2	12.8	14.4
1898	11.5	13.3	15.0	11.8	13.7	15.3
1899	12.5	14.6	16.4	12.9	15.0	16.8
1900	13.5	15.8	17.7	13.9	16.2	18.1
1901	14.6	17.2	19.2	15.0	17.6	19.6
1902	15.5	18.1	20.2	16.0	18.6	20.7
1903	16.5	19.2	21.4	17.0	19.7	21.9
1904	17.6	20.6	22.9	18.2	21.2	23.5
1905	18.9	22.1	24.6	19.5	22.7	25.2
1906	19.7	22.7	25.4	20.4	23.4	26.1
1907	21.0	24.3	27.2	21.7	25.0	27.9
1908	22.3	25.7	28.7	23.0	26.4	29.5
1909	23.3	26.4	29.6	24.1	27.2	30.4
1910	24.4	27.5	30.9	25.2	28.4	31.7
1911	25.9	29.5	33.1	26.9	30.4	34.0
1912	26.9	30.0	33.8	27.9	31.0	34.7
1913	27.7	30.7	34.7	28.8	31.8	35.7
1914	29.7	33.5	37.7	30.8	34.6	38.9
1915	33.0	37.4	42.2	34.2	38.6	43.4
1916	37.5	42.3	48.0	38.7	43.5	49.2
1917	42.5	49.2	56.0	43.7	50.3	57.2
1918	49.2	57.7	65.9	50.4	58.9	67.1
1919	53.4	61.1	70.2	54.9	62.6	71.6
1920	55.9	63.1	72.6	57.5	64.8	74.3

(continued)

Year on Which Moving Average Is Centered	Variant I			Variant III		
	Flow of Goods to Consumers (1)	Net National Product (2)	Gross National Product (3)	Flow of Goods to Consumers (4)	Net National Product (5)	Gross National Product (6)
1921	58.1	66.0	75.8	60.1	68.0	77.7
1922	60.5	67.6	77.3	62 9	70.0	79.7
1923	61.2	68.0	77.5	63.8	70.5	80.0
1924	64.1	72.4	82.1	66.8	75.1	84.8
1925	67.0	76.3	86.3	69.9	79.1	89.1
1926	69.3	78.3	88.5	72.3	81.3	91.5
1927	71.6	81.3	91.8	74.6	84.3	94.8
1928	73.0	81.6	92.2	75.4	84.0	94.6
1929	71.0	77.3	87.8	73.0	79.4	89.9
1930	66.4	69.9	80.0	68.2	71.7	81.9
1931	61.1	62.0	71.7	62.4	63.3	73.0
1932	56.0	54.5	63.7	56.8	55.3	64.6
1933	52.2	49.9	58.9	53.8	51.5	60.5
1934	51.8	50.4	59.4	54.2	52.8	61.8
1935	55.1	55.9	65.3	58.1	58.9	68.3
1936	58.4	60.6	70.5	62.0	64.1	74.1
1937	61.4	64.9	75.3	65.3	68.8	79.2
1938	64.8	69.8	80.7	68.6	73.6	84.5
1939	69.3	76.4	88.1	72.6	79.7	91.4
1940	74.2	83.1	95.9	77.1	86.0	98.8
1941	81.6	92.1	106.6	84.4	94.9	109.4
1942	90.2	101.0	117.9	93.1	103.8	120.7
1943	100.4	109.4	129.1	103.3	112.3	131.9
1944	113.4	121.5	143.9	116.6	124.6	147.0
1945	128.4	135.5	161.8	132.0	139.1	165.3
1946	143.7	150.8	181.4	147.8	155.0	185.6
1947	157.5	163.5	198.2	162.4	168.3	203.1
1948	171.5	180.4	219.4	177.2	186.1	225.1
1949	183.4	194.9	238.9	189.8	201.3	245.3
1950	193.7	207.5	254.7	200.7	214.5	261.7
1951	203.7	219.6	268.9	211.4	227.3	276.6
1952	214.4	233.9	284.8	222.8	242.3	293.2
1953	225.9	248.0	300.5	234.9	257.0	309.5

SOURCE, BY COLUMN

All entries are averages of annual series.

(1) and (4) 1871–1916: Calculated from the annual series for 1869–1918 derived as the sum of those described in the notes to Table R-27, cols. 1–4, and 5–8, respectively.

1917–1953: Calculated from the annual series for 1915–1918 described above, and those for 1919–1955 in Table R-1, cols. 1 and 3, respectively.

(2) and (5) 1871–1916: Calculated from the annual series for 1869–1918 derived as the sum of the series underlying col. 1 or 4, and that described in the notes to Table R-29, col. 3.

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-1, cols. 4 and 6, respectively.

(3) and (6) 1871–1916: Calculated from the annual series for 1869–1918 derived as the sum of the series underlying col. 1 or 4, and that described in the notes to Table R-29, col. 1.

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-1, cols. 7 and 9, respectively.

FIVE-YEAR MOVING AVERAGES OF FLOW OF GOODS TO CONSUMERS,
NET NATIONAL PRODUCT, AND GROSS NATIONAL PRODUCT,
VARIANTS I AND III, 1929 PRICES, 1869–1955
(billions of dollars)

Year on Which Moving Average Is Centered	Variant I			Variant III		
	Flow of Goods to Consumers (1)	Net National Product (2)	Gross National Product (3)	Flow of Goods to Consumers (4)	Net National Product (5)	Gross National Product (6)
1871	6.78	8.08	8.90	7.00	8.30	9.11
1872	7.22	8.59	9.47	7.45	8.82	9.70
1873	7.70	9.15	10.1	7.94	9.40	10.3
1874	8.26	9.88	10.9	8.53	10.1	11.2
1875	8.75	10.3	11.4	9.03	10.6	11.7
1876	9.28	10.9	12.1	9.57	11.2	12.4
1877	10.0	11.8	13.1	10.3	12.1	13.4
1878	11.1	13.1	14.5	11.4	13.5	14.8
1879	12.0	14.3	15.7	12.4	14.6	16.1
1880	13.1	15.5	17.0	13.4	15.9	17.4
1881	14.0	16.5	18.1	14.4	16.9	18.5
1882	14.7	17.3	19.0	15.2	17.7	19.5
1883	15.2	17.7	19.5	15.6	18.1	20.0
1884	15.7	18.2	20.2	16.2	18.7	20.7
1885	16.1	18.7	20.8	16.6	19.2	21.3
1886	16.4	19.0	21.3	16.9	19.6	21.8
1887	16.8	19.4	21.8	17.3	20.0	22.3
1888	17.1	20.1	22.6	17.6	20.6	23.1
1889	17.5	20.8	23.4	18.1	21.3	24.0
1890	18.1	21.8	24.6	18.6	22.3	25.1
1891	18.6	22.6	25.6	19.2	23.2	26.1
1892	18.9	23.0	26.2	19.5	23.6	26.7
1893	19.7	23.8	27.1	20.4	24.4	27.7
1894	20.3	24.3	27.6	20.9	24.9	28.3
1895	21.0	24.7	28.2	21.6	25.4	28.9
1896	21.7	25.6	29.2	22.4	26.3	29.9
1897	23.2	27.2	30.9	23.9	28.0	31.7
1898	24.2	28.4	32.3	25.0	29.2	33.0
1899	25.8	30.6	34.6	26.7	31.4	35.4
1900	27.2	32.2	36.4	28.1	33.2	37.3
1901	28.8	34.3	38.6	29.8	35.2	39.5
1902	30.0	35.5	40.0	31.1	36.6	41.0
1903	31.5	37.1	41.8	32.6	38.3	42.9
1904	33.0	39.0	43.8	34.3	40.2	45.0
1905	34.7	40.9	45.9	36.0	42.2	47.2
1906	35.5	41.3	46.6	36.9	42.7	47.9
1907	37.0	43.2	48.6	38.5	44.6	50.1
1908	38.3	44.5	50.2	39.9	46.1	51.8
1909	39.3	45.0	50.9	40.9	46.6	52.5
1910	40.3	45.9	52.1	42.0	47.6	53.7
1911	42.2	48.4	54.8	43.9	50.0	56.4
1912	43.1	48.5	55.2	44.8	50.2	56.9
1913	43.7	48.9	55.8	45.5	50.6	57.5
1914	44.7	50.8	57.9	46.6	52.6	59.7
1915	45.4	51.7	59.1	47.4	53.7	61.0

(continued)

Year on Which Moving Average Is Centered	Variant I			Variant III		
	Flow of Goods to Consumers (1)	Net National Product (2)	Gross National Product (3)	Flow of Goods to Consumers (4)	Net National Product (5)	Gross National Product (6)
1916	45.9	51.9	59.6	47.9	53.9	61.6
1917	47.0	54.3	62.3	49.2	56.4	64.5
1918	48.6	56.5	64.9	50.9	58.9	67.3
1919	49.9	56.5	65.1	52.4	59.0	67.7
1920	51.8	57.8	66.7	54.4	60.4	69.4
1921	54.6	61.2	70.4	57.4	64.0	73.2
1922	57.7	63.9	73.2	60.7	66.9	76.2
1923	60.2	66.9	76.3	63.3	70.0	79.4
1924	63.2	71.4	81.2	66.4	74.6	84.4
1925	66.0	75.2	85.3	69.4	78.6	88.6
1926	68.3	77.3	87.6	71.8	80.8	91.2
1927	70.6	80.3	90.9	74.1	83.8	94.4
1928	72.8	81.4	92.2	75.9	84.4	95.3
1929	72.8	79.4	90.3	76.0	82.6	93.4
1930	71.1	74.6	85.4	74.4	77.9	88.7
1931	69.1	69.5	80.2	72.2	72.6	83.3
1932	66.7	64.3	74.8	69.8	67.4	77.9
1933	65.0	62.1	72.5	69.2	66.4	76.7
1934	65.5	63.4	73.8	70.8	68.7	79.0
1935	68.4	· 69.2	79.8	74.4	75.1	85.7
1936	71.4	74.0	84.7	78.0 ·	80.6	91.4
1937	74.6	79.1	90.1	81.7	86.1	97.2
1938	78.5	84.5	95.8	85.4	91.3	102.6
1939	82.5	90.7	102.4	88.8	97.0	108.7
1940	85.1	94.0	106.4	91.1	100.0	112.4
1941	88.2	97.8	111.4	94.3	104.0	117.5
1942	90.9	100.5	115.7	97.3	106.9	122.1
1943	94.1	101.7	118.8	100.8	108.4	125.5
1944	98.4	104.8	123.4	105.7	112.1	130.6
1945	103.6	108.8	129.0	111.4	116.7	136.8
1946	108.7	· 114.1	135.7	117.2	122.6	144.2
1947	113.8	117.8	140.6	122.9	126.9	149.7
1948	119.1	124.7	148.4	128.8	134.5	158.2
1949	122.2	128.2	153.3	132.3	138.4	163.5
1950	125.6	132.5	158.4	136.1	143.0	168.9
1951	129.8	137.0	163.3	140.6	147.9	174.1
1952	133.8	143.1	169.4	145.0	154.2	180.6
1953	138.4	148.5	175.0	149.9	160.0	186.5

SOURCE, BY COLUMN

All entries are averages of annual series.

(1) and (4) 1871–1916: Calculated from the annual series for 1869–1918 derived as the sum of those described in the notes to Table R-28, cols. 1–4, and 5–8, respectively.

1917–1953: Calculated from the annual series for 1915–1918 described above, and those for 1919–1955 in Table R-2, cols. 1 and 3, respectively.

(2) and (5) 1871–1916: Calculated from the annual series for 1869–1918 derived as the sum of the series underlying col. 1 or 4, and that described in the notes to Table R-29, col. 6.

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-2, cols. 4 and 6, respectively.

(3) and (6) 1871–1916: Calculated from the annual series for 1869–1918 derived as the sum of the series underlying col. 1 or 4, and that described in the notes to Table R-29, col. 4.

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-2, cols. 7 and 9, respectively.

FIVE-YEAR MOVING AVERAGES OF COMPONENTS OF FLOW OF GOODS TO CONSUMERS,
VARIANTS I AND III, CURRENT PRICES, 1869–1955

(billions of dollars)

Year on Which Moving Average Is Centered	Variant I				Variant III			
	Perish-ables (1)	Semi-durables (2)	Durables (3)	Services (4)	Perish-ables (5)	Semi-durables (6)	Durables (7)	Services (8)
1871	2.33	1.17	0.47	1.33	2.29	1.01	0.50	1.59
1872	2.43	1.20	0.48	1.38	2.38	1.03	0.51	1.64
1873	2.53	1.22	0.50	1.44	2.48	1.06	0.53	1.72
1874	2.63	1.21	0.50	1.50	2.58	1.05	0.53	1.78
1875	2.75	1.18	0.49	1.55	2.70	1.02	0.51	1.85
1876	2.81	1.17	0.47	1.61	2.76	1.01	0.49	1.92
1877	2.84	1.19	0.47	1.70	2.78	1.03	0.50	2.02
1878	3.08	1.30	0.50	1.84	3.02	1.12	0.53	2.19
1879	3.30	1.39	0.54	1.95	3.24	1.20	0.56	2.33
1880	3.61	1.49	0.58	2.08	3.53	1.29	0.61	2.48
1881	3.92	1.60	0.63	2.20	3.84	1.38	0.67	2.62
1882	4.20	1.64	0.67	2.29	4.12	1.42	0.70	2.73
1883	4.20	1.62	0.68	2.34	4.12	1.39	0.72	2.78
1884	4.18	1.63	0.70	2.40	4.09	1.41	0.74	2.85
1885	4.08	1.62	0.72	2.43	4.00	1.40	0.76	2.90
1886	4.01	1.64	0.74	2.47	3.93	1.41	0.78	2.94
1887	4.00	1.69	0.77	2.51	3.92	1.46	0.81	2.99
1888	4.04	1.74	0.80	2.54	3.96	1.50	0.85	3.02
1889	4.18	1.78	0.83	2.59	4.09	1.54	0.87	3.08
1890	4.25	1.84	0.86	2.64	4.16	1.59	0.90	3.14
1891	4.42	1.85	0.86	2.68	4.33	1.59	0.91	3.19
1892	4.42	1.79	0.84	2.70	4.33	1.55	0.88	3.21
1893	4.54	1.76	0.82	2.78	4.45	1.52	0.87	3.31
1894	4.53	1.72	0.80	2.84	4.44	1.48	0.84	3.38
1895	4.62	1.69	0.77	2.92	4.53	1.46	0.82	3.48
1896	4.66	1.70	0.78	3.03	4.56	1.47	0.82	3.61
1897	4.93	1.82	0.85	3.24	4.83	1.57	0.89	3.86
1898	5.22	1.93	0.90	3.43	5.11	1.67	0.95	4.08
1899	5.72	2.08	0.98	3.73	5.60	1.79	1.03	4.44
1900	6.18	2.22	1.06	4.02	6.06	1.91	1.12	4.79
1901	6.66	2.40	1.16	4.38	6.52	2.06	1.22	5.22
1902	7.06	2.51	1.22	4.71	6.92	2.17	1.29	5.60
1903	7.45	2.66	1.31	5.08	7.30	2.29	1.39	6.05
1904	7.84	2.88	1.44	5.48	7.68	2.49	1.52	6.53
1905	8.34	3.10	1.56	5.92	8.17	2.67	1.64	7.05
1906	8.64	3.23	1.61	6.25	8.46	2.79	1.69	7.44
1907	9.16	3.46	1.72	6.69	8.97	2.98	1.81	7.97
1908	9.75	3.61	1.82	7.10	9.55	3.11	1.92	8.46
1909	10.2	3.71	1.87	7.47	10.0	3.20	1.97	8.90
1910	10.7	3.86	1.96	7.84	10.5	3.32	2.07	9.34

(continued)

Year on Which Moving Average Is Centered	Variant I				Variant III			
	Perish-ables (1)	Semi-durables (2)	Durables (3)	Services (4)	Perish-ables (5)	Semi-durables (6)	Durables (7)	Services (8)
1911	11.4	4.09	2.15	8.32	11.2	3.53	2.26	9.91
1912	11.8	4.17	2.23	8.71	11.6	3.60	2.36	10.4
1913	12.0	4.24	2.31	9.15	11.8	3.66	2.44	10.9
1914	12.8	4.56	2.58	9.81	12.5	3.93	2.72	11.7
1915	14.3	5.19	2.90	10.6	14.0	4.48	3.06	12.6
1916	16.6	6.18	3.16	11.6	16.2	5.33	3.34	13.8
1917	19.0	7.35	3.79	12.4	18.6	6.34	3.99	14.8
1918	21.9	8.88	4.55	13.8	21.5	7.65	4.80	16.5
1919	23.3	9.66	4.88	15.6	22.9	8.33	5.15	18.5
1920	23.6	10.1	5.20	17.0	23.1	8.74	5.49	20.2
1921	23.4	10.5	5.84	18.5	22.9	9.02	6.16	22.0
1922	23.2	10.5	6.16	20.6	22.7	9.09	6.50	24.6
1923	22.8	10.4	6.51	21.5	22.3	8.97	6.87	25.6
1924	23.8	10.8	7.16	22.4	23.3	9.31	7.56	26.7
1925	24.8	11.2	7.65	23.4	24.3	9.63	8.07	27.9
1926	25.6	11.3	7.88	24.4	25.1	9.76	8.31	29.1
1927	26.6	11.6	8.23	25.2	26.0	10.0	8.68	29.9
1928	26.7	11.5	7.99	26.8	26.1	9.91	8.42	31.0
1929	25.7	11.0	7.36	27.0	25.1	9.46	7.76	30.7
1930	24.0	9.95	6.46	26.0	23.4	8.58	6.82	29.4
1931	22.1	8.85	5.53	24.6	21.5	7.58	5.79	27.4
1932	20.7	7.91	4.58	22.8	20.2	6.76	4.79	25.1
1933	20.2	7.38	4.20	20.4	19.7	6.32	4.38	23.5
1934	21.2	7.35	4.37	18.9	20.5	6.26	4.55	22.9
1935	23.3	7.86	5.00	19.0	22.6	6.68	5.20	23.6
1936	25.1	8.36	5.39	19.6	24.4	7.16	5.65	24.8
1937	26.5	8.78	5.86	20.3	25.8	7.52	6.14	25.9
1938	27.7	9.20	6.37	21.5	27.0	7.88	6.67	27.0
1939	29.3	9.83	7.01	23.2	28.5	8.42	7.34	28.3
1940	31.6	11.0	7.02	24.6	30.8	9.40	7.35	29.6
1941	35.2	12.8	7.19	26.4	34.3	10.9	7.54	31.6
1942	39.6	14.8	7.21	28.6	38.6	12.7	7.55	34.3
1943	44.8	17.4	7.27	31.0	43.6	14.9	7.62	37.2
1944	51.0	20.0	8.46	34.0	49.6	17.1	8.87	41.0
1945	57.6	22.2	11.1	37.5	56.1	19.0	11.6	45.3
1946	64.2	24.0	14.0	41.5	62.4	20.5	14.7	50.1
1947	69.7	25.1	17.3	45.5	67.8	21.5	18.1	55.0
1948	74.6	25.8	21.2	49.9	72.6	22.1	22.2	60.3
1949	79.6	26.3	23.3	54.2	77.5	22.6	24.4	65.4
1950	83.9	26.8	24.5	58.4	81.7	23.0	25.6	70.4
1951	87.9	27.1	25.9	62.9	85.5	23.2	27.2	75.6
1952	92.4	27.6	27.0	67.5	89.9	23.6	28.3	81.0
1953	97.0	28.3	28.4	72.2	94.4	24.3	29.7	86.5

SOURCE, BY COLUMN

All entries are averages of annual series.

(1) 1871–1916: Calculated from the annual series for 1869–1918 derived by multiplying the 1929 price series (see notes to Table R-28, col. 1) by the price index implicit in output for domestic consumption. Output for domestic consumption, in current and 1929 prices, was estimated by the method described in the notes to Kuznets, *National Product since 1869*, Table II-1, cols. 1 and 2, except that a further adjustment was made for 1904–1918 to exclude gasoline and lubricating oils consumed by passenger cars used for business (see notes to Table R-13, cols. 1–3).

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-3, col. 1.

(2) 1871–1916: Calculated from the annual series for 1869–1918 derived by multiplying the 1929 price series (see notes to Table R-28, col. 2) by the price index implicit in output for domestic consumption. Output for domestic consumption, in current and 1929 prices, was estimated by the method described in the notes to *National Product since 1869*, Table II-2, cols. 1 and 2, except that a further adjustment was made for 1904–1918 to exclude tires and tubes for passenger cars used for business (see notes to Table R-13, cols. 1–3).

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-3, col. 2.

(3) 1871–1916: Calculated from the annual series for 1869–1918 derived by multiplying the 1929 price series (see notes to Table R-28, col. 3) by the price index implicit in output for domestic consumption. Output for domestic consumption, in current and 1929 prices, was estimated by the method described in the notes to *National Product since 1869*, Table II-3, cols. 1 and 2, except that a further adjustment was made for 1899–1918 to exclude passenger cars used for business (see notes to Table R-13, cols. 1–3).

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-3, col. 3.

(4) 1871–1916: Calculated from the annual series for 1869–1918 derived by multiplying the 1929 price series (see notes to Table R-28, col. 4) by a price index obtained as follows.

1. The implicit annual price index for services, 1919–1941, was derived from Table R-3, cols. 4 and 8.

2. The implicit decade average price index for services, 1869–1878 through 1934–1943, was derived from Table R-13, cols. 4 and 8, centered at the mid-point for each decade, and interpolated along a straight line.

3. Deviations of the annual indexes derived in step 1 from those derived in step 2 were computed.

4. The implicit annual price index for consumer commodities was derived for 1919–1941 from Table R-3, cols. 1–3 and 5–7, and for 1869–1918 from the annual series underlying cols. 1–3 of the present table and cols. 1–3 of Table R-28.

5. The implicit decade average price index for consumer commodities was derived for 1869–1878 through 1914–1923 from decade averages of the annual series underlying cols. 1–3 of the present table, and cols. 1–3 of

(Notes on following page)

NOTES TO TABLE R-27 (concluded)

(4) Table R-28, and for 1914–1923 through 1934–1943 from Table R-13, cols. 1–3 and 5–7, and interpolated along a straight line.

   6. Deviations of the annual indexes derived in step 4 from those derived in step 5 were computed.

   7. The regression line of deviations in step 3 on deviations in step 6 for 1919–1941 was computed, yielding the equation, $y = 0.633464 + 0.107464x$.

   8. By means of the equation in step 7 and deviations in step 6 for 1869–1918, deviations corresponding to those in step 3 were derived.

   9. Deviations in step 8 were subtracted from the indexes described in step 2 for 1869–1918, yielding a preliminary annual price index for services. This price index was adjusted as follows: The annual 1929 price series (see notes to Table R-28, col. 4) was multiplied by the preliminary price index just described, yielding a preliminary series in current prices. Ten-year averages of this series were computed for the overlapping decades, and a preliminary implicit price index for the decades derived; the ratio of the price index for decades described in step 2 to this preliminary index was computed, interpolated along a straight line, and applied to the preliminary price index to yield the final annual price index by which the 1929 price values were converted to current prices.

   1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-3, col. 4.

(5)–(7) 1871–1916: Calculated from the annual series for 1869–1918 derived by multiplying the Variant I estimate (see notes to cols. 1–3) by the 1929–1931 ratio of the Variant III to the Variant I estimate. See notes to lines 1–10, Table R-18, cols. 2–4.

   1917–1953: Calculated from the annual series for 1915–1918 described above, and those for 1919–1955 in Table R-9, cols. 2–4.

(8) 1871–1916: Calculated from the annual series for 1869–1918 derived as follows: the 1929–1931 ratio of the Variant III to the Variant II estimate (see notes to Table R-18, col. 5, lines 1–10) applied to the Variant II estimate derived annually by the procedure for 1919–1928 outlined in the notes to Table R-9, col. 1.

   1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-9, col. 5.

FIVE-YEAR MOVING AVERAGES OF COMPONENTS OF FLOW OF GOODS TO CONSUMERS,
VARIANTS I AND III, 1929 PRICES, 1869–1955
(billions of dollars)

Year on Which Moving Average Is Centered	Variant I				Variant III			
	Perishables (1)	Semidurables (2)	Durables (3)	Services (4)	Perishables (5)	Semidurables (6)	Durables (7)	Services (8)
1871	2.83	1.38	0.60	1.98	2.78	1.22	0.64	2.35
1872	3.06	1.44	0.62	2.10	3.01	1.27	0.67	2.50
1873	3.28	1.51	0.67	2.24	3.22	1.33	0.72	2.67
1874	3.58	1.56	0.72	2.40	3.52	1.37	0.77	2.86
1875	3.84	1.62	0.75	2.53	3.77	1.43	0.81	3.02
1876	4.11	1.71	0.78	2.68	4.04	1.51	0.84	3.18
1877	4.43	1.86	0.85	2.86	4.36	1.64	0.91	3.41
1878	5.00	2.06	0.91	3.14	4.92	1.82	0.98	3.73
1879	5.46	2.22	0.99	3.37	5.37	1.96	1.07	4.02
1880	5.96	2.39	1.08	3.62	5.86	2.11	1.16	4.32
1881	6.39	2.55	1.17	3.85	6.28	2.25	1.26	4.59
1882	6.80	2.64	1.23	4.04	6.69	2.33	1.32	4.82
1883	6.99	2.70	1.30	4.17	6.87	2.38	1.40	4.96
1884	7.18	2.82	1.40	4.31	7.06	2.49	1.50	5.14
1885	7.28	2.89	1.49	4.42	7.16	2.55	1.60	5.26
1886	7.36	2.97	1.58	4.52	7.24	2.62	1.70	5.38
1887	7.41	3.10	1.67	4.62	7.28	2.74	1.80	5.50
1888	7.40	3.20	1.76	4.70	7.28	2.83	1.89	5.59
1889	7.58	3.30	1.81	4.81	7.46	2.92	1.95	5.73
1890	7.80	3.44	1.88	4.95	7.67	3.03	2.02	5.89
1891	8.15	3.49	1.90	5.08	8.01	3.08	2.04	6.05
1892	8.39	3.50	1.89	5.17	8.24	3.09	2.03	6.15
1893	8.85	3.59	1.93	5.38	8.70	3.17	2.08	6.41
1894	9.14	3.64	1.96	5.54	8.99	3.21	2.11	6.60
1895	9.52	3.71	2.00	5.76	9.36	3.28	2.15	6.86
1896	9.83	3.85	2.07	6.00	9.66	3.39	2.23	7.15
1897	10.4	4.10	2.25	6.42	10.2	3.62	2.42	7.65
1898	10.9	4.24	2.32	6.76	10.7	3.74	2.50	8.05
1899	11.6	4.49	2.43	7.28	11.4	3.96	2.62	8.67
1900	12.2	4.72	2.54	7.75	12.0	4.17	2.73	9.23
1901	12.9	5.01	2.66	8.32	12.6	4.42	2.86	9.90
1902	13.3	5.20	2.70	8.79	13.1	4.59	2.91	10.5
1903	13.8	5.45	2.84	9.35	13.6	4.81	3.06	11.1
1904	14.4	5.68	3.04	9.94	14.1	5.02	3.27	11.8
1905	15.1	5.86	3.16	10.6	14.9	5.18	3.40	12.6
1906	15.3	5.99	3.17	11.0	15.1	5.29	3.41	13.1
1907	15.8	6.23	3.34	11.6	15.6	5.50	3.59	13.8
1908	16.4	6.37	3.45	12.1	16.1	5.62	3.72	14.4
1909	16.8	6.56	3.47	12.5	16.5	5.79	3.74	14.9
1910	17.1	6.84	3.58	12.8	16.8	6.03	3.85	15.3

(continued)

Year on Which Moving Average Is Centered	Variant I				Variant III			
	Perish- ables (1)	Semi- durables (2)	Durables (3)	Services (4)	Perish- ables (5)	Semi- durables (6)	Durables (7)	Services (8)
1911	17.9	7.16	3.79	13.3	17.6	6.32	4.08	15.9
1912	18.4	7.31	3.80	13.6	18.1	6.45	4.09	16.2
1913	18.6	7.45	3.80	13.9	18.3	6.58	4.10	16.5
1914	18.8	7.61	4.02	14.3	18.5	6.72	4.33	17.0
1915	18.9	7.58	4.18	14.7	18.6	6.70	4.50	17.6
1916	19.1	7.46	4.17	15.2	18.8	6.58	4.49	18.1
1917	19.3	7.46	4.43	15.8	18.9	6.59	4.77	18.9
1918	19.8	7.32	4.66	16.8	19.5	6.46	5.02	20.0
1919	20.4	7.30	4.50	17.7	20.0	6.44	4.85	21.1
1920	21.1	7.58	4.57	18.6	20.7	6.69	4.92	22.1
1921	21.8	8.10	5.12	19.6	21.4	7.14	5.52	23.3
1922	22.8	8.40	5.51	20.9	22.5	7.41	5.93	24.9
1923	23.7	9.09	6.08	21.4	23.3	8.02	6.55	25.5
1924	24.6	9.52	7.01	22.1	24.1	8.40	7.55	26.3
1925	25.4	10.0	7.63	23.0	25.0	8.82	8.22	27.4
1926	26.0	10.3	7.99	24.0	25.6	9.08	8.60	28.6
1927	26.6	10.8	8.35	24.8	26.1	9.57	8.95	29.5
1928	27.0	11.0	8.18	26.6	26.4	9.68	8.77	31.0
1929	27.0	11.1	7.60	27.1	26.6	9.77	8.18	31.5
1930	26.8	10.7	6.82	26.7	26.3	9.44	7.39	31.3
1931	26.9	10.2	5.98	26.0	25.9	8.94	6.53	30.7
1932	26.8	9.64	5.21	25.1	25.8	8.42	5.76	29.8
1933	27.0	9.44	5.04	23.4	26.0	8.24	5.60	29.4
1934	28.2	9.47	5.39	22.4	26.9	8.24	5.95	29.6
1935	29.8	9.68	6.11	22.8	28.5	8.45	6.70	30.7
1936	31.3	10.1	6.56	23.4	30.2	8.84	7.17	31.8
1937	32.9	10.7	7.11	23.9	31.8	9.33	7.76	32.8
1938	34.7	11.2	7.65	25.0	33.5	9.78	8.35	33.8
1939	36.2	11.7	8.17	26.4	34.9	10.2	8.92	34.7
1940	37.6	12.2	7.90	27.4	36.3	10.7	8.62	35.5
1941	39.0	13.0	7.73	28.5	37.6	11.4	8.44	36.9
1942	40.6	13.6	7.22	29.5	39.2	11.9	7.89	38.4
1943	42.7	14.1	6.63	30.6	41.2	12.4	7.24	40.0
1944	44.9	14.6	6.84	32.1	43.3	12.7	7.47	42.1
1945	46.8	14.8	8.20	33.8	45.2	12.9	8.96	44.4
1946	48.7	14.7	9.84	35.5	47.0	12.9	10.7	46.6
1947	50.2	14.7	11.7	37.2	48.4	12.9	12.8	48.9
1948	51.2	14.6	14.1	39.2	49.4	12.8	15.4	51.3
1949	51.9	14.4	15.0	40.8	50.1	12.6	16.4	53.3
1950	53.1	14.5	15.4	42.6	51.2	12.7	16.8	55.4
1951	54.7	14.7	16.1	44.4	52.8	12.8	17.6	57.4
1952	56.2	14.8	16.7	46.1	54.2	12.9	18.2	59.6
1953	58.0	15.0	17.4	47.9	56.0	13.2	19.0	61.7

SOURCE, BY COLUMN

All entries are averages of annual series.

(1)–(3) 1871–1916: Calculated from the annual series for 1869–1918 derived by interpolating between or extrapolating from the decade averages in Table R-13, cols. 5–7, on the basis of the annual series on output for domestic consumption in 1929 prices, described in the notes to Table R-27, cols. 1–3. The ratios of the decade averages of flow to the decade averages of output were computed and centered at the mid-points of the decades. Annual ratios were interpolated along a straight line, and applied to the annual output figures.

1917–1953: Calculated from the annual series for 1915–1918 described above, and those for 1919–1955 in Table R-3, cols. 5–7.

(4) 1871–1916: Calculated from the annual series for 1869–1918 derived as follows.

1. For the period from 1869 to 1943 the decade averages in Table R-13, col. 8, were centered at the mid-points of the decades and annual estimates were interpolated along a straight line.

2. For 1919–1941 deviations of the annual estimates in Table R-3, col. 8, from those derived in step 1 were computed.

3. Step 1 was carried through for consumer commodities from the decade averages in Table R-13, cols. 5–7.

4. For 1869–1941 step 2 was carried through for consumer commodities, from the annual series underlying cols. 1–3 of the present table.

5. For 1919–1941 the regression line of deviations in step 2 on deviations in step 4 was computed, yielding the equation, $y = -18.809 + 0.304053x$.

6. By means of the equation in step 5 and the deviations for 1869–1918 in step 4, deviations for 1869–1918 corresponding to those in step 2 were derived.

7. Deviations derived in step 6 were subtracted from the estimates in step 1, yielding a preliminary annual series for services in 1929 prices. The ratios of the decade averages in Table R-13, col. 8 to the ten-year averages of the preliminary annual series were computed, and centered at the mid-points of the decades. Annual ratios were interpolated along a straight line between those points, and applied to the preliminary annual series to yield the final annual series for services.

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-3, col. 8.

(5)–(7) 1871–1916: Calculated from the annual series for 1869–1918 derived by multiplying the Variant I estimate (see notes to cols. 1–3) by the 1929–1931 ratio of the Variant III to the Variant I estimate. See notes to Table R-19, lines 1–10, cols. 2–4.

1917–1953: Calculated from the annual series for 1915–1918 described above, and those for 1919–1955 in Table R-10, cols. 2–4.

(8) 1871–1916: Calculated from the annual series for 1869–1918 derived by dividing the current price series (see notes to Table R-27, col. 8) by the price index implicit in the Variant I estimate.

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-10, col. 5.

TABLE R-29

(billions of dollars)

Year on Which Moving Average Is Centered	Current Prices			1929 Prices		
	Gross Capital Formation (1)	Capital Consumption (2)	Net Capital Formation (3)	Gross Capital Formation (4)	Capital Consumption (5)	Net Capital Formation (6)
1871	1.34	0.51	0.82	2.11	0.81	1.30
1872	1.40	0.55	0.85	2.25	0.88	1.37
1873	1.47	0.58	0.89	2.40	0.95	1.45
1874	1.59	0.62	0.97	2.63	1.02	1.62
1875	1.55	0.63	0.92	2.70	1.10	1.60
1876	1.52	0.63	0.89	2.83	1.18	1.65
1877	1.58	0.64	0.94	3.07	1.26	1.81
1878	1.72	0.67	1.06	3.36	1.34	2.02
1879	1.86	0.70	1.16	3.66	1.43	2.23
1880	2.01	0.76	1.26	3.94	1.53	2.42
1881	2.13	0.82	1.31	4.14	1.64	2.51
1882	2.22	0.88	1.34	4.31	1.75	2.57
1883	2.18	0.93	1.25	4.36	1.86	2.50
1884	2.21	0.98	1.23	4.50	1.97	2.52
1885	2.24	1.02	1.22	4.71	2.09	2.62
1886	2.26	1.07	1.19	4.83	2.22	2.62
1887	2.31	1.14	1.17	4.98	2.35	2.63
1888	2.56	1.20	1.36	5.54	2.50	3.05
1889	2.69	1.25	1.44	5.90	2.66	3.24
1890	2.92	1.29	1.63	6.53	2.82	3.71
1891	3.04	1.33	1.72	6.93	2.97	3.96
1892	3.10	1.34	1.76	7.22	3.12	4.10
1893	3.06	1.36	1.71	7.33	3.25	4.08
1894	3.01	1.37	1.63	7.35	3.37	3.98
1895	2.91	1.40	1.51	7.23	3.49	3.74
1896	3.00	1.45	1.55	7.43	3.61	3.82
1897	3.22	1.54	1.69	7.76	3.73	4.03
1898	3.48	1.64	1.84	8.09	3.86	4.22
1899	3.89	1.76	2.13	8.73	4.00	4.73
1900	4.23	1.88	2.35	9.20	4.15	5.06
1901	4.56	1.99	2.58	9.71	4.30	5.41
1902	4.71	2.08	2.63	9.95	4.46	5.49
1903	4.91	2.19	2.72	10.3	4.63	5.65
1904	5.29	2.33	2.96	10.8	4.82	5.94
1905	5.67	2.50	3.17	11.2	5.02	6.15

(continued)

Year on Which Moving Average Is Centered	Current Prices			1929 Prices		
	Gross Capital Formation (1)	Capital Consumption (2)	Net Capital Formation (3)	Gross Capital Formation (4)	Capital Consumption (5)	Net Capital Formation (6)
1906	5.69	2.66	3.02	11.1	5.24	5.82
1907	6.14	2.84	3.30	11.6	5.47	6.16
1908	6.42	3.02	3.40	11.9	5.70	6.20
1909	6.35	3.20	3.15	11.7	5.94	5.71
1910	6.48	3.36	3.12	11.8	6.17	5.59
1911	7.11	3.56	3.55	12.6	6.40	6.18
1912	6.84	3.74	3.09	12.0	6.64	5.40
1913	6.94	3.96	2.98	12.0	6.87	5.15
1914	8.05	4.26	3.80	13.1	7.10	6.05
1915	9.22	4.80	4.42	13.7	7.35	6.31
1916	10.5	5.71	4.79	13.6	7.64	6.00
1917	13.5	6.86	6.63	15.3	8.04	7.29
1918	16.7	8.19	8.47	16.4	8.41	7.94
1919	16.7	9.04	7.68	15.2	8.66	6.58
1920	16.7	9.51	7.23	14.9	8.94	5.98
1921	17.6	9.73	7.90	15.9	9.19	6.68
1922	16.8	9.71	7.11	15.5	9.29	6.21
1923	16.2	9.48	6.76	16.1	9.46	6.65
1924	18.0	9.71	8.30	18.0	9.83	8.19
1925	19.2	10.0	9.23	19.2	10.1	9.15
1926	19.2	10.2	9.03	19.4	10.3	9.03
1927	20.2	10.5	9.70	20.3	10.6	9.71
1928	19.2	10.6	8.54	19.4	10.8	8.57
1929	16.8	10.5	6.35	17.4	10.9	6.58
1930	13.6	10.1	3.48	14.3	10.8	3.49
1931	10.6	9.69	0.90	11.1	10.7	0.41
1932	7.72	9.29	−1.57	8.08	10.5	−2.43
1933	6.68	9.00	−2.32	7.50	10.4	−2.89
1934	7.60	8.98	−1.38	8.28	10.4	−2.11
1935	10.2	9.42	0.79	11.3	10.6	0.76
1936	12.1	9.97	2.10	13.4	10.8	2.60
1937	13.9	10.4	3.50	15.5	11.0	4.48
1938	15.9	10.9	4.98	17.2	11.3	5.93
1939	18.8	11.7	7.14	19.9	11.7	8.18
1940	21.7	12.8	8.87	21.3	12.4	8.86
1941	25.0	14.5	10.4	23.2	13.5	9.67
1942	27.7	16.9	10.7	24.7	15.1	9.60

Year on Which Moving Average Is Centered	Current Prices			1929 Prices		
	Gross Capital Formation (1)	Capital Consumption (2)	Net Capital Formation (3)	Gross Capital Formation (4)	Capital Consumption (5)	Net Capital Formation (6)
1943	28.7	19.7	9.00	24.7	17.1	7.65
1944	30.5	22.5	8.02	25.0	18.6	6.37
1945	33.3	26.2	7.08	25.4	20.2	5.24
1946	37.8	30.6	7.19	27.0	21.6	5.39
1947	40.7	34.8	5.99	26.8	22.8	4.00
1948	47.9	39.0	8.89	29.4	23.7	5.62
1949	55.5	44.1	11.4	31.2	25.1	6.09
1950	61.0	47.2	13.8	32.7	25.8	6.90
1951	65.2	49.3	15.9	33.5	26.2	7.24
1952	70.4	50.9	19.5	35.6	26.4	9.22
1953	74.6	52.5	22.1	36.6	26.5	10.1

The series are identical for Variants I and III.

(Notes on following page)

Appendix C

SOURCE, BY COLUMN

All entries are averages of annual series.

(1) 1871–1916: Calculated from the annual series for 1869–1918 derived as the sum of the series described in the notes to Table R-30, col. 5, Table R-33, col. 1, and Table R-34, cols. 1 and 3.

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-4, col. 5.

(2) 1871–1916: Calculated from the annual series for 1869–1918 derived as the sum of the series described in the notes to Table R-31, col. 5, and Table R-33, col. 2.

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-8, col. 3.

(3) 1871–1916: Calculated from the annual series for 1869–1918 derived by subtracting capital consumption (see notes to col. 2) from gross capital formation (see notes to col. 1).

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-4, col. 7.

(4) 1871–1916: Calculated from the annual series for 1869–1918 derived as the sum of the series described in the notes to Table R-30, col. 10, Table R-33, col. 4, and Table R-34, cols. 2 and 4.

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-5, col. 5.

(5) 1871–1916: Calculated from the annual series for 1869–1918 derived as the sum of those described in the notes to Table R-31, col. 10, and Table R-33, col. 5.

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-8, col. 6.

(6) 1871–1916: Calculated from the annual series for 1869–1918 derived by subtracting capital consumption (see notes to col. 5) from gross capital formation (see notes to col. 4).

1917–1953: Calculated from the annual series for 1915–1918 described above, and that for 1919–1955 in Table R-5, col. 7.

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TABLE R-30

FIVE-YEAR MOVING AVERAGES OF GROSS CONSTRUCTION, BY TYPE OF CONSTRUCTION, CURRENT AND 1929 PRICES, 1869–1955

(billions of dollars)

YEAR ON WHICH MOVING AVERAGE IS CENTERED	CURRENT PRICES					1929 PRICES				
	Nonfarm Residential (1)	Government Excluding Military (2)	Military (3)	Other (4)	Total (5)	Nonfarm Residential (6)	Government Excluding Military (7)	Military (8)	Other (9)	Total (10)
1871	0.22	0.06		0.50	0.77	0.47	0.11		0.92	1.50
1872	0.22	0.06		0.52	0.81	0.49	0.12		0.97	1.58
1873	0.23	0.06		0.56	0.86	0.51	0.13		1.05	1.69
1874	0.25	0.07		0.59	0.90	0.55	0.13		1.13	1.82
1875	0.26	0.07		0.54	0.87	0.62	0.14		1.06	1.82
1876	0.28	0.06		0.48	0.83	0.71	0.14		0.99	1.84
1877	0.29	0.06		0.47	0.82	0.75	0.15		1.00	1.90
1878	0.30	0.07		0.47	0.83	0.79	0.15		1.01	1.95
1879	0.31	0.07		0.52	0.91	0.82	0.16		1.14	2.12
1880	0.33	0.08		0.59	1.00	0.84	0.17		1.27	2.29
1881	0.35	0.08		0.68	1.11	0.87	0.18		1.42	2.47
1882	0.40	0.09		0.74	1.23	0.99	0.19		1.52	2.70
1883	0.48	0.09		0.75	1.32	1.18	0.20		1.52	2.90
1884	0.57	0.10		0.74	1.40	1.41	0.21		1.47	3.09
1885	0.67	0.10		0.73	1.50	1.68	0.22		1.44	3.33

Year								
1886	0.73	0.10	0.74	1.56	1.83	0.23	1.45	3.51
1887	0.79	0.11	0.70	1.60	2.02	0.24	1.36	3.62
1888	0.83	0.11	0.86	1.81	2.12	0.25	1.72	4.09
1889	0.81	0.12	0.98	1.91	2.09	0.27	2.01	4.37
1890	0.81	0.12	1.18	2.11	2.09	0.28	2.53	4.90
1891	0.79	0.13	1.30	2.22	2.09	0.30	2.84	5.22
1892	0.75	0.13	1.43	2.31	2.01	0.32	3.21	5.54
1893	0.72	0.14	1.41	2.27	2.00	0.33	3.24	5.57
1894	0.72	0.14	1.35	2.21	2.02	0.34	3.14	5.51
1895	0.70	0.14	1.25	2.09	1.98	0.36	2.95	5.30
1896	0.70	0.15	1.20	2.05	1.98	0.37	2.90	5.25
1897	0.70	0.16	1.19	2.04	1.95	0.39	2.82	5.16
1898	0.65	0.17	1.28	2.10	1.77	0.41	2.98	5.16
1899	0.65	0.18	1.43	2.26	1.72	0.43	3.30	5.46
1900	0.63	0.20	1.64	2.47	1.61	0.46	3.68	5.75
1901	0.64	0.22	1.82	2.68	1.58	0.50	3.98	6.05
1902	0.66	0.25	1.96	2.87	1.59	0.55	4.26	6.40
1903	0.82	0.28	1.95	3.04	1.91	0.61	4.17	6.69
1904	0.93	0.31	2.05	3.29	2.10	0.65	4.21	6.96
1905	1.03	0.35	2.15	3.54	2.23	0.71	4.23	7.18
1906	1.13	0.40	2.18	3.71	2.38	0.79	4.19	7.35
1907	1.25	0.43	2.32	4.00	2.55	0.83	4.34	7.72
1908	1.22	0.46	2.53	4.22	2.41	0.88	4.69	7.97
1909	1.19	0.50	2.56	4.25	2.30	0.95	4.73	7.99
1910	1.20	0.53	2.56	4.30	2.31	0.99	4.73	8.03

(continued)

TABLE R-30 (concluded)

YEAR ON WHICH MOVING AVERAGE IS CENTERED	CURRENT PRICES					1929 PRICES				
	Nonfarm Residential (1)	*Government* *Excluding Military* (2)	*Military* (3)	*Other* (4)	*Total* (5)	*Nonfarm Residential* (6)	*Government* *Excluding Military* (7)	*Military* (8)	*Other* (9)	*Total* (10)
1911	1.22	0.55		2.75	4.51	2.31	1.01	0.01	4.98	8.31
1912	1.17	0.58	a	2.60	4.35	2.23	1.06	0.01	4.66	7.95
1913	1.21	0.62	0.01	2.34	4.17	2.28	1.12	0.01	4.16	7.58
1914	1.26	0.64	0.01	2.27	4.17	2.34	1.12	0.02	3.92	7.40
1915	1.19	0.66	0.13	2.21	4.19	2.15	1.09	0.17	3.55	6.96
1916	1.04	0.68	0.44	2.05	4.22	1.81	1.02	0.52	2.98	6.32
1917	1.09	0.73	0.66	2.30	4.77	1.66	0.95	0.72	2.92	6.24
1918	1.07	0.82	0.69	2.83	5.41	1.38	0.87	0.74	3.08	6.05
1919	1.19	0.99	0.69	2.98	5.85	1.31	0.92	0.74	2.99	5.96
1920	1.64	1.19	0.58	3.12	6.52	1.76	1.08	0.59	3.07	6.50
1921	2.38	1.37	0.27	3.42	7.45	2.49	1.21	0.25	3.34	7.30
1922	3.06	1.57	0.05	3.64	8.32	3.18	1.39	0.04	3.58	8.19
1923	3.85	1.76	0.02	3.72	9.36	4.05	1.61	0.02	3.84	9.52
1924	4.50	1.88	0.01	4.21	10.6	4.70	1.75	0.01	4.34	10.8
1925	4.83	2.03	0.01	4.61	11.5	4.99	1.88	0.01	4.70	11.6
1926	4.90	2.20	0.01	4.82	11.9	5.09	2.09	0.01	4.93	12.1
1927	4.61	2.32	0.01	5.07	12.0	4.77	2.24	0.01	5.18	12.2
1928	3.96	2.46	0.02	5.02	11.4	4.08	2.45	0.02	5.11	11.7
1929	3.22	2.56	0.02	4.46	10.3	3.34	2.66	0.02	4.57	10.6
1930	2.37	2.44	0.03	3.68	8.52	2.49	2.72	0.03	3.79	9.02

1931	1.56	2.27	0.03	2.88	6.74	1.66	2.61	0.04	3.00	7.30
1932	1.00	2.21	0.04	2.04	5.28	1.13	2.57	0.04	2.17	5.91
1933	0.81	2.08	0.04	1.44	4.38	0.98	2.43	0.05	1.59	5.04
1934	0.81	2.26	0.04	1.30	4.41	1.00	2.52	0.04	1.44	5.01
1935	1.06	2.50	0.04	1.57	5.16	1.23	2.60	0.04	1.67	5.55
1936	1.35	2.85	0.04	1.78	6.03	1.52	2.89	0.05	1.84	6.29
1937	1.75	3.16	0.06	1.99	6.96	1.90	3.19	0.06	2.03	7.19
1938	2.14	3.37	0.13	2.23	7.86	2.24	3.38	0.14	2.24	7.99
1939	2.52	3.50	0.45	2.52	8.98	2.50	3.42	0.45	2.49	8.86
1940	2.50	4.01	1.44	2.41	10.4	2.41	3.71	1.27	2.39	9.78
1941	2.29	4.10	1.94	2.29	10.6	2.15	3.62	1.65	2.26	9.69
1942	1.93	3.80	2.08	2.24	10.1	1.74	3.23	1.76	2.16	8.88
1943	1.56	3.50	2.14	2.28	9.48	1.32	2.84	1.78	2.09	8.03
1944	1.65	3.11	1.86	2.93	9.54	1.20	2.39	1.49	2.33	7.40
1945	2.56	2.62	0.89	4.08	10.2	1.56	1.90	0.68	2.77	6.92
1946	4.07	2.80	0.42	5.69	13.0	2.22	1.81	0.31	3.46	7.79
1947	5.52	3.61	0.28	7.18	16.6	2.89	2.13	0.19	4.06	9.27
1948	7.80	4.63	0.17	8.68	21.3	3.89	2.58	0.09	4.61	11.2
1949	9.18	5.90	0.31	9.91	25.3	4.33	3.08	0.15	4.86	12.4
1950	10.1	7.16	0.55	10.9	28.7	4.59	3.55	0.25	5.10	13.5
1951	10.8	8.24	0.78	11.8	31.6	4.75	3.95	0.35	5.32	14.4
1952	11.8	9.17	0.96	12.9	34.8	5.06	4.27	0.42	5.58	15.3
1953	12.6	10.0	1.18	14.1	37.9	5.22	4.54	0.52	5.89	16.2

Because of rounding, detail will not necessarily add to total.

a Less than $0.005 billion.

The series are identical for Variants I and III.

(Notes on following page).

Appendix C

SOURCE, BY COLUMN

All entries are averages of annual series.

(1) Calculated from the annual series for 1869–1955 described below.

1869–1883: Estimated by the following steps.

1. Decade averages of construction excluding government were calculated for 1864–1873, 1869–1878, 1874–1883, 1879–1888, and 1884–1893 by deducting from the decade averages of gross construction (Table R-14, col. 1, and extension indicated in its notes) decade averages of government construction (computed from the annual series underlying cols. 2 and 3, and extension indicated in their notes).

2. The ratio of the decade average of nonfarm residential construction for 1884–1893 (calculated from the annuals underlying col. 1) to the decade average of construction excluding government (step 1) was calculated (42.7 per cent). The ratio for 1879–1888 was assumed to be 42 per cent (slightly lower than for 1884–1893); for 1874–1883, 37 per cent (appreciably lower than for 1879–1888); for 1869–1878, 33 per cent (appreciably lower than for 1874–1883); and for 1864–1873, 33 per cent (the same as for 1869–1878).

3. The decade averages of construction excluding government (step 1) were multiplied by the ratios assumed in step 2, to yield decade averages of nonfarm residential construction.

4. Interpolating along a straight line between the logs of the decade averages (step 3) centered at their mid-points, yielded a preliminary annual series. Those for 1879–1883 were discarded because the decade average for 1879–1888 derived by averaging them with the series for 1884–1888 was appreciably higher than that estimated in step 3. We replaced them by estimates obtained by averaging: (a) a series in which the percentage change from year to year was assumed to be the same as that from 1877 to 1878, and (b) a series in which the percentage change from year to year was assumed to be the same as that from 1884 to 1885.

5. Finally, the annual series estimated in step 4 was adjusted by the ratio of the decade average (step 3) to the decade average of the preliminary series.

1884–1888: By letter from David M. Blank (Institute for Urban Land Use and Housing Studies, Columbia University).

1889–1952: Grebler, Blank, and Winnick, *op. cit.*, Appendix B, Table B-6, p. 338.

1953–1955: From *Survey of Current Business*, July 1956, Table 31.

(2) Calculated from the annual series for 1869–1955 described below.

1869–1914: Sum of separate estimates for federal, state, and local governments described below.

Federal government: Sum of separate estimates for (1) military and naval construction, (2) conservation and development, (3) nonresidential building, and (4) other public construction. Each series was carried back through 1819 since it was needed for the estimate of capital consumption. We assumed that before 1915 the volume of residential building, highway construction, and construction for sewage disposal and water supply was negligible.

1. *Historical Statistics of the United States, 1789–1945*, Series H-28, adjusted to a calendar year basis by averaging pairs of fiscal years. While this construction

(2)   is financed from military and naval funds, we have not treated it as military (see Table R-6, col. 3) although most of it for 1861–1865 and for 1898 undoubtedly falls in that category.

2. The 1915 figure extrapolated by *Historical Statistics*, Series H-29 and H-31. The latter were adjusted to a calendar year basis by averaging pairs of fiscal years.

3. *Ibid.*, Series H-30, adjusted to a calendar year basis by averaging pairs of fiscal years.

4. The 1915 figure extrapolated by *Historical Statistics*, Series H-32, adjusted for 1819–1882 and 1903–1915 as follows.

1819–1882: Net expenditures for lighthouse service (*ibid.*, Series K-172) were deducted. The balance was adjusted to a calendar year basis by averaging pairs of fiscal years.

1903–1915: The series as shown includes expenditures on the Panama Canal which should not properly be included in the series for continental United States. A series excluding these expenditures was calculated by subtracting nonresidential building (see above) from Goldsmith's fiscal year estimate of public building underlying the calendar year series shown in *A Study of Saving in the United States*, Vol. I, Table R-27, col. 11, p. 619. Calendar year estimates were derived by averaging pairs of fiscal years.

State and local governments:

1869–1901: The annual series in 1929 prices underlying col. 7 multiplied by the price index derived by extrapolating that implicit in the estimate for 1902 by the cost of construction index described in Kuznets, *National Product since 1869*, Table IV-4, notes to line 1.

1902–1914: Sum of estimates of construction of (1) highways, (2) sewers, (3) public service enterprises including water supply systems, and (4) all other.

1. Highways: Sum of separate estimates for states, counties, and local governments.

State governments: Outlays on highways are reported for 1915–1919 in *Financial Statistics of States* (Bureau of the Census). They were assumed to be for fiscal years, although some states report on a calendar year basis. Outlays for 1902 and 1913 were calculated as the difference between operation alone and operation including outlays as reported in the *Census of Wealth, Debt and Taxation* for those years. Estimates for 1903–1912 and for 1914 were interpolated along a straight line. Calendar year estimates were derived by averaging pairs of fiscal years. The resulting outlay series for 1915–1919 is somewhat lower than the construction series for those years shown in *Construction and Building Materials, Statistical Supplement, May 1954*, Table 3. This could be attributed to our procedure in deriving the calendar year series for outlay and to its exclusion of federal aid. To adjust the outlay series upward did not seem warranted, and it was used as a continuation of the construction series without splicing with the latter.

Counties: Total outlay is reported for fiscal years 1902 and 1913 in *Census of Wealth, Debt and Taxation, 1902* and *1913*. Estimates for 1904–1912 were derived as the product of outlay by cities of 100,000 and over (described below) and the ratio of county outlay to the latter, the ratio

(2)   being interpolated along a straight line between those for 1902 and 1913. Total outlay for 1903 was estimated as a straight-line interpolation between that for 1902 and that for 1904. Outlay on highways is reported for 1902 (*ibid.*). Its ratio to total outlay was computed for that year and estimated for 1941 from data for selected counties reported in *Financial Statistics of Counties: 1941* (Bureau of the Census), Table 27. Annual ratios for 1903–1913 were interpolated along a straight line between those for 1902 and 1941. Highway outlay for 1903–1913 was estimated as the product of this ratio and total outlay. This outlay series was used as a continuation of the construction series reported for 1915 and later years in *Construction and Building Materials, Statistical Supplement, May 1954*, Table 3. Since the latter series is for calendar years, a fiscal year estimate for 1916 was derived by averaging pairs of calendar years. Fiscal year figures for 1914 and 1915 were interpolated along a straight line between those for 1913 and 1916. The fiscal year series for 1902–1915 was then adjusted to a calendar year basis by averaging pairs of years.

Local governments: Total capital outlay for 1902 is reported in *Census of Wealth, Debt and Taxation* for that year. The *Census* for 1913 reports outlay for all local governments of 2,500 and over. Total outlay for all local governments in that year was derived by substituting for the census figure for cities of 2,500–8,000 an estimate of outlay for all minor civil divisions, calculated as follows.

a. Outlay by cities of 25,000 and over is reported for 1902 in *Financial Statistics of Cities* (Bureau of the Census).

b. Outlay by cities of 30,000 and over, and by cities of 100,000 and over is reported for 1904–1913 (*ibid.*).

c. It was assumed that the change in outlay from 1902 to 1904 by cities of 100,000 and over was the same, proportionately, as the change from the 1902 outlay by cities of 25,000 and over to the 1904 outlay by cities of 30,000 and over.

d. For 1902 and 1913, outlay by cities of 25,000 (or 30,000) to 100,000 was calculated by subtracting outlay by cities of 100,000 and over from that by cities of 25,000 (or 30,000) and over.

e. The ratio of outlay by all minor civil divisions in 1902 to the outlay by cities of 8,000–25,000 was calculated from the *Census of Wealth, Debt and Taxation* and extrapolated to 1913 by the change in the ratio of outlay by cities of 25,000 (or 30,000) to 100,000 to that by cities of 100,000 and over.

f. Outlays by all minor civil divisions in 1913 were estimated by multiplying outlay by cities of 8,000–30,000 as reported in the *Census* for 1913, by the ratio calculated in step e.
      The ratio of total outlay to that by cities of 100,000 and over was computed for 1902 and 1913, interpolated along a straight line for the intervening years, and held at the 1913 level for 1915–1919. Outlay by cities of 100,000 and over as reported in *Financial Statistics of Cities, 1904* through *1912* and *1915* through *1919* was then multiplied by this ratio to yield total outlay for those years. Outlay for 1903 was estimated by straight-line interpolation between that for 1902 and that for 1904.

(2)   The ratio of highway outlay to total outlay by cities of 30,000 and over was computed for 1904–1913 and 1915–1919 from the same source. Total outlay by all local governments was multiplied by this ratio to yield highway outlay in those years. For 1915–1919, the estimates so derived were replaced by the estimates of highway construction given in *Construction and Building Materials, Statistical Supplement, May 1954*, Table 3. While the former are slightly higher, on the average, than the latter, the difference is too small to warrant adjustment of the series for 1904–1913. The estimate for 1914 was interpolated along a straight line between those for 1913 and 1915. Highway outlay in 1902 and 1903 was estimated by multiplying the expenditures by 148 cities (of 30,000 and over) on street paving and on bridges other than toll, as reported in *Financial Statistics of Cities, 1905*, Table 5, pp. 170–171, by the 1904–1905 ratio of highway outlay by all local governments to highway expenditures by these cities.

2. Sewers: Estimates cover cities alone. Expenditures by states and counties are negligible.

   Financial Statistics of Cities reports outlay on sewers and sewage disposal for 1904–1912 and 1915–1919, by cities of 30,000 and over. Outlay for 1913 was assumed to be the same percentage of outlay for sanitation (*ibid.*) as in 1912. All local government construction of sewers in 1915 and later years is reported in *Construction and Building Materials, Statistical Supplement, May 1954*, Table 3. Outlay for 1904–1913 was adjusted by the 1915–1918 average ratio of construction to outlay. Construction in 1914 was interpolated along a straight line between that for 1913 and 1915. Construction in 1902 and 1903 was estimated by multiplying the expenditures on sanitation by 148 cities (of 30,000 and over), as reported in *Financial Statistics of Cities* for 1905, Table 5, pp. 164–165, by the 1904–1905 ratio of sewer construction by all local governments to sanitation expenditures by these cities.

3. Public service enterprises including water supply: Sum of separate estimates for state and local governments. Construction by counties was negligible.

   State governments: Outlay for public service enterprises is reported for 1913 in *Census of Wealth, Debt and Taxation* for that year, and for 1915–1919 in *Financial Statistics of States*. (Expenditures on water supply are not available separately, and any such expenditures are included in "all other" construction by states.) It was interpolated for 1914 along a straight line between the figures for 1913 and 1915. For 1902 it was estimated as the same percentage of outlay on other than highway as in 1913. Outlay on other than highway was derived for both years by deducting highway outlay (see above) from total outlay as reported in *Census of Wealth, Debt and Taxation*. Estimates for 1903–1912 were interpolated along a straight line between those for 1902 and 1913. Pairs of years were averaged to yield a calendar year series. This series was used in place of a construction series, since no construction series was available.

   Local governments: Outlay by cities of 30,000 and over on (a) water supply systems, and on (b) municipal service enterprises, and public service enterprises excluding water supply systems is reported for 1904–1913 and 1915–1919 in *Financial Statistics of Cities*, Table 9. Outlay for 1914 was interpolated along a straight line between that for 1913 and 1915. Outlay in 1902 and 1903 was estimated as the product of payments by 148 cities of 30,000 and over for the given type of outlay (i.e., waterworks, or electric

(Notes continue on following page)

(2)   light and power, gas works, etc., as shown in *Financial Statistics of Cities, 1905,* Table 6, pp. 198–199) and the 1904–1905 ratio of outlay by all cities of 30,000 and over to expenditures by those cities.

  a. Water supply systems: *Construction and Building Materials, Statistical Supplement, May 1954,* Table 3, shows construction for 1915 and later years. Construction for 1902–1914 was estimated by applying to the outlay series for cities of 30,000 and over (described above) the 1915–1918 ratio of the construction to the outlay series.

  b. Municipal service enterprises, etc.: From the construction series for 1915 and later years (*ibid.,* Table 3) was deducted the outlay by states (see above) to yield an estimate of construction by cities. The latter was extrapolated back to 1902 by applying to the outlay series for cities of 30,000 and over (described above) the 1915–1918 ratio of the construction to the outlay series.

 4. All other construction: Estimated by the following steps.

  a. From total outlay by states and local governments was deducted their outlay on highways. The latter is described above, as is total outlay by counties and cities. Total state outlay is shown for 1902 and 1913 in *Historical Statistics of the United States, 1789–1945,* Series P-198, and for 1915–1918 in *Financial Statistics of States.* Straight-line interpolation between these figures yielded the annual estimates for 1903–1912 and 1914. The resulting series—assumed to be for fiscal years (see notes on state highway outlays)—was adjusted to a calendar year basis by averaging pairs of fiscal years.

  b. Construction by state and local governments for 1915 and later years is given in *Construction and Building Materials, Statistical Supplement, May 1954,* Table 5. Federal aid (*ibid.*) was added, and highway construction (*ibid.*) deducted.

  c. State and local construction other than highway, as derived in step b, was extrapolated from 1915 to 1902 by multiplying the outlay series described in step a by the 1915–1918 ratio of the construction to the outlay series.

  d. From state and local construction other than highway was deducted sewer, water supply, and public service enterprise construction described above.

 1915–1952: *Construction and Building Materials, Statistical Supplement, May 1954,* Table 3.

 1953–1955: From *Survey of Current Business,* July 1956, Table 31.

(3) Calculated from the annual series in Table R-6, col. 3.

(4) Calculated from the annual series derived as the difference between that underlying col. 5 and those underlying cols. 1–3.

(5) Calculated from the annual series for 1869–1955 derived as the sum of (1) the cost of oil and gas wells drilled, and (2) all other new construction.

 1. 1869–1918: Calculated by multiplying the 1929 price series underlying col. 10 by the price index for petroleum pipe lines. The latter was computed for 1915 and later years from *Construction and Building Materials, Statistical Supplement, May 1954,* pp. 33 and 82 and was extrapolated from 1915 by the cost of con-

(5)   struction index described in *National Product since 1869*, Table IV-4, notes to line 1.

1919–1955: Described in the notes to Table R-4, col. 1.

2. 1869–1914: A preliminary series was calculated by multiplying the 1929 price series underlying col. 10 by the price index. The latter was derived by extrapolating the price index implicit in the estimate for 1915 by the cost of construction index indicated above. For 1869–1913 the preliminary series was adjusted by the ratios of the final decade averages underlying Table R-14, col. 1 to the ten-year averages of the preliminary series. The ratios were centered at the mid-point of each overlapping decade and estimated annually by straight-line interpolation between these mid-points. No adjustment was made in the estimate for 1914.

1915–1918: Sum of new private nonfarm residential construction given in col. 1, and other new construction shown in *Construction and Building Materials, Statistical Supplement, May 1954,* Tables 2 and 3.

1919–1955: Described in the notes to Table R-4, col. 1.

(6) Calculated from the annual series for 1869–1955 described below.

1869–1888 (1864–1868 also estimated, for computation of 1864–1873 decade): A preliminary series was calculated by dividing the series underlying col. 1 by the annual price index derived by extrapolating the index implicit in the estimate for 1889 by the cost of construction index described in *National Product since 1869*, Table IV-4, notes to line 1. The preliminary series was then adjusted to the level of the decade estimates derived by dividing the decade estimates in current prices (see notes to col. 1) by the decade averages of the annual price index.

1889–1952: Grebler, Blank, and Winnick, *op. cit.*, Appendix B, Table B-6.

1953–1955: Col. 1 divided by the price index derived by extrapolating that for 1952 by the index implicit in the 1947–1949 price series for all private residential nonfarm building (including nonhousekeeping), *Construction Review*, September 1956.

(7) Calculated from the annual series for 1869–1955 described below.

1819–1914 (1819–1868 estimated for calculation of depreciation): Sum of separate estimates for federal government, and state and local governments.

Federal government: Sum of separate estimates for (1) military and naval construction, (2) conservation and development, (3) nonresidential building, and (4) other public construction. For each type of construction, the series in current prices as described in the notes to col. 2 was deflated by the annual price index derived by extrapolating that implicit in the estimate for 1915 by the cost of construction index described in *National Product since 1869*, Table IV-4, notes to line 1. The latter, available only back to 1840, was extended to 1810 by the Warren and Pearson wholesale price index of building materials given in *Historical Statistics of the United States, 1789–1945*, Series L-10.

State and local governments:

1819–1901: Extrapolated from 1902 by the following procedure:

1. Decade averages of net national product per capita in 1929 prices as shown for 1874–1883, 1884–1893, 1894–1903, and 1899–1908 in Kuznets' paper in *Income and Wealth, Series II* (International Association for Research in Income

(Notes continue on following page)

Appendix C

(7) and Wealth, 1952), Table 4, p. 55, were centered at the end of 1878, 1888, 1898, and 1903, respectively. (The net national product series from which they were calculated differs slightly from that in Table R-12, col. 4, but the effect on the per capitas is negligible.) In *National Income in the United States, 1799–1938* by Robert F. Martin (National Industrial Conference Board, 1939), Table 1, is shown per capita realized income in 1926 prices. Since the series shows practically no change from 1902 to the end of 1903 (estimated by averaging the estimates for 1903 and 1904), it was assumed that the 1929 price series figure for 1902 was identical with that for the end of 1903 (i.e., the mid-point of the decade average for 1899–1908). The 1929 price figure for the end of 1878 (i.e., the mid-point of the decade average for 1874–1883) was extrapolated to the end of 1868, 1858, 1848, and 1838 by the change in the Martin series from 1869 to 1879, 1859 to 1869, 1849 to 1859, and 1839 to 1849, respectively. The figure for the end of 1808 was estimated on the assumption that there was a 50 per cent increase in per capita income between 1808 and 1838. Estimates for the end of 1818 and 1828 were interpolated along a logarithmic straight line between those for 1808 and 1838.

2. Urban and rural population as of the end of 1818, 1828, 1838, etc., and for July 1, 1902 were estimated. The end-of-year figures were derived by averaging pairs of July 1 figures (for 1818 and 1819, 1828 and 1829, etc.). The July 1 figures were estimated as follows.

   Urban, rural, and total population as of census dates are given for 1800 and later years in *Historical Statistics of the United States, 1789–1945*, Series B-16, B-17, and B-13. From these series the ratio of urban to total population was computed. The ratio as of July 1 for any given year was derived by interpolating along a straight line between the ratios for the census dates. Applying these ratios to total population as of July 1 (*ibid.*, Series B-31) yielded a breakdown of the total into urban and rural.

   Since in the later years construction in urban areas accounts for a much higher proportion of total public construction than that in rural areas, it was assumed that this was true in the years before 1902. To reflect this differential, we weighted urban population 3 and rural population 1.

3. Multiplying the weighted index of population derived in step 2 by the per capitas derived in step 1 yielded the index by which total public construction in 1902 in 1929 prices was extrapolated back to the end of 1898, 1888, 1878, etc. The ratio of construction to total population as of these dates was calculated, and annual ratios as of July 1 were interpolated along a straight line between them. These ratios, multiplied by total population as of July 1 (*ibid.*, Series B-31), yielded the estimate of public construction for each year from 1901 through 1819.

   1902–1914: Sum of the components underlying col. 2 each converted to 1929 prices by a price index derived for each series by extrapolating that implicit in the estimate for 1915 by the cost of construction index described in *National Product since 1869*, Table IV-4, notes to line 1.

   1915–1952: The series in *Construction and Building Materials, Statistical Supplements, May 1954*, Table 16, adjusted to a 1929 price base.

   1953–1955: The 1952 figure extrapolated by the 1947–1949 price series given in *Construction Review*, September 1956, Table 4, p. 11.

(8) Calculated from the annual series in Table R-7, col. 1.

(9) Calculated from the annual series derived as the difference between that underlying col. 10 and those underlying cols. 6–8.

(10) Calculated from the annual series for 1869–1955 derived as the sum of (1) the cost of oil and gas wells drilled, and (2) all other new construction.

    1. 1869–1918: Described in the notes to Table R-15, col. 1.

    1919–1955: Described in the notes to Table R-5, col. 1.

    2. 1869–1913: Interpolations between or extrapolations from the series underlying Table R-15, col. 1, by the annual series on output of construction materials for domestic consumption described in *National Product since 1869*, Table II-5, notes to col. 2. The ratios of the decade averages of gross construction to the decade averages of output were computed and centered at the midpoints of the decades. Annual ratios were interpolated along a straight line and applied to the annual output figures. The resulting estimates for 1909–1913 when averaged with those for 1914–1918 yielded a figure for 1909–1918 below that shown in Table R-15, col. 1. They were adjusted by the relative difference between the two estimates for the quinquennium.

    1914: Extrapolation of the figure for 1915 by the 1914–1915 change in Shaw's series on output of construction materials in constant prices as calculated from *Value of Commodity Output since 1869*, p. 77.

    1915–1918: Sum of new private nonfarm residential construction (col. 6), and other new construction given in *Construction and Building Materials, Statistical Supplement, May 1954*, Tables 15 and 16, and adjusted to a 1929 price base.

    1919–1955: Described in the notes to Table R-5, col. 1.

TABLE R-31

FIVE-YEAR MOVING AVERAGES OF DEPRECIATION ON CONSTRUCTION, BY TYPE OF CONSTRUCTION, CURRENT AND 1929 PRICES, 1869–1955
(billions of dollars)

YEAR ON WHICH MOVING AVERAGE IS CENTERED	CURRENT PRICES					1929 PRICES				
	Nonfarm Residential (1)	Government Excluding Military (2)	Military (3)	Other (4)	Total (5)	Nonfarm Residential (6)	Government Excluding Military (7)	Military (8)	Other (9)	Total (10)
1871	0.06	0.03		0.21	0.31	0.13	0.06		0.37	0.56
1872	0.06	0.03		0.23	0.33	0.14	0.06		0.40	0.61
1873	0.07	0.03		0.25	0.35	0.15	0.06		0.44	0.65
1874	0.07	0.03		0.26	0.37	0.16	0.07		0.48	0.70
1875	0.07	0.03		0.28	0.38	0.17	0.07		0.52	0.76
1876	0.07	0.03		0.28	0.39	0.18	0.07		0.57	0.82
1877	0.07	0.03		0.29	0.40	0.19	0.08		0.61	0.88
1878	0.08	0.04		0.31	0.42	0.20	0.08		0.65	0.93
1879	0.08	0.04		0.33	0.45	0.22	0.08		0.70	0.99
1880	0.09	0.04		0.35	0.48	0.23	0.08		0.73	1.05
1881	0.10	0.04		0.38	0.51	0.24	0.09		0.78	1.10
1882	0.10	0.04		0.41	0.55	0.26	0.09		0.82	1.16
1883	0.11	0.04		0.43	0.59	0.27	0.10		0.86	1.23
1884	0.12	0.05		0.46	0.63	0.30	0.10		0.91	1.30
1885	0.13	0.05		0.48	0.66	0.32	0.10		0.95	1.38
1886	0.14	0.05		0.51	0.70	0.35	0.11		1.00	1.47
1887	0.15	0.05		0.54	0.75	0.39	0.11		1.06	1.56
1888	0.17	0.05		0.56	0.78	0.42	0.12		1.11	1.65
1889	0.18	0.06		0.58	0.81	0.46	0.12		1.17	1.75
1890	0.19	0.06		0.59	0.84	0.49	0.13		1.23	1.85

Year										
1891	0.20	0.06		0.60	0.86	0.53	0.14		1.29	1.95
1892	0.21	0.06		0.60	0.86	0.56	0.14		1.34	2.04
1893	0.22	0.06		0.60	0.88	0.59	0.15		1.39	2.13
1894	0.22	0.06		0.61	0.90	0.62	0.16		1.44	2.22
1895	0.23	0.07		0.62	0.92	0.65	0.16		1.49	2.31
1896	0.24	0.07		0.64	0.95	0.68	0.17		1.54	2.39
1897	0.25	0.08		0.67	1.00	0.71	0.18		1.59	2.48
1898	0.27	0.08		0.71	1.06	0.73	0.19		1.65	2.57
1899	0.29	0.09		0.75	1.12	0.76	0.20		1.71	2.66
1900	0.31	0.09		0.79	1.19	0.78	0.21		1.76	2.75
1901	0.32	0.10		0.84	1.26	0.80	0.22		1.82	2.84
1902	0.34	0.11		0.87	1.32	0.81	0.23		1.88	2.92
1903	0.35	0.12		0.92	1.38	0.83	0.24		1.94	3.01
1904	0.38	0.13		0.98	1.48	0.86	0.26		1.99	3.11
1905	0.41	0.14		1.04	1.59	0.89	0.27		2.06	3.21
1906	0.44	0.15		1.10	1.69	0.92	0.29		2.12	3.32
1907	0.47	0.16		1.16	1.79	0.95	0.30		2.18	3.44
1908	0.50	0.18		1.21	1.89	0.98	0.32		2.25	3.56
1909	0.52	0.19		1.26	1.97	1.02	0.34		2.32	3.68
1910	0.54	0.20		1.30	2.05	1.04	0.36		2.39	3.80
1911	0.56	0.22	a	1.36	2.14	1.07	0.39	a	2.46	3.92
1912	0.58	0.23	a	1.42	2.23	1.10	0.41	a	2.53	4.04
1913	0.59	0.25	a	1.48	2.32	1.12	0.44	a	2.60	4.17
1914	0.62	0.27	a	1.58	2.47	1.15	0.46	a	2.68	4.29
1915	0.66	0.31	0.01	1.76	2.74	1.17	0.49	0.01	2.76	4.43
1916	0.74	0.36	0.02	2.04	3.16	1.19	0.51	0.02	2.84	4.56
1917	0.84	0.44	0.05	2.39	3.72	1.20	0.54	0.05	2.93	4.72
1918	1.00	0.54	0.10	2.84	4.49	1.21	0.56	0.09	3.01	4.87
1919	1.10	0.62	0.14	3.12	4.97	1.22	0.58	0.13	3.09	5.01
1920	1.16	0.66	0.17	3.25	5.24	1.22	0.60	0.16	3.16	5.15

(continued)

TABLE R-31 (concluded)

YEAR ON WHICH MOVING AVERAGE IS CENTERED	CURRENT PRICES					1929 PRICES				
	Nonfarm Residential (1)	*Government Excluding Military* (2)	*Military* (3)	*Other* (4)	*Total* (5)	*Nonfarm Residential* (6)	*Government Excluding Military* (7)	*Military* (8)	*Other* (9)	*Total* (10)
1921	1.22	0.72	0.20	3.33	5.48	1.24	0.63	0.18	3.23	5.28
1922	1.27	0.76	0.21	3.35	5.59	1.28	0.66	0.19	3.28	5.41
1923	1.26	0.77	0.20	3.26	5.49	1.33	0.70	0.19	3.33	5.56
1924	1.33	0.81	0.20	3.31	5.65	1.40	0.75	0.19	3.41	5.74
1925	1.42	0.86	0.21	3.43	5.92	1.47	0.79	0.19	3.49	5.95
1926	1.49	0.89	0.20	3.51	6.10	1.55	0.85	0.19	3.58	6.17
1927	1.57	0.94	0.20	3.61	6.32	1.62	0.90	0.19	3.68	6.40
1928	1.62	0.97	0.20	3.71	6.50	1.67	0.97	0.19	3.78	6.61
1929	1.63	1.00	0.19	3.74	6.56	1.70	1.04	0.20	3.86	6.79
1930	1.58	0.99	0.18	3.73	6.48	1.72	1.11	0.20	3.92	6.94
1931	1.51	1.02	0.17	3.66	6.36	1.71	1.18	0.20	3.95	7.04
1932	1.43	1.08	0.17	3.62	6.29	1.69	1.25	0.20	3.96	7.10
1933	1.36	1.14	0.16	3.55	6.22	1.68	1.31	0.20	3.95	7.15
1934	1.33	1.23	0.17	3.54	6.26	1.67	1.38	0.20	3.94	7.18
1935	1.38	1.37	0.17	3.62	6.54	1.65	1.44	0.20	3.94	7.23
1936	1.44	1.47	0.16	3.77	6.85	1.65	1.50	0.19	3.96	7.29
1937	1.49	1.54	0.14	3.84	7.01	1.65	1.57	0.16	3.98	7.36
1938	1.57	1.63	0.12	3.94	7.26	1.66	1.65	0.13	4.00	7.44
1939	1.68	1.73	0.10	4.05	7.55	1.68	1.73	0.10	4.03	7.54
1940	1.77	1.91	0.12	4.10	7.90	1.70	1.81	0.11	4.07	7.69
1941	1.87	2.12	0.20	4.19	8.38	1.71	1.89	0.17	4.11	7.87
1942	2.00	2.30	0.30	4.39	8.98	1.72	1.96	0.24	4.15	8.07
1943	2.12	2.47	0.41	4.62	9.62	1.72	2.01	0.33	4.19	8.24
1944	2.27	2.66	0.54	4.97	10.4	1.71	2.05	0.41	4.19	8.36
1945	2.51	2.86	0.67	5.62	11.7	1.70	2.08	0.46	4.20	8.45

Year										
1946	2.83	3.12	0.77	6.38	13.1	1.70	2.10	0.49	4.25	8.54
1947	3.11	3.41	0.86	7.14	14.5	1.72	2.12	0.50	4.30	8.65
1948	3.44	3.72	0.95	7.91	16.0	1.76	2.16	0.51	4.38	8.80
1949	3.81	4.06	1.03	8.74	17.6	1.81	2.20	0.51	4.49	9.01
1950	4.11	4.38	1.09	9.31	18.9	1.86	2.25	0.52	4.57	9.20
1951	4.36	4.65	1.15	9.80	20.0	1.92	2.31	0.53	4.64	9.40
1952	4.64	4.95	1.22	10.3	21.1	1.98	2.37	0.55	4.70	9.61
1953	4.93	5.33	1.31	10.8	22.4	2.05	2.44	0.57	4.77	9.84

Because of rounding, detail will not necessarily add to total.

ᵃ Less than $5 million.

The series are identical for Variants I and III.

SOURCE, BY COLUMN

All entries are averages of annual series.

(1) Calculated from the annual series for 1869–1955 described below.

1869–1888: See notes to Table R-16, col. 1.

1889–1952: Given in Grebler, Blank, and Winnick, *op. cit.*, Appendix E, Table E-2, pp. 384–385.

1953–1955: Col. 5 multiplied by the price index implicit in gross construction, Table R-30, cols. 1 and 6.

(2) Calculated from the annual series for 1869–1955 estimated separately for (1) sewer and highway construction, and (2) all other government construction excluding military. For both (1) and (2), the annual estimates in 1929 prices underlying col. 7 were multiplied by the price index calculated for the given type of construction from the series described in the notes to Table R-30, col. 2 or 7.

(3) Calculated from the annual series in Table R-6, col. 5.

(4) Calculated from the annual series for 1869–1955 estimated as the sum of (1) estimated depreciation on "other" construction, and (2) depletion. For both (1) and (2) the annual estimates in 1929 prices underlying col. 9 were multiplied by the appropriate price index. The price index for (1) was calculated from the series underlying Table R-30, cols. 4 and 9; that for (2) before 1919 is the index implicit in output

of producers' durables (see notes to Table R-14, col. 2), excluding munitions (Tables R-6 and R-7), and for 1919–1955, the index implicit in flow of producers' durables, excluding munitions (Tables R-4 to R-7).

(5) Calculated from the annual series for 1869–1955 estimated as the sum of those underlying cols. 1–4.

(6) Calculated from the annual series for 1869–1955 described below.

1869–1888: See notes to Table R-17, col. 1.

1889–1952: Given in Grebler, Blank, and Winnick, *op. cit.*, Appendix E, Table E-2, pp. 384–385.

1953–1955: Calculated by the procedure indicated for preceding years in notes to Table E-2, *ibid.*, p. 385.

(7) Calculated from the annual series for 1869–1955 described in the notes to Table R-8, col. 4.

(8) Calculated from the annual series in Table R-7, col. 3.

(9) Calculated from the annual series for 1869–1955 estimated as the sum of (1) estimated depreciation on "other" construction, and (2) depletion.

1869–1918: Described in the notes to Table R-17, col. 1.

1919–1955: Described in the notes to Table R-8, col. 4.

(10) Calculated from the annual series for 1869–1955 estimated as the sum of those underlying cols. 6–9.

TABLE R-32

FIVE-YEAR MOVING AVERAGES OF NET CONSTRUCTION, BY TYPE OF CONSTRUCTION, CURRENT AND 1929 PRICES, 1869–1955

(billions of dollars)

YEAR ON WHICH MOVING AVERAGE IS CENTERED	CURRENT PRICES					1929 PRICES				
	Nonfarm Residential (1)	Government Excluding Military (2)	Military (3)	Other (4)	Total (5)	Nonfarm Residential (6)	Government Excluding Military (7)	Military (8)	Other (9)	Total (10)
1871	0.16	0.02		0.28	0.46	0.34	0.05		0.54	0.93
1872	0.16	0.03		0.29	0.48	0.35	0.06		0.57	0.97
1873	0.17	0.03		0.31	0.51	0.36	0.06		0.61	1.04
1874	0.18	0.03		0.33	0.54	0.40	0.07		0.65	1.11
1875	0.19	0.03		0.26	0.49	0.45	0.07		0.54	1.06
1876	0.21	0.03		0.20	0.44	0.53	0.07		0.42	1.02
1877	0.22	0.03		0.17	0.42	0.56	0.07		0.39	1.03
1878	0.22	0.03		0.16	0.41	0.58	0.08		0.36	1.02
1879	0.23	0.03		0.20	0.46	0.60	0.08		0.45	1.13
1880	0.24	0.04		0.24	0.52	0.62	0.09		0.54	1.24
1881	0.25	0.04		0.30	0.59	0.63	0.09		0.64	1.37
1882	0.30	0.04		0.34	0.68	0.74	0.10		0.70	1.54
1883	0.37	0.05		0.32	0.73	0.91	0.11		0.65	1.67
1884	0.45	0.05		0.28	0.78	1.11	0.11		0.57	1.79
1885	0.54	0.05		0.24	0.83	1.35	0.11		0.48	1.95

Year								
1886	0.59	0.05	0.23	0.86	1.48	0.12	0.45	2.04
1887	0.64	0.06	0.16	0.85	1.63	0.13	0.30	2.06
1888	0.66	0.06	0.30	1.02	1.69	0.13	0.61	2.44
1889	0.63	0.06	0.40	1.10	1.63	0.14	0.84	2.61
1890	0.62	0.06	0.60	1.28	1.60	0.16	1.30	3.05
1891	0.59	0.07	0.70	1.36	1.56	0.16	1.55	3.28
1892	0.54	0.07	0.83	1.44	1.45	0.18	1.87	3.50
1893	0.51	0.07	0.80	1.39	1.41	0.18	1.85	3.44
1894	0.50	0.07	0.74	1.31	1.40	0.19	1.70	3.29
1895	0.47	0.08	0.62	1.16	1.33	0.20	1.46	2.99
1896	0.46	0.08	0.56	1.10	1.30	0.20	1.36	2.86
1897	0.44	0.08	0.51	1.04	1.24	0.21	1.23	2.68
1898	0.37	0.09	0.57	1.03	1.03	0.22	1.33	2.58
1899	0.36	0.10	0.69	1.14	0.96	0.23	1.60	2.80
1900	0.33	0.10	0.84	1.28	0.84	0.25	1.92	3.00
1901	0.32	0.12	0.98	1.42	0.78	0.28	2.16	3.22
1902	0.32	0.14	1.08	1.56	0.78	0.32	2.38	3.48
1903	0.46	0.16	1.03	1.66	1.08	0.36	2.23	3.67
1904	0.56	0.18	1.07	1.81	1.24	0.40	2.22	3.85
1905	0.62	0.21	1.11	1.95	1.35	0.44	2.18	3.96
1906	0.69	0.24	1.09	2.02	1.46	0.50	2.07	4.03
1907	0.78	0.26	1.16	2.20	1.60	0.52	2.16	4.28
1908	0.72	0.28	1.32	2.33	1.42	0.56	2.44	4.42
1909	0.66	0.32	1.31	2.28	1.29	0.61	2.41	4.31
1910	0.66	0.32	1.27	2.25	1.27	0.63	2.34	4.24

TABLE R-32 (concluded)

YEAR ON WHICH MOVING AVERAGE IS CENTERED	CURRENT PRICES					1929 PRICES				
	Nonfarm Residential (1)	Government Excluding Military (2)	Military (3)	Other (4)	Total (5)	Nonfarm Residential (6)	Government Excluding Military (7)	Military (8)	Other (9)	Total (10)
1911	0.65	0.33	a	1.39	2.37	1.24	0.62	0.01	2.52	4.39
1912	0.60	0.35		1.18	2.12	1.13	0.65		2.13	3.91
1913	0.61	0.37	0.01	0.86	1.85	1.16	0.68	0.01	1.56	3.41
1914	0.64	0.37	0.01	0.69	1.71	1.19	0.66	0.02	1.24	3.11
1915	0.53	0.35	0.13	0.44	1.45	0.98	0.60	0.17	0.79	2.54
1916	0.31	0.32	0.42	0.02	1.06	0.62	0.51	0.49	0.14	1.76
1917	0.25	0.29	0.61	−0.09	1.05	0.45	0.41	0.66	−0.01	1.52
1918	0.06	0.28	0.59	−0.01	0.92	0.16	0.31	0.65	0.06	1.18
1919	0.09	0.38	0.55	−0.14	0.88	0.09	0.34	0.61	−0.10	0.95
1920	0.49	0.52	0.40	−0.13	1.28	0.54	0.47	0.43	−0.09	1.35
1921	1.16	0.65	0.07	0.09	1.97	1.25	0.58	0.07	0.12	2.01
1922	1.80	0.81	−0.16	0.29	2.74	1.90	0.72	−0.15	0.30	2.78
1923	2.59	0.99	−0.18	0.47	3.87	2.72	0.91	−0.17	0.50	3.96
1924	3.16	1.08	−0.19	0.90	4.95	3.31	1.00	−0.18	0.93	5.06
1925	3.41	1.17	−0.20	1.18	5.57	3.52	1.09	−0.18	1.21	5.64
1926	3.41	1.31	−0.19	1.32	5.84	3.54	1.24	−0.18	1.35	5.94
1927	3.04	1.38	−0.19	1.46	5.70	3.15	1.34	−0.18	1.49	5.80
1928	2.33	1.49	−0.18	1.31	4.95	2.41	1.48	−0.18	1.33	5.05
1929	1.59	1.56	−0.17	0.72	3.69	1.64	1.62	−0.17	0.71	3.80
1930	0.79	1.45	−0.15	−0.06	2.04	0.77	1.61	−0.16	−0.13	2.08

Year	1	2	3	4	5	6	7	8	9	10
1931	0.05	1.25	−0.14	−0.79	0.37	−0.05	1.43	−0.16	−0.95	0.26
1932	−0.44	1.13	−0.13	−1.58	−1.01	−0.57	1.32	−0.16	−1.78	−1.19
1933	−0.55	0.95	−0.12	−2.11	−1.84	−0.70	1.11	−0.15	−2.36	−2.10
1934	−0.52	1.03	−0.13	−2.23	−1.85	−0.66	1.14	−0.16	−2.50	−2.17
1935	−0.32	1.14	−0.13	−2.05	−1.38	−0.42	1.16	−0.16	−2.27	−1.68
1936	−0.09	1.38	−0.12	−1.99	−0.82	−0.13	1.39	−0.14	−2.12	−1.00
1937	0.26	1.61	−0.08	−1.85	−0.06	0.26	1.61	−0.09	−1.95	−0.17
1938	0.57	1.74	0.01	−1.71	0.61	0.58	1.73	0.01	−1.76	0.56
1939	0.84	1.76	0.35	−1.53	1.43	0.82	1.69	0.34	−1.54	1.32
1940	0.72	2.10	1.32	−1.69	2.46	0.71	1.90	1.15	−1.68	2.09
1941	0.42	1.98	1.74	−1.90	2.23	0.44	1.73	1.48	−1.84	1.81
1942	−0.07	1.50	1.78	−2.15	1.07	0.02	1.27	1.51	−1.99	0.81
1943	−0.56	1.03	1.73	−2.33	−0.14	−0.39	0.82	1.45	−2.09	−0.21
1944	−0.62	0.44	1.32	−2.04	−0.90	−0.51	0.34	1.08	−1.86	−0.95
1945	0.04	−0.24	0.22	−1.54	−1.51	−0.14	−0.18	0.22	−1.43	−1.53
1946	1.24	−0.32	−0.36	−0.70	−0.14	0.52	−0.29	−0.18	−0.79	−0.75
1947	2.41	0.20	−0.59	0.04	2.07	1.17	a	−0.32	−0.24	0.62
1948	4.36	0.91	−0.78	0.77	5.27	2.14	0.42	−0.41	0.24	2.38
1949	5.37	1.84	−0.72	1.17	7.66	2.52	0.88	−0.36	0.37	3.41
1950	6.02	2.78	−0.54	1.59	9.84	2.73	1.30	−0.27	0.53	4.29
1951	6.41	3.60	−0.37	2.03	11.7	2.83	1.64	−0.19	0.68	4.96
1952	7.15	4.22	−0.27	2.60	13.7	3.08	1.90	−0.13	0.88	5.72
1953	7.64	4.70	−0.13	3.32	15.5	3.17	2.10	−0.06	1.12	6.33

Because of rounding, detail will not necessarily add to total.

a Less than $5 million.

SOURCE: All entries are averages of annual series calculated by subtracting the series underlying Table R-31, cols. 1–10, from those underlying Table R-30, cols. 1–10, respectively.

TABLE R-33

FIVE-YEAR MOVING AVERAGES OF GROSS AND NET PRODUCERS' DURABLES,
CURRENT AND 1929 PRICES, 1869–1955

(billions of dollars)

Year on Which Moving Average Is Centered	Current Prices			1929 Prices		
	Gross Producers' Durables (1)	Capital Consumption (2)	Net Producers' Durables (3)	Gross Producers' Durables (4)	Capital Consumption (5)	Net Producers' Durables (6)
1871	0.39	0.21	0.18	0.46	0.24	0.22
1872	0.40	0.22	0.18	0.48	0.27	0.22
1873	0.40	0.24	0.16	0.49	0.29	0.20
1874	0.41	0.25	0.16	0.51	0.32	0.19
1875	0.37	0.25	0.12	0.50	0.34	0.16
1876	0.33	0.24	0.09	0.49	0.36	0.13
1877	0.33	0.24	0.09	0.54	0.38	0.16
1878	0.38	0.24	0.14	0.64	0.41	0.24
1879	0.45	0.26	0.19	0.77	0.44	0.33
1880	0.53	0.28	0.25	0.91	0.48	0.43
1881	0.58	0.31	0.28	1.01	0.53	0.48
1882	0.60	0.33	0.27	1.04	0.58	0.46
1883	0.55	0.34	0.21	1.00	0.63	0.37
1884	0.53	0.35	0.18	1.00	0.67	0.32
1885	0.52	0.36	0.16	1.02	0.71	0.31
1886	0.52	0.37	0.15	1.05	0.75	0.30
1887	0.56	0.39	0.17	1.13	0.79	0.34
1888	0.61	0.41	0.20	1.24	0.84	0.40
1889	0.64	0.44	0.20	1.32	0.90	0.42
1890	0.64	0.45	0.19	1.36	0.96	0.40
1891	0.65	0.47	0.18	1.42	1.02	0.40
1892	0.63	0.48	0.15	1.40	1.07	0.33
1893	0.61	0.48	0.14	1.43	1.12	0.31
1894	0.60	0.47	0.13	1.47	1.15	0.32
1895	0.58	0.48	0.10	1.44	1.18	0.25
1896	0.58	0.50	0.08	1.42	1.21	0.20
1897	0.66	0.53	0.12	1.54	1.25	0.29
1898	0.75	0.58	0.17	1.66	1.29	0.37
1899	0.84	0.64	0.20	1.75	1.34	0.41
1900	0.97	0.69	0.28	1.97	1.40	0.57
1901	1.10	0.72	0.38	2.23	1.46	0.77
1902	1.16	0.76	0.40	2.34	1.54	0.80
1903	1.22	0.80	0.42	2.47	1.62	0.85
1904	1.36	0.85	0.50	2.72	1.71	1.01
1905	1.48	0.91	0.57	2.94	1.81	1.13
1906	1.47	0.98	0.49	2.88	1.92	0.96
1907	1.54	1.05	0.48	2.97	2.03	0.94
1908	1.64	1.13	0.50	3.10	2.14	0.95
1909	1.62	1.23	0.39	2.98	2.26	0.72
1910	1.65	1.31	0.33	2.97	2.37	0.60

(continued)

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Year on Which Moving Average Is Centered	Current Prices			1929 Prices		
	Gross Producers' Durables (1)	Capital Consumption (2)	Net Producers' Durables (3)	Gross Producers' Durables (4)	Capital Consumption (5)	Net Producers' Durables (6)
1911	1.85	1.42	0.43	3.24	2.48	0.76
1912	1.92	1.51	0.41	3.31	2.60	0.71
1913	1.96	1.64	0.32	3.24	2.70	0.54
1914	2.28	1.79	0.49	3.57	2.80	0.76
1915	2.83	2.06	0.76	3.94	2.92	1.02
1916	3.69	2.56	1.14	4.34	3.07	1.27
1917	4.56	3.14	1.42	4.81	3.32	1.50
1918	5.42	3.70	1.72	5.27	3.54	1.73
1919	5.57	4.07	1.50	5.09	3.65	1.44
1920	5.45	4.27	1.18	4.86	3.80	1.06
1921	5.29	4.25	1.04	4.85	3.90	0.95
1922	5.14	4.12	1.02	4.85	3.88	0.97
1923	5.07	3.99	1.08	4.98	3.90	1.08
1924	5.54	4.06	1.49	5.58	4.08	1.50
1925	5.90	4.09	1.81	5.96	4.13	1.83
1926	6.01	4.10	1.91	6.10	4.16	1.94
1927	6.42	4.16	2.26	6.51	4.22	2.29
1928	6.38	4.11	2.27	6.53	4.22	2.32
1929	5.85	3.91	1.94	6.05	4.06	1.98
1930	5.08	3.66	1.43	5.33	3.89	1.44
1931	4.25	3.33	0.92	4.57	3.66	0.91
1932	3.42	3.00	0.43	3.85	3.41	0.44
1933	3.10	2.78	0.33	3.61	3.24	0.37
1934	3.53	2.72	0.81	4.15	3.21	0.94
1935	4.44	2.87	1.56	5.09	3.32	1.77
1936	5.06	3.12	1.94	5.66	3.49	2.17
1937	5.55	3.38	2.18	6.11	3.68	2.43
1938	6.11	3.66	2.45	6.56	3.88	2.69
1939	6.98	4.14	2.84	7.07	4.18	2.89
1940	8.61	4.94	3.67	8.04	4.74	3.30
1941	12.3	6.16	6.14	10.7	5.65	5.09
1942	16.4	7.94	8.47	14.0	7.08	6.94
1943	19.2	10.0	9.20	16.3	8.82	7.50
1944	20.0	12.0	8.02	16.7	10.2	6.46
1945	21.0	14.6	6.42	17.0	11.7	5.27
1946	20.8	17.5	3.34	16.1	13.1	2.98
1947	20.0	20.2	−0.20	14.3	14.1	0.19
1948	21.0	23.0	−2.01	13.7	14.9	−1.28
1949	24.6	26.4	−1.83	15.0	16.1	−1.14
1950	27.7	28.3	−0.60	16.2	16.6	−0.46
1951	30.5	29.3	1.20	17.4	16.8	0.55
1952	32.7	29.8	2.86	18.3	16.8	1.53
1953	34.1	30.2	3.94	18.8	16.6	2.14

Because of rounding, detail will not necessarily add to total.
The series are identical for Variants I and III.

(Notes on following page)

Appendix C

All entries are averages of annual series.

(1) Calculated from the annual series for 1869–1955 described below.

1869–1918: The 1929 price series underlying col. 4 multiplied by the price index implicit in output for domestic consumption. Output for domestic consumption, in current and 1929 prices, was derived by the method described in the notes to *National Product since 1869*, Table II-4, cols. 1 and 2, except that a further adjustment was made for 1899–1918 to include passenger cars used for business (see notes to Table R-13, cols. 1–3).

1919–1955: Table R-4, col. 2.

(2) Calculated from the annual estimates underlying Table R-16, col. 6.

(3) Calculated from the annual series derived by subtracting that underlying col. 2 from that underlying col. 1.

(4) Calculated from the annual series for 1869–1955 described below.

1869–1918: Interpolations between or extrapolations from the decade averages in Table R-15, col. 2, by the annual series on output for domestic consumption in 1929 prices, described in the notes to col. 1. The ratios of the decade averages of flow to the decade averages of output were computed and centered at the midpoints of the decades. Annual ratios were interpolated along a straight line and applied to the annual output figures.

1919–1955: Table R-5, col. 2.

(5) Calculated from the annual estimates underlying Table R-17, col. 6.

(6) Calculated from the annual series derived by subtracting that underlying col. 5 from that underlying col. 4.

FIVE-YEAR MOVING AVERAGES OF NET CHANGES IN INVENTORIES
AND IN CLAIMS AGAINST FOREIGN COUNTRIES,
CURRENT AND 1929 PRICES, 1869–1955
(billions of dollars)

Year on Which Moving Average Is Centered	Net Changes in Inventories		Net Changes in Claims against Foreign Countries	
	Current Prices (1)	1929 Prices (2)	Current Prices (3)	1929 Prices (4)
1871	0.35	0.39	−0.18	−0.24
1872	0.35	0.40	−0.16	−0.22
1873	0.37	0.43	−0.15	−0.21
1874	0.39	0.46	−0.11	−0.16
1875	0.37	0.47	−0.06	−0.09
1876	0.37	0.50	−0.01	−0.01
1877	0.40	0.57	0.03	0.06
1878	0.45	0.66	0.06	0.10
1879	0.44	0.66	0.06	0.10
1880	0.45	0.68	0.04	0.07
1881	0.43	0.65	0.01	0.02
1882	0.40	0.60	−0.02	−0.03
1883	0.34	0.51	−0.03	−0.06
1884	0.33	0.51	−0.06	−0.10
1885	0.29	0.47	−0.06	−0.12
1886	0.27	0.44	−0.09	−0.17
1887	0.25	0.42	−0.10	−0.19
1888	0.26	0.43	−0.11	−0.22
1889	0.24	0.41	−0.10	−0.20
1890	0.25	0.43	−0.09	−0.17
1891	0.24	0.41	−0.06	−0.13
1892	0.21	0.37	−0.05	−0.09
1893	0.24	0.44	−0.05	−0.10
1894	0.22	0.42	−0.03	−0.05
1895	0.23	0.46	0.01	0.03
1896	0.27	0.54	0.10	0.22
1897	0.37	0.72	0.16	0.34
1898	0.38	0.71·	0.26	0.56
1899	0.47	0.87	0.31	0.66
1900	0.47	0.83	0.32	0.65
1901	0.50	0.86	0.28	0.56
1902	0.42	0.70	0.26	0.51
1903	0.44	0.72	0.21	0.40
1904	0.47	0.75	0.17	0.32
1905	0.49	0.75	0.16	0.30
1906	0.35	0.54	0.16	0.30
1907	0.50	0.75	0.10	0.19
1908	0.53	0.76	0.04	0.07
1909	0.46	0.65	0.02	0.03
1910	0.54	0.75	a	0.01

(continued)

Year on Which Moving Average Is Centered	Net Changes in Inventories		Net Changes in Claims against Foreign Countries	
	Current Prices (1)	1929 Prices (2)	Current Prices (3)	1929 Prices (4)
1911	0.76	1.06	−0.01	−0.02
1912	0.57	0.78	a	a
1913	0.47	0.66	0.35	0.54
1914	0.67	0.85	0.93	1.33
1915	0.63	0.71	1.58	2.03
1916	0.60	0.59	1.98	2.39
1917	1.39	1.14	2.77	3.13
1918	2.81	1.94	3.02	3.09
1919	2.54	1.60	2.75	2.60
1920	2.54	1.57	2.22	2.00
1921	3.01	2.02	1.88	1.69
1922	2.04	1.28	1.31	1.18
1923	0.93	0.75	0.88	0.86
1924	1.21	1.00	0.65	0.64
1925	1.18	1.02	0.66	0.66
1926	0.50	0.38	0.77	0.76
1927	1.02	0.90	0.73	0.72
1928	0.60	0.48	0.73	0.73
1929	0.04	0.11	0.68	0.69
1930	−0.55	−0.62	0.57	0.59
1931	−0.78	−1.19	0.40	0.42
1932	−1.31	−2.05	0.33	0.37
1933	−0.98	−1.37	0.18	0.22
1934	−0.47	−1.03	0.12	0.15
1935	0.51	0.56	0.10	0.12
1936	0.70	1.08	0.29	0.35
1937	1.00	1.78	0.38	0.45
1938	1.23	1.86	0.70	0.82
1939	1.90	2.85	0.97	1.12
1940	1.77	2.34	0.97	1.12
1941	1.69	2.23	0.38	0.53
1942	1.34	1.82	−0.14	0.03
1943	0.60	0.86	−0.66	−0.51
1944	0.85	0.89	0.06	−0.04
1945	0.35	0.32	1.83	1.18
1946	1.39	1.39	2.59	1.77
1947	1.09	1.07	3.04	2.13
1948	2.82	2.49	2.81	2.02
1949	3.72	2.52	1.89	1.30
1950	4.50	3.02	0.07	0.05
1951	3.72	2.16	−0.72	−0.44
1952	3.83	2.52	−0.91	−0.56
1953	3.21	2.00	−0.57	−0.33

a Less than $0.005 billion.

Appendix C

The series are identical for Variants I and III. The price index used in calculating net changes in claims against foreign countries in 1929 prices is that implicit in gross national product excluding such changes, Variant I. Strictly speaking, for Variant III we should have computed the index implicit in that variant. But the difference is negligible and has been disregarded.

SOURCE, BY COLUMN

All entries are averages of annual series.

(1) Calculated from the annual series for 1869–1955 described below.

1869–1918: The 1929 price series underlying col. 2 multiplied by the BLS wholesale price index for all commodities, given in *Historical Statistics of the United States, 1789–1945*, Series L-15, adjusted to a 1929 base.

1919–1955: Table R-4, col. 3.

(2) Calculated from the annual series for 1869–1955 described below.

1869–1918: A preliminary series was derived by applying to annual changes in commodity output for 1869–1918 the regression line of annual cbanges in inventories (Table R-5, col. 3) on annual changes in commodity output (derived from Table R-21, col. 1) for 1919–1938. The regression equation is $y = 0.4462 + 0.306228x$. The final annual series was then calculated by computing the ratios of the decade averages in Table R-15, col. 3 to the decade averages of tbe preliminary annual series, interpolating along a straight line, and applying the resulting annual ratios to the preliminary series.

1919–1955: Table R-5, col. 3.

(3) Calculated from the annual estimates described in the notes to Table R-14, col. 4, or given in Table R-4, col. 4.

(4) Calculated from the annual series for 1869–1955 described below.

1869–1918: The series in current prices underlying col. 3 divided by the price index implicit in gross national product excluding net changes in claims against foreign countries, Variant I (series underlying Table R-25, col. 3, minus that underlying col. 3 in the present table divided by the sum of the series underlying Table R-26, col. 1, Table R-30, col. 10, Table R-33, col. 4, and col. 2 in the present table.

1919–1955: Table R-5, col. 4.

Changes in Net Durable Capital, Sector Estimates, Compared with Commodity Flow Totals of Net Construction and Equipment

Nature of the Comparison

IN the preceding appendixes we presented estimates of durable capital formation (construction plus producers' durable commodities), gross and net, in current and in 1929 prices. For the years since 1919, the estimates are based on the *annual* volume of construction and of flow of producers' durable commodities into domestic consumption. For the earlier years they are based on the flow of construction materials and of producers' durable commodities, available decennially and interpolated annually. The underlying information, particularly for the decades before 1919, is given in the censuses of production (chiefly that of manufactures), and the data relate exclusively to the flow of commodities without indicating the industry that is the ultimate user of the capital good in question.

In the monographs on real capital accumulation and its financing in the major sectors of the economy an attempt has been made to prepare estimates of additions to capital for a period long enough to permit analysis of secular trends. In some of those sectors—agriculture, mining, manufacturing—the estimates are based upon the value of capital held by enterprises as reported in current prices either in the relevant censuses of production, or in corporate balance sheets. The current price values must be converted to constant prices before changes in real capital stock can be properly measured. In another sector— residential real estate—the basic estimates relate to the gross volume of

capital additions, which are then reduced by an appropriate charge for capital consumption. In the regulated industries (utilities) sector a somewhat similar method is used: capital expenditures net of capital consumption are estimated.

The point to be noted is that for the years before 1919, the two sets of series—the total based on flow of commodities, and the sector estimates—are independent of each other. In some cases the primary source of the data is identical for both sets: thus, the *Census of Manufactures* is the source of the data not only for flow of producers' durable commodities and construction materials but also for capital held by manufacturing enterprises. However, the information on commodity production is quite distinct from that on capital. For other sectors— for instance, agriculture and mining—the data on capital come from a primary source different from that for total construction and flow of producers' durable commodities. Likewise, nonfarm residential and government construction estimates before 1919 are quite independent of the series on total construction: from 1919 on, total construction is, in effect, a summation of parts, whereas before 1919 it is an extrapolation based on the flow of all construction materials.

Although we show the two sets of estimates for the entire period 1880–1948, we limit our analysis to the comparison for 1880–1922, for two reasons. First, only in the earlier period are the sector estimates relatively independent of those derived from the flow of construction materials and producers' durable equipment; from 1919 on, this is not true of the estimates of nonfarm residential and government construction—quantitatively important sectors in recent years. Second, and perhaps more important, the estimates of capital formation for the years since 1919 do not need the careful checking of level and movement that the estimates for the earlier years do, since the available data provide a more solid foundation. Furthermore, a check of the level and movement in the earlier periods is a test of both sets of estimates, although, obviously, agreement of the totals provides no assurance that the sector estimates are free from significant errors.

The two sets of estimates can be compared effectively only for *net* volumes, in constant prices, and for construction and producers' durable equipment *combined*. Net volumes must be used because in several sectors capital additions are derived as differences between capital stock at two points of time. Since capital stock is given net of accumulated capital consumption, the differences represent net capital additions. We could have estimated capital consumption and derived

gross capital additions, but in so doing we would only have added a further conjectural element to the comparison. We combine construction and producers' durable equipment because the underlying data on gross capital expenditures for several sectors do not distinguish the two. The same is true of the capital stock data for other sectors.

Finally, it seemed best to compare totals in constant prices since our main interest is in real capital accumulation. Besides, the price series used in the two sets of estimates are essentially the same. Keeping the prices in the comparison does not affect the results if the original data are in current prices, whereas a spurious element of similarity is introduced if the price element is added to the comparison where the original data do not require it.

Results of the Comparison

The detailed comparison is presented in Table R-35, although full information on the derivation of the sector estimates is not given there. It is available in the occasional papers and monographs already published by the National Bureau. A summary is given in Table D-1.

The periods distinguished in this table (and in Table R-35) are dictated largely by the censuses from which the data on capital stock for several sectors are derived. More periods could have been set up. For example, we could have taken account of the Census for 1904. But this further detail would hardly have been useful. In general, comparisons of the type made here are significant only for relatively long periods; and besides, we are interested in the longer-term movements alone.

The total of the sector estimates is narrower in scope than the total based on flow of construction materials and producers' durable equipment. The sector total excludes and the commodity flow total includes the following items: nonhousekeeping residential construction; construction and equipment for several industrial divisions included in the censuses of wealth in "other industrial" (trade, the construction industry, the finance and service industries); durable capital accumulation for such nonprofit institutions as trade unions, benevolent societies, etc.; and finally, producers' durable equipment flowing to governments. The total of sector estimates should, therefore, be smaller than the total derived from flow of construction materials and producers' durables, except for periods—if any—when net durable capital formation in the missing sectors can be assumed to be negative.

Appendix D

	1880–1890 (1)	1890–1900 (2)	1900–1912 (3)	1912–1922 (4)	1922–1930 (5)	1930–1940 (6)	1940–1948 (7)
1. Total, sectors	22.7	25.6	48.9	29.8	46.3	5.2	33.9
2. Total, direct estimate of net construction and producers' durables	23.0	33.8	60.7	29.8	54.0	7.5	41.3
3. Difference, line 2 minus line 1	0.3	8.2	11.8	ᵃ	7.7	2.4	7.4
4. Line 1, per year	2.27	2.56	3.89	2.98	6.39	0.52	3.87
5. Line 2, per year	2.30	3.38	4.82	2.98	7.44	0.75	4.72
6. Difference, line 5 minus line 4	0.03	0.82	0.94	ᵃ	1.06	0.24	0.85

Because of rounding, detail will not necessarily add to total.
ᵃ Less than $0.05 billion.

SOURCE, BY LINE
1. Table R-35, line 8. For 1880–1890, we added an arbitrary allowance of $0.2 billion for lines 5b and 5c. Line 5d was omitted throughout.
2. Table R-35, line 9.

The two series move similarly, and the former is smaller than the latter, the positive difference presumably reflecting in part net capital formation in the missing sectors. Since the similarity in the pattern of movement may be due in part to the use in the two series of identical time periods with differing duration, we reduced the changes in each series to an annual basis (lines 4 and 5). Even then, the similarity persists—as it should, because the omissions from the sector estimates are a relatively small fraction of the total.

Yet there are some perceptible differences. Of these, the most important is in the movement from 1880–1890 to 1890–1900. In the earlier decade the two totals are practically identical, and net capital formation assignable to the missing sectors is negligible. In 1890–1900, the total based on commodity flow is about $8 billion larger than the sector total. The sector total rises about 13 per cent from the first to the second decade; the total based on commodity flow rises 47 per cent.

We checked further by comparing the difference between the two

TABLE D-2

DIFFERENCE BETWEEN SECTOR TOTALS AND COMMODITY FLOW TOTALS
OF NET CONSTRUCTION AND EQUIPMENT COMPARED WITH ESTIMATES
OF NET CAPITAL FORMATION FOR MISSING SECTORS,
1929 PRICES, 1880–1922
(billions of dollars)

	1880–1890 (1)	1890–1900 (2)	1900–1912 (3)	1912–1922 (4)	Total 1880–1922 (5)
1. Difference, Table D-1, line 3	0.3	8.2	11.8	a	20.3
		VALUATION A			
2. Real estate improvements, other industrial	2.81	1.49	4.17	−2.62	5.85
3. Equipment, other industrial	2.20	0.84	2.34	−0.58	4.80
4. Equipment, tax exempt	0.52	0.77	1.24	−0.28	2.26
5. Total, lines 2, 3, and 4	5.53	3.10	7.76	−3.48	12.91
		VALUATION B			
6. Real estate improvements, other industrial	2.56	1.61	4.68	−1.23	7.62
7. Equipment, other industrial	2.18	1.15	2.32	−0.91	4.74
8. Equipment, tax exempt	0.52	0.77	1.24	−0.28	2.26
9. Total, lines 6, 7, and 8	5.26	3.54	8.25	−2.42	14.62

Because of rounding, detail will not necessarily add to total.
a Less than $0.05 billion.

SOURCE: Lines 2–4 and 6–8 calculated from Simon Kuznets, *National Product since 1869* (New York, NBER, 1946), Tables IV-5 and IV-6, pp. 218–219.

series with an independent estimate of net capital formation for the missing sectors (Table D-2). From the wealth estimates originally presented in *National Product since 1869* (particularly Tables IV-5 and IV-6, pp. 218–219) we took the following items to represent the missing sectors: "other industrial" real estate improvements and equipment, and "tax exempt" equipment. The allowance is too large because some tax exempt equipment is included under the nonprofit institutions (religious bodies, hospitals, etc.) covered under the sector estimates in Table R-35; and it is too small because some nonhousekeeping residential construction may be included under "residential" in the wealth estimates, and because construction by some nonprofit institutions is missing from the sector estimates in Table R-35. But these discrepancies

in scope are minor compared with the margin of error involved in the procedures employed in dividing the total value of real estate into land and improvements and in adjusting the successive estimates for changes in valuation.

Two aspects of the comparison in Table D-2 are of interest. The first concerns the order of magnitudes. For the period from 1880 to 1922 as a whole, the difference between the sector totals and the totals based on commodity flow is larger than net capital accumulation in the missing sectors suggested by the wealth data. These totals are $20.3 billion, and between $12.9 billion and $14.6 billion, depending upon the basis of valuation assumed in passing from current to constant prices. The difference is substantial, but can easily arise out of faulty adjustment of the wealth data for changes in prices. However, a difference of almost $6 billion (the difference in column 5 between line 1 and Valuation B, line 9—more acceptable than Valuation A, line 5) is not large in terms of the aggregate for 1880–1922 which in Table D-1, line 2, amounts to $147.3 billion. It can, in fact, be interpreted as evidence of substantial agreement between the two sets of estimates with respect to order of magnitude.

It is in the pattern of movement from period to period that differences emerge, especially from 1880–1890 to 1890–1900. The census of wealth data suggest that net capital formation in the missing sectors is over $5 billion in 1880–1890 compared with only about $3.5 billion in 1890–1900, as contrasted with the negligible amount in the earlier decade and the $8.2 billion in the later decade suggested by the difference between the sector and the commodity flow totals in Table D-1. And there is disagreement in the succeeding periods. The difference in Table D-1 suggests net capital formation in the missing sectors of $11.8 billion for 1900–1912 and practically zero for 1912–1922, whereas the census of wealth figures in Table D-2 (Valuation B) show only $8.2 billion for 1900–1912 and a disinvestment of $2.4 for 1912–1922.

Which of the two patterns is more acceptable—that suggested by the capital stock data or that indicated by the commodity flow data? We definitely favor the latter, for two major reasons. First, in observing movements over time, records of flows are generally more reliable than net changes in successive large totals that represent stocks. A small relative error in the estimate of a large stock can mean a damaging error in the derived net change. Hence, even if we could assume that the capital stock and the flow data are subject to the same relative error, there is ground for preferring the latter. Second, while evaluation of

relative error margins is largely a matter of judgment, the strong impression here is that the capital stock data, which require major adjustments before successive totals of *reproducible* capital in constant prices can be secured, are subject to wider margins of error than the flow data, even though the latter were interpolated between successive census totals on the basis of rather small samples of annual series.

TABLE D-3

SECTOR TOTALS OF CHANGES IN NET DURABLE CAPITAL COMPARED WITH
NET CHANGES IN THE EARLIER ESTIMATES OF VALUE OF
REAL ESTATE IMPROVEMENTS AND VALUE OF EQUIPMENT,
1929 PRICES, 1880–1922

(billions of dollars)

	1880–1890 (1)	1890–1900 (2)	1900–1912 (3)	1912–1922 (4)	Total 1880–1922 (5)
1. Sector total, Table D-1	22.7	25.6	48.9	29.8	127.1
Earlier Estimates					
		VALUATION A			
2. Real estate improvements, total	21.2	19.9	47.8	1.08	89.9
3. Real estate improvements, other industrial	2.81	1.49	4.17	−2.62	5.85
4. Line 2 minus line 3	18.4	18.4	43.6	3.70	84.1
5. Equipment, total	6.93	8.34	18.1	2.63	36.0
6. Equipment, other industrial + tax exempt	2.72	1.62	3.58	−0.86	7.05
7. Line 5 minus line 6	4.21	6.72	14.5	3.49	28.9
8. Line 4 plus line 7	22.6	25.1	58.2	7.19	113.0
		VALUATION B			
9. Real estate improvements, total	20.0	20.5	50.6	9.66	100.8
10. Real estate improvements, other industrial	2.56	1.61	4.68	−1.23	7.62
11. Line 9 minus line 10	17.5	18.9	46.0	10.9	93.2
12. Equipment, total	6.91	8.79	18.1	2.12	35.9
13. Equipment, other industrial + tax exempt	2.70	1.92	3.56	−1.19	7.00
14. Line 12 minus line 13	4.21	6.87	14.5	3.31	28.9
15. Line 11 plus line 14	21.7	25.7	60.5	14.2	122.1

Because of rounding, detail will not necessarily add to total.

SOURCE: Lines 2, 3, 5, 6, 9, 10, 12, and 13, calculated from Kuznets, *National Product since 1869*, Tables IV-5 and IV-6, pp. 218–219.

It is not unlikely that further work and revision of the capital stock estimates would yield a somewhat different picture of relative magnitudes in 1880–1890 and 1890–1900–in the omitted sectors and perhaps even in some of the covered sectors. In this connection Table D-3 is of at least suggestive value. It presents a comparison of the totals yielded by the rough estimates based on capital stock data in *National Product since 1869* with the totals based on the sector estimates in Table R-35. For the entire period 1880–1922, the estimate based on the more recent and detailed work is not much different from that of the older series (Valuation B)–about $127 billion compared with $122 billion. Nor is there much difference in the totals for the first two decades. But in the last two periods substantial revisions appear: for 1900–1912 a reduction from $60.5 billion to $48.9 billion; and for 1912–1922 an increase from $14.2 billion to $29.8 billion. While many of our flow estimates have also been revised, none of the changes in the comprehensive totals has been as large as those shown in Table D-3. The table thus illustrates the marked modifications in net changes derivable from capital stock data resulting from changes in detail of procedure.

But it should be emphasized that this comment applies to net changes for relatively short periods. The longer the period of comparison, the higher, usually, the ratio of the intervening flow to the terminal stock figures and the narrower, therefore, the effect of errors in the latter upon possible errors in the former. For this reason we can attach some weight to the agreement of the commodity flow and the sector totals over the entire span from 1880 to 1922. For a study of the movement over the shorter periods, the estimates based on flow data are preferable.

TABLE R-35

CHANGE IN VALUE OF BUILDINGS AND EQUIPMENT, SECTOR ESTIMATES, COMPARED WITH NET CONSTRUCTION AND NET PRODUCERS' DURABLES, COMMODITY FLOW TOTALS, 1929 PRICES, 1880–1948

(millions of dollars)

	June 1, 1880– June 1, 1890 (1)	June 1, 1890– June 1, 1900 (2)	June 1, 1900– Dec. 31, 1912 (3)	Dec. 31, 1912– Dec. 31, 1922 (4)	Dec. 31, 1922– Apr. 1, 1930 (5)	Apr. 1, 1930– Apr. 1, 1940 (6)	Apr. 1, 1940– Dec. 31, 1948 (7)
1. Agriculture (change in reproducible wealth)	726	1,476	4,677	1,883	150	−1,969	5,030
2. Mining, total (change in reproducible wealth)	464	734	1,855	1,849	928	−1,470	599
a. Metals	149	194	265	−72	−2	−302	−41
b. Anthracite coal	25	33	49	8	−24	−76	−20
c. Bituminous coal	60	151	426	145	−131	−239	69
d. Petroleum and natural gas	159	301	1,036	1,756	1,030	−742	583
e. Other nonmetallic minerals	70	55	79	13	54	−111	7
3. Manufacturing, total (change in reproducible wealth)	2,585	3,168	8,133	6,749	5,001	−1,695	9,437
a. Food, liquors, and tobacco	433	843	n.c.	n.c.	n.c.	−500	603
b. Textiles, clothing, and leather	492	550	n.c.	n.c.	n.c.	−1,136	261
c. Rubber products	14	28	n.c.	n.c.	n.c.	−143	181
d. Forest products	319	107	n.c.	n.c.	n.c.	−365	193
e. Paper, printing, and publishing	260	287	n.c.	n.c.	n.c.	−101	515
f. Chemicals, and petroleum refining	162	215	n.c.	n.c.	n.c.	1,203	3,905
g. Stone, clay, and glass products	111	174	n.c.	n.c.	n.c.	−308	−16
h. Metals and metal products	751	928	n.c.	n.c.	n.c.	−170	3,428
i. Miscellaneous	43	36	n.c.	n.c.	n.c.	−175	367

4. Nonfarm residential construction (net)	12,321	12,943	14,995	7,602	22,293	-1,321	3,526
5. Private nonprofit institutions, and proprietary hospitals, total (change in reproducible wealth)	n.a.	n.a.	n.a.	n.a.	n.a.	730	328
a. Religious bodies	530	563	597	227	920	226	325
b. Secondary schools and higher educational institutions	n.a.	183	323	386	381	284	36
c. Private nonprofit hospitals	n.a.	111	292	402	305	287	15
d. Proprietary hospitals	n.a.	n.a.	n.a.	n.a.	n.a.	-67	-48
6. Government construction (net)	1,160	1,956	6,045	8,334	7,527	13,418	11,192
7. Transportation and other public utilities, total (change in reproducible wealth)	4,692	4,495	12,005	2,398	8,798	-2,606	3,712
a. Telephones	67	333	733	-33	1,209	91	1,929
b. Local bus lines	0	0	[a]	12	99	140	154
c. Electric light and power	100	497	2,327	709	3,420	61	1,024
d. Steam railroads	3,807	1,506	5,212	817	2,605	-1,579	-21
e. Electric railways	290	1,557	1,737	-429	-771	-1,002	-812
f. Other	427	602	1,995	1,322	2,236	-317	1,438
8. Total of above sectors [b]	22,478	25,335 [c]; 25,629 [d]	48,922	29,830	46,303	5,154 [c]; 5,087 [d]	33,824
9. Net construction and net producers' durables	22,981	33,785 [c]	60,710	29,849	53,955	7,534	41,273
10. Difference (line 9 minus line 8)	503	8,450 [c]; 8,156 [d]	11,788	19	7,652	2,380 [c]; 2,447 [d]	7,449

Because of rounding, detail will not necessarily add to total.

n.a. = not available; n.c. = not calculated.

[a] Less than $0.5 million.

[b] Excludes government equipment, nonhousekeeping residential construction, "other" nonprofit institutions, "other" industrial, as well as subgroups for which it is indicated that data are not available for the given period.

[c] Comparable with entry for preceding period.

[d] Comparable with entry for following period.

Appendix D

For those wealth series for which the value for the given census date was not reported, it was interpolated along a logarithmic straight line between the two dates closest to the given date. In estimating net construction and net producers' durables for a fraction of a year, the total for the year was pro-rated on the basis of the number of months covered (for example, the period from June 1 through December 31 was assigned 7/12 of the total for the given calendar year).

For agriculture, mining, and manufacturing, specific references are to the earlier Occasional Papers; but the series are identical with those in the later monographs.

SOURCE, BY LINE

1. Change in value estimated separately for machinery and equipment and for buildings. For the value of machinery and equipment, we used Alvin S. Tostlebe's series in *The Growth of Physical Capital in Agriculture, 1870–1950* (Occasional Paper 44, New York, NBER, 1954), Table G-1, p. 91. For the value of buildings, Tostlebe supplied special computations for the census dates 1880, 1890, 1900, 1910, 1920, 1930, 1940, and 1950.

2. Change in value estimated from special tabulations provided by Israel Borenstein (for census dates 1880, 1890, 1909, 1919, 1929, 1940, and 1948) underlying his series in *Capital and Output Trends in Mining Industries, 1870–1948* (Occasional Paper 45, New York, NBER, 1954), or revisions of them. The series for nonmetallic minerals for 1880, 1890, and 1909 was first raised by the proportionate difference between the entry for 1919 comparable with those for the later years and the entry for 1919 comparable with those for the earlier years.

3. Change in value estimated from special calculations provided by Daniel Creamer (for census dates 1880, 1890, 1900, 1909, 1914, 1919, 1929, 1937, and 1948) underlying his series in *Capital and Output Trends in Manufacturing Industries, 1880–1948* (Occasional Paper 41, New York, NBER, 1954), or revisions of them.

4. Calculated from the annual series described in Table R-32, notes to col. 6. For cols. 1 and 2, the use of Grebler's estimate of value as of June 1, 1890 (rather than the value arrived at by pro-rating net construction) yields slightly different results: $12,466 million for col. 1, and $12,798 million for col. 2.

5. Change in value estimated from NBER series (mimeographed) prepared by Robert Rude. His series for religious bodies were estimated for December 31, 1870, 1890, 1906, 1916, 1922, 1928, 1936, 1947, and 1948; those for educational institutions, for June 30, 1890, 1906, 1916, 1926, 1928, 1936, and 1948; and those for hospitals, for December 31, 1890, 1906, 1910, 1916, 1923, 1928, 1935, and for September 30, 1946 and 1948 for private nonprofit hospitals, and for December 31, 1928 and 1935, and September 30, 1946 and 1948 for proprietary hospitals.

6. Calculated from the annual series described in Table R-32, notes to cols. 7 and 8.

7. Change in value estimated from the annual series, January 1, 1880 through January 1, 1949, in Melville J. Ulmer, *Capital in Transportation, Communications, and Public Utilities: Its Formation and Financing* (Princeton for NBER, 1960), Table B-1, pp. 235–236; Table C-1, pp. 256–257; Table D-1, pp. 320–321; Table E-1, pp. 374–375; Table F-1, pp. 405–406; Table G-1, p. 440; Table H-1, pp. 452–453.

8. Calculated from the annual series described in Table R-32, notes to col. 10, and in Table R-33, notes to col. 6.

APPENDIX E

Estimates of Population and of the Labor Force: Census and Mid-Censal Dates, and Quinquennial Moving Averages

SINCE population and labor force are two important variables in our analysis of trends in national product and capital formation, and since long swings in the rate of secular growth are a major component in long-term changes, we need continuous estimates of these two variables—either acceptable annual estimates, or annual approximations that yield acceptable five-year moving averages. For the purpose at hand, the available annual series on population suffer from three defects: (1) they make no allowance for the known underenumeration of the group 0 to 4 years of age; (2) for the decades before 1900, they are based on straight-line interpolation between the decennial census figures; and (3) before 1920 the annual registration of births and deaths was only partial. For labor force, annual estimates are available only for the recent decades. We thought it advisable, therefore, to derive new and consistent series on population and on labor force, sufficiently continuous to serve our purpose.

In this task, we had the invaluable assistance of the staff of the University of Pennsylvania Study of Population Redistribution and Economic Growth, directed by Dorothy S. Thomas and the author. The detailed notes to Tables R-36 and R-38 describe the procedures used, aimed at securing an adequate population series and, indirectly, a series on labor force. The technically-minded reader is directed to these notes, and will find additional information in the full report of

the study.[1] Here we give only a brief sketch of the procedures and comment upon the character of the estimates.

Estimates of Population, Census and Mid-Censal Dates

The annual estimates of population are the sum of separate estimates for the native born white, the nonwhite, and the foreign born. Before such annual estimates of native born could be attempted, several steps were necessary: (1) adjustment of each census total from 1870 to 1950 for the underenumeration of the age group 0 to 4 years; (2) adjustment of the census total for 1870 for the underenumeration which may have affected all age groups; and (3) estimation of the mid-censal population (the population as of the mid-point between two census dates) for the period from 1870 to 1940.

1. The general method followed in adjusting for underenumeration of the age group 0 to 4 years was to work back from the age group 10 to 14 years in the next census year, applying to the latter a "reverse survival" or "revival" ratio secured from life tables. The principle underlying this adjustment was that there was much less, if any, tendency to undercount the age group 10 to 14 years than to undercount the age group 0 to 4 years. Comparison of the native born 0 to 4 group in one census with the native born 10 to 14 group in the next census (10 years later) in many cases showed the latter to be larger than the former, whereas deaths during the intercensal interval would have made it smaller. Unless there had been a major overcount of the 10 to 14 years group, which seemed unlikely, this result was due to the usual tendency to undercount the 0 to 4 group. The adjustment for the latter was made separately for whites and nonwhites. For 1950, for which no life tables were available at the time of computation, the undercount was assumed proportional to that established for 1940.

2. The adjustment for underenumeration in the 1870 Census followed the same procedure. A revival ratio was applied to the number of native born reported in the 1880 Census. This was done separately for whites and nonwhites, by age group and by sex. The ratio estimated in this case for each 1880 group 14 years of age and over was the 1880–1890 census survival rate modified by the trend from 1870 to 1890 in

[1] *Population Redistribution and Economic Growth, United States, 1870–1950,* Vols. I and II (American Philosophical Society, Philadelphia, 1957 and 1960). A third volume is in preparation.

the life table survival rates. For the 10 to 14 group in 1880 the revival
ratio was taken from the life tables (see discussion under step 1 above),
because the census survival rates for this age group are misleading
owing to the census undercount of the 0 to 4 group in the initial of
the two censuses. This adjustment, and that for underenumeration of
the 0 to 4 group, add some 2.39 million to the 1870 total of native born
compared with the usual adjustment of 1.26 million which excludes
the correction for underenumeration of the 0 to 4 group.[2]

3. Mid-censal population was estimated in two distinct steps. First,
mid-censal population was estimated for the age groups 0 to 4 and
5 to 9. For this purpose reverse survival or revival ratios were applied
to the groups 5 to 9, and 10 to 14 years of age, respectively, in the
census totals for the terminal date of the interval, the ratios being de-
rived from appropriate life tables.

Second, for each age group 5 years and over, the number of deaths
and disappearances during the census interval was estimated as the dif-
ference between the number of persons in the given age group at the
beginning of the interval and the number in the group 10 years older
at the next census. The estimates were made separately for males
and females, for native whites, and nonwhites. Since the native born
population of the United States could be reasonably assumed to be
a closed group, these differences were treated as deaths. From appro-
priate life tables, the ratio of deaths during the first five years to those
during the entire intercensal period, for each age, sex, and race group,
was used to apportion the deaths during the intercensal interval be-
tween the first and the second half of that interval. These calculations,
carried through for each decade from 1870 through 1940, were subject
to only two modifications: (1) for 1870–1880 the revised 1870 figures
were used; (2) for the 1910–1920 decade a special adjustment was made
to take account of the influenza epidemic of 1918, not reflected in the
life tables for 1920.

The above calculations were carried through for the native born
white and total nonwhite. For foreign born whites an annual series
was available from the detailed work on the census data on foreign
born and on the annual series of immigration and emigration pre-
pared by Simon Kuznets and Ernest Rubin.[3]

[2] See *Historical Statistics of the United States, 1789–1945*, Series B-2 for 1870 and
note 11 to that figure.

[3] In connection with *Immigration and the Foreign Born* (Occasional Paper 46, New
York, NBER, 1954).

Appendix E

Estimates of the Labor Force, Census and Mid-Censal Dates

Here too, we used the detailed work on estimates of the gainfully occupied and the labor force, by states, for the period since 1870, prepared by the University of Pennsylvania Study of Population Redistribution and Economic Growth. One conclusion of that study, of major importance to us, is that the shift from the gainfully occupied concept, followed in the censuses before 1940, to the labor force concept, adopted in the Census of 1940, has no significant effect on long-term trends. For our purpose, then, the two concepts are sufficiently similar to permit treatment of the resulting totals as a continuous and comparable series.

Another specific result of the Pennsylvania study utilized is the estimate of the number in the labor force 10 to 13 years of age in 1940 and 1950. The Censuses for those two years omitted that age group from the labor force count, whereas the earlier censuses had covered it in the totals of gainfully occupied. We therefore added that age group to the 1940 and 1950 totals to secure a series fully comparable in age coverage.

Having this series of the gainfully occupied or labor force for ages 10 and over for each census year, we could proceed to the subsequent calculations, which were relatively simple.

1. The procedures described in the first section of this appendix yielded population by age and sex for each census year, and for the mid-point of each intercensal interval, separately for native white and total nonwhite. We could, therefore, obtain population 10 years of age and over, separately for males and females, and for native born whites and all nonwhites.

2. For foreign born whites, we had annual series, but no age distribution except for the census years. For the mid-censal foreign born population 10 years of age and over, we interpolated between the number at the beginning and end of the intercensal interval on the basis of the annual series for total foreign born whites, male and female separately.

3. The sum of the results under (1) and (2) gave us total population, 10 years of age and over, male and female separately, at the census dates and at the mid-points of the intercensal intervals, 1870 to 1940.

4. For each census year, we had total labor force or gainfully occupied 10 years of age and over, separately for males and females. We calculated the ratio of this series to total population, 10 years of age and over, male and female separately, and estimated the ratio for the

mid-point of the intercensal interval by straight-line interpolation. The application of this interpolated ratio to population 10 years of age and over, male and female separately, gave us the mid-censal estimate of the labor force.

.*The Annual Series and the Five-Year Moving Averages*

The estimating procedures described above yielded series on native born white, and total nonwhite population, male and female separately, for census dates, 1870 to 1950, and at roughly quinquennial intervals from 1870 to 1940, supplemented by an annual series on foreign born white population from 1869 through 1940. We also had series on the labor force, male and female separately, for census dates, 1870 to 1950, and at roughly quinquennial intervals from 1870 through 1940.

The next question was whether we could interpolate between the quinquennial estimates to derive acceptable *annual* approximations. This would have been possible for population, and perhaps for labor force, from 1920 on, since the available annual series on population for those years is based on a sufficiently comprehensive area of registration of births and deaths to warrant confidence in the annual changes shown. But any attempt to do so for the decades before 1920, and particularly before 1900, would run into serious difficulties. And since five-year moving averages suffice for our purposes, the time expenditure for making annual estimates did not seem warranted.

We decided therefore, that it was sufficient to estimate native born and total nonwhite population, annually, by straight-line logarithmic interpolation between the totals given at roughly quinquennial intervals, and then to add the annual series on foreign born whites estimated by Kuznets and Rubin. This was done for all the intervals from 1870 through 1940.

For the years after 1940, we estimated the annual total population directly, rather than by components, by interpolation between and extrapolation from the adjusted census totals for 1940 and 1950, using the annual estimates of the Census Bureau as an index. For the labor force also for the years after 1940, we made annual interpolations between and extrapolations from the census totals for 1940 and 1950, on the basis of the Census Bureau annual series on the labor force.

The procedure for the years beginning with 1920 could have been refined easily, but was not, because we felt that little effect on the five-year moving averages could be anticipated. To check on our de-

cision, we calculated five-year moving averages of the available annual population series from 1920 to 1940 and compared them with five-year moving averages of the series derived by our procedure (shown in Table R-37). Our estimates are consistently larger than those derived from the current annual series, because of our adjustment for the underenumeration of the 0 to 4 group. But the excess ranges from 0.4 million to 0.8 million, or from slightly over 0.3 per cent to slightly over 0.7 per cent of the totals. This variation of about one-half of 1 per cent did not seem significant enough to warrant changes in the already established procedure, which could be followed for the full period covered.

The fact remains that the underlying annual series of population and labor force are not true annual estimates, but rather quinquennial series. Yet the resulting five-year moving averages should be reliable enough for a study of long swings in the rate of secular growth. They also permit us to calculate five-year moving averages of product and flow of goods per capita, and per member of the labor force (see Table R-40).

POPULATION EXCLUDING ARMED FORCES OVERSEAS, CENSUS AND MID-CENSAL DATES,
1870–1950

(millions)

| | Native White | | Foreign White | | Nonwhite | | Total |
| | Male | Female | Male | Female | Male | Female | Population |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
June 1, 1870	14.79	14.58	2.94	2.55	2.94	2.95	40.75
June 1, 1875	16.73	16.57	3.46	2.98	3.27	3.31	46.32
June 1, 1880	18.85	18.43	3.52	3.04	3.46	3.41	50.71
June 1, 1885	21.15	20.63	4.61	3.84	3.72	3.65	57.61
June 1, 1890	23.63	22.99	4.95	4.17	3.98	3.90	63.63
June 1, 1895	26.23	25.52	5.43	4.59	4.35	4.27	70.39
June 1, 1900	28.82	28.03	5.52	4.70	4.67	4.62	76.36
May 8, 1905	31.61	30.76	6.37	5.11	4.95	4.89	83.70
Apr. 15, 1910	34.82	33.90	7.52	5.82	5.20	5.12	92.39
Feb. 22, 1915	38.19	37.34	8.18	6.46	5.45	5.39	101.01
Jan. 1, 1920	41.20	40.48	7.53	6.18	5.56	5.50	106.45
Feb. 15, 1925	45.16	44.51	7.73	6.54	5.94	5.94	115.82
Apr. 1, 1930	48.63	48.07	7.50	6.48	6.28	6.34	123.30
Apr. 1, 1935	51.17	50.86	6.69	5.91	6.49	6.62	127.74
Apr. 1, 1940	53.74	53.62	6.01	5.41	6.69	6.90	132.37
Apr. 1, 1950	62.25	63.07	5.18	4.98	7.74	8.08	151.30

Estimates include the armed forces stationed in the United States at the time of enumeration.

SOURCE, BY COLUMN

(1), (2), (5),

and (6) 1870–1940: From "Midcensal Estimates of the Native White and Total Nonwhite Population of the United States, 1870–1940," unpublished memorandum by Everett S. Lee (Study of Population Redistribution and Economic Growth, University of Pennsylvania), Table II-B for 1870 and 1875, and Table I for later dates.

While the basic data are the census totals by race, nativity, age, and sex, several adjustments and additional calculations had to be made. The adjustments were designed to correct the 1870 Census total for the undercount and all census totals for underenumeration of the age group 0 to 4 years. The additional calculations were needed to estimate mid-censal population totals for a study of movement by five-year intervals, and entailed estimating deaths and births during a given intercensal period and distributing them between the halves of that period. It is impossible here to give a detailed description of the procedures employed, but the notes below will be useful to technicians as a more specific indication of what was done.

1. Adjustment of the Age Group 0 to 4 Years for Underenumeration, Census Dates

"Reverse survival" or "revival" ratios were applied to the age group 10 to 14 years at the following census and the resulting estimate was substituted for the enumerated age group 0 to 4 years. This is not a correction for underenumeration *per se* but for underenumeration relative to the enumerated 10–14 age

(1), (2), (5), and (6)   group at the following census. For native whites, the survival ratios were obtained from a series of life tables for native whites, prepared by Dorothy Thomas and the University of Pennsylvania staff in connection with the Kuznets-Rubin study, *Immigration and the Foreign Born* (see pp. 65–68 of Occasional Paper 46, New York, NBER, 1954). For nonwhites, the survival ratios from the life tables for Negroes centering around census years were averaged to approximate decade ratios for the period 1900–1940. For the period before 1900, the 1900–1910 ratio of Negro to native white ratios, multiplied by the native white ratios for 1870–1880, 1880–1890, and 1890–1900, respectively, yielded ratios for all nonwhites for those decades.

2. Deriving Mid-Censal Population

a. Estimating the Age Groups 0 to 4, and 5 to 9 Years

The 0–4 and 5–9 age groups at mid-censal dates were estimated by applying reverse survival or revival ratios to the age groups 5–9, and 10–14, respectively, at the terminal census. The reverse survival ratios were derived in the following manner. For each of the life tables of the United States from 1900 through 1950 the ratios of the L_x's in the 0–4 age group to those in the 5–9 group, and of those in the 5–9 age group to those in the 10–14 group were obtained. In establishing the ratio to be used in computing a given mid-censal population, the ratios from the life tables centering around the initial and the terminal censuses were weighted 3 and 1 in favor of the latter. For example, in computing the ratio used in estimating the 1935 0–4 age group from the 1940 enumerated 5–9 age group, the reverse survival ratio from the 1940 life table was given a weight of 3 and that from the 1930 life table a weight of 1.

For the period 1870–1900, the English life tables for 1871–1880, 1881–1890, and 1891–1900 were used to establish a trend. The United States ratio for total whites for the 1900–1910 decade (as estimated by averaging the 1900 and 1910 ratios) was divided by the English ratio for 1901–1910. The resulting dividend, multiplied by the English ratios for 1871–1880, 1881–1890, and 1891–1900, yielded estimates that were assumed to represent the ratios that would have been found in United States decade life tables for native whites, had these existed. These decade ratios were assumed to apply to 1875, 1885, and 1895, respectively, and those for the census years were interpolated between them or extrapolated from them. Here again, the resulting ratios were weighted 3 and 1 in favor of the second census year. For nonwhites, the corresponding ratios were obtained by dividing the 1900–1910 ratio for Negroes by that for native whites, and multiplying the dividend by the native white revival ratios for 1880–1875, 1890–1885, and 1900–1895.

b. Estimating the Age Groups 10 Years and Over

i. Apportioning Deaths between the Two Halves of Each Intercensal Period from 1870 to 1910, and from 1920 to 1940

Here, a method was needed that would take account of the uneven distribution of deaths during an intercensal period and yield mid-censal estimates in which

(1), (2), (5), and (6)

the biases were to some extent proportional to those of both the preceding and following censuses. From life tables the proportion of deaths that occurred in each group in the first five years of the intercensal period was established and on that basis the total number of deaths for that age group was distributed between the two halves of the period.

The life tables used were those for the United States including or centered around the census years 1900, 1910, 1920, 1930, 1940, and 1950. (It should be noted that those for 1900, 1910, and 1920 were based on the mortality rates in the registration states of those years—only ten states and the District of Columbia in 1900, the coverage increasing in 1910 and 1920. For the last three census years the mortality in all the states is covered, that in Texas in 1930 having been estimated.) The deaths in a given age group in the first five years of an intercensal period and those in the entire period were obtained by subtracting from the sum of the L_x's in the given age group the sum of those in the groups 5 and 10 years older. The proportional distribution of the deaths computed from these data was calculated for each census year and the proportions for contiguous census years averaged (except those for 1910 and 1920) to approximate the proportion that would have been obtained from decade life tables (e.g., the proportion used for 1900–1910 was the average of those for 1900 and 1910).

The total number of deaths for a given age group was estimated as the difference between the number of persons in the given age group at the beginning of the intercensal period and the number in the group 10 years older at the end of the period. Multiplying that number by the proportion established from the life tables yielded the number of deaths occurring in the first five and last five years of the period. The estimated deaths for the first five-year period were then subtracted from the population at the beginning of the period, yielding the number surviving to the mid-censal point. This procedure was followed for each age group 5–14 and over, resulting in a mid-censal population estimate for ages 10 and over.

Because there were no United States life tables for the years before 1900, and because very few states recorded the number of deaths during that period, the 1900–1910 proportions were used in distributing the number of deaths for the intercensal periods before 1900. (Proportions computed from the English life tables for 1871–1880, 1881–1890, and 1891–1900 showed trends for some age groups too different from those in the United States life tables to warrant their use as extrapolators of the United States ratios. Furthermore, such extrapolation of the United States trend, besides being a doubtful procedure, would make relatively little difference in the resulting mid-censal estimates.)

ii. Apportioning Deaths between the Two Halves of the 1910–1920 Intercensal Period

Because of the influenza epidemic of 1918, a year not included in the 1919–1921 life table, the method em-

(1), (2), (5), and (6)

ployed for the other decades could not be used in esti-
mating the mid-censal population aged 10 and over be-
tween 1910 and 1920. Instead, an attempt was made to
distribute among the age cohorts of the 1910 Census and
persons born after that date the number of deaths occur-
ring each year from April 15, 1910 to January 1, 1920.
For example, the group aged 5–14 at the 1910 Census
was assigned the following proportions of the deaths
occurring in 1910 and succeeding years:

1910 $0.45747D_5 + 0.70834(D_6 \ldots \ldots D_{14})$
        $+ 0.25087D_{15}$

1911 $0.04253D_5 + 0.74913D_6 + D_7 \ldots \ldots D_{14}$
        $+ 0.95747D_{15} + 0.25087D_{16}$

1912 $0.04253D_6 + 0.74913D_7 + D_8 \ldots \ldots D_{15}$
        $+ 0.95747D_{16} + 0.25087D_{17}$

and so on.

The underlying assumption was a rectangular distri-
bution of deaths for each year of age and for each calendar
year. Since the deaths were recorded by 5-year age groups,
it was further assumed that one-fifth of the deaths in each
5-year age group could be assigned to each included
single year of age. Because the deaths of native whites
in 1912 and 1913 were not reported separately, they were
estimated by straight-line interpolation between those for
1911 and 1914. Furthermore, the proportion of native
white deaths in the registration states between April 15,
1910 and January 1, 1915 to those between April 15,
1910 and January 1, 1920 was assumed to apply to all
native white population.

An important factor in the distribution of deaths among
age groups over a long period is migration. In-migration
increases the number of deaths in most age groups simply
because the population is increased by migration, while
out-migration has the opposite effect. For nonwhites, the
rather small amount of in-migration, probably increasing
in the war years, made the proportion of deaths occurring
in an age cohort in the registration states of 1910 much
too high for the second half of the period. For nonwhites,
therefore, the proportion of deaths in 1910–1915 to those
in 1910–1920 was estimated by adjusting the native white
proportions by the 1900–1910 ratio of nonwhite to native
white.

iii. A Check on the Method Used for All Intercensal Periods
except 1910–1920

It was assumed that the average of the proportions
established from life tables for each end of the decade
adequately represented proportions for the entire inter-
censal interval. A crude check on this assumption for
the periods from 1900 to 1940 was made on the basis
of the distribution of the deaths of native whites in
the registration states following the procedure employed
for the period 1910–1920. The proportion of deaths oc-
curring in the first five years of each intercensal period
was quite close to that obtained by using life tables. The
largest difference was just over 4 percentage points, but
the proportions derived from the registration states data

(1), (2), (5), and (6)   were much more irregular than those obtained from the life tables, partly because of the smoothing of life table values and partly because of the unavoidably crude distribution of deaths. In addition, deaths of native whites had to be estimated for those years when they were not presented separately.

c. Special Adjustment for 1870 and 1875

The 1870 population was computed as follows. Reverse survival ratios were applied to the more complete enumeration of 1880, using the 1880–1890 census survival ratios adjusted for the effect of changing mortality. The life tables for native whites computed by Dorothy Thomas and the University of Pennsylvania staff were used to estimate the effect of changing mortality. The ten-year survival ratios computed from those tables for each age group for 1870–1880 were divided by the ratios for 1880–1890. The resulting adjustment was applied to the census survival ratios for 1880–1890. The adjusted ratios were then applied to the appropriate 1880 populations to yield 1870 populations for the age groups 5–9 through 50–54. For ages 55 and over in 1870 the 1880–1890 census survival ratios were used without adjustment because of the unreliability of the life tables for the upper age groups. The age group 0–4 was estimated by the life table survival ratio referred to under b-i above. The adjustment applied to the native white census survival ratios was applied also to the nonwhite census survival ratios.

The 1875 population was computed as follows. The ratios of five- to ten-year reverse survival ratios were obtained from life tables and applied to the ten-year reverse survival ratios used above to approximate five-year reverse census survival ratios. The resulting five-year reverse survival ratios were then multiplied by the appropriate age groups in the 1880 Census to yield an estimated 1875 population for each age group except the 0–4 group which was estimated by the life table survival ratio referred to under b-i above.

1950: *Census of Population, 1950.* Numbers of nonwhite males and nonwhite females, as reported, were adjusted for underenumeration of children under 5 by applying to the 1950 enumeration of the 0–4 group the 1940 ratio of the adjusted 0–4 group to the enumerated 0–4 group, computed from the University of Pennsylvania Study (cited) and extrapolated to 1950 by the similar ratio computed for 1940 and 1950 from *Current Population Reports* (Census Bureau, Series P-25, No. 98). The numbers of native white males and native white females, as reported, were adjusted for underenumeration of children under 5 by the same procedure, except that the 1940 University of Pennsylvania ratio was the ratio of native whites adjusted to total whites enumerated, and the extrapolating ratio was the ratio of total whites adjusted to total whites enumerated.

(3) and (4) 1870–1940: From worksheets underlying the estimates given in Simon Kuznets and Ernest Rubin, *Immigration and the Foreign Born,* Table B-6.

1950: *Census of Population, 1950,* Vol. II, Table 35.

(7) Sum of cols. 1–6.

TABLE R-37

FIVE-YEAR MOVING AVERAGES OF TOTAL POPULATION, JULY 1, 1869–1955
(millions)

Year on Which Moving Average Is Centered (July 1)	Native White Male (1)	Native White Female (2)	Foreign White Male (3)	Foreign White Female (4)	Nonwhite Male (5)	Nonwhite Female (6)	Total Population Excluding Armed Forces Overseas (7)	Armed Forces Overseas (8)	Total Population Including Armed Forces Overseas (9)
1871	15.6	15.4	3.22	2.77	3.08	3.10	42.0	0	42.0
1872	16.0	15.8	3.32	2.85	3.14	3.17	43.1	0	43.1
1873	16.4	16.2	3.39	2.91	3.20	3.23	44.2	0	44.2
1874	16.8	16.6	3.43	2.95	3.26	3.28	45.3	0	45.3
1875							46.2	0	46.2
1876	17.2	16.9	3.43	2.96	3.31	3.32	47.1	0	47.1
1877	17.6	17.3	3.41	2.96	3.35	3.35	48.0	0	48.0
1878	18.0	17.7	3.43	2.97	3.39	3.37	48.9	0	48.9
1879	18.4	18.1	3.51	3.03	3.43	3.40	49.9	0	49.9
1880	18.9	18.5	3.67	3.13	3.47	3.43	51.1	0	51.1
1881	19.3	18.9	3.88	3.27	3.52	3.46	52.4	0	52.4
1882	19.8	19.3	4.12	3.43	3.57	3.51	53.7	0	53.7
1883	20.2	19.8	4.33	3.59	3.62	3.56	55.1	0	55.1
1884	20.7	20.2	4.49	3.72	3.67	3.61	56.4	0	56.4
1885	21.2	20.7	4.60	3.82	3.73	3.66	57.7	0	57.7
1886	21.7	21.1	4.69	3.90	3.78	3.71	58.9	0	58.9
1887	22.2	21.6	4.76	3.97	3.83	3.75	60.1	0	60.1
1888	22.7	22.1	4.83	4.04	3.88	3.80	61.3	0	61.3
1889	23.2	22.5	4.93	4.13	3.94	3.86	62.6	0	62.6
1890	23.7	23.0	5.05	4.22	4.00	3.92	63.9	0	63.9
1891	24.2	23.5	5.17	4.33	4.06	3.98	65.2	0	65.2
1892	24.7	24.0	5.28	4.42	4.13	4.05	66.6	0	66.6
1893	25.2	24.5	5.37	4.50	4.20	4.13	68.0	0	68.0
1894	25.7	25.0	5.43	4.56	4.28	4.20	69.2	0	69.2
1895	26.3	25.5	5.45	4.60	4.35	4.27	70.5	0	70.5

1896	26.8	26.0	5.42	4.60	4.41	4.34	71.6	0	71.6
1897	27.3	26.5	5.41	4.61	4.48	4.42	72.8	0	72.8
1898	27.8	27.0	5.43	4.63	4.55	4.48	74.0	0	74.0
1899	28.3	27.6	5.46	4.65	4.61	4.55	75.2	a	75.2
1900	28.9	28.1	5.52	4.68	4.67	4.61	76.4	a	76.4
1901	29.4	28.6	5.62	4.73	4.73	4.67	77.8	0.01	77.8
1902	30.0	29.2	5.77	4.80	4.79	4.73	79.2	0.01	79.2
1903	30.5	29.7	5.95	4.89	4.85	4.79	80.7	0.02	80.8
1904	31.1	30.3	6.17	5.01	4.90	4.84	82.3	0.02	82.4
1905	31.7	30.9	6.44	5.16	4.96	4.89	84.1	0.03	84.1
1906	32.3	31.5	6.65	5.31	5.01	4.94	85.7	0.03	85.8
1907	33.0	32.1	6.87	5.45	5.06	4.99	87.5	0.04	87.5
1908	33.6	32.7	7.11	5.60	5.11	5.04	89.2	0.05	89.3
1909	34.3	33.4	7.31	5.73	5.16	5.09	91.0	0.05	91.0
1910	35.0	34.1	7.45	5.84	5.21	5.14	92.7	0.06	92.7
1911	35.6	34.7	7.66	5.98	5.26	5.19	94.5	0.06	94.5
1912	36.3	35.4	7.89	6.13	5.31	5.24	96.3	0.06	96.4
1913	37.0	36.1	7.99	6.25	5.36	5.30	98.1	0.07	98.1
1914	37.7	36.8	8.04	6.34	5.41	5.34	99.7	0.07	99.7
1915	38.4	37.5	8.08	6.40	5.45	5.38	101.2	0.07	101.2
1916	39.0	38.2	8.02	6.40	5.48	5.42	102.5	0.07	102.6
1917	39.6	38.8	7.87	6.34	5.50	5.44	103.6	0.08	103.7
1918	40.3	39.5	7.74	6.28	5.53	5.47	104.8	0.08	104.9
1919	40.9	40.2	7.66	6.28	5.57	5.52	106.1	0.08	106.2
1920	41.6	40.9	7.57	6.27	5.62	5.57	107.5	0.09	107.6
1921	42.3	41.6	7.52	6.30	5.67	5.64	109.1	0.09	109.2
1922	43.1	42.4	7.56	6.37	5.74	5.71	110.9	0.09	111.0
1923	43.9	43.2	7.61	6.44	5.82	5.80	112.7	0.09	112.8
1924	44.6	44.0	7.63	6.47	5.89	5.88	114.4	0.09	114.5
1925	45.3	44.7	7.67	6.50	5.96	5.96	116.2	0.10	116.2
1926	46.1	45.4	7.68	6.52	6.03	6.04	117.8	0.10	117.9
1927	46.7	46.1	7.64	6.51	6.10	6.12	119.3	0.10	119.4
1928	47.4	46.8	7.60	6.50	6.16	6.20	120.7	0.10	120.8
1929	48.1	47.5	7.53	6.48	6.22	6.27	122.0	0.10	122.2
1930	48.7	48.1	7.43	6.42	6.28	6.34	123.3	0.11	123.4

TABLE R-37 (concluded)

Year on Which Moving Average Is Centered (July 1)	Native White		Foreign White		Nonwhite		Total Population Excluding Armed Forces Overseas	Armed Forces Overseas	Total Population Including Armed Forces Overseas
	Male (1)	Female (2)	Male (3)	Female (4)	Male (5)	Female (6)	(7)	(8)	(9)
1931	49.2	48.7	7.30	6.34	6.33	6.41	124.3	0.11	124.5
1932	49.8	49.3	7.15	6.24	6.38	6.47	125.3	0.12	125.4
1933	50.3	49.9	6.98	6.13	6.42	6.52	126.2	0.12	126.3
1934	50.8	50.4	6.81	6.00	6.46	6.58	127.1	0.13	127.2
1935	51.3	51.0	6.65	5.88	6.50	6.64	127.9	0.14	128.1
1936	51.8	51.5	6.51	5.77	6.54	6.69	128.9	0.14	129.0
1937	52.3	52.1	6.37	5.67	6.58	6.75	129.8	0.15	129.9
1938							130.7	0.16	130.9
1939							131.7	0.18	131.9
1940							132.7	0.34	133.0
1941							133.5	0.81	134.3
1942							133.9	1.88	135.8
1943							134.0	3.33	137.3
1944							135.4	3.55	138.9
1945							137.3	3.49	140.8
1946							139.6	3.10	142.7
1947							142.8	2.10	144.9
1948							146.5	0.70	147.2
1949							149.2	0.63	149.8
1950							151.6	0.75	152.4
1951							154.1	0.91	155.0
1952							156.6	1.05	157.6
1953							159.2	1.15	160.3

Because of rounding, detail will not necessarily add to total.
a Less than 0.005 million.

Appendix E

NOTES TO TABLE R-37

SOURCE, BY COLUMN

The description of the series in a given column applies to the annual estimates underlying the five-year moving averages.

(1) and (2) Logarithmic straight-line interpolation of Table R-36, cols. 1 and 2, respectively.

(3) and (4) Calculated from Kuznets and Rubin, *Immigration and the Foreign Born*, Table B-6.

(5) and (6) Logarithmic straight-line interpolation of Table R-36, cols. 5 and 6, respectively.

(7) 1869: Extrapolated from 1870 with the Census Bureau estimate (given in *Historical Statistics of the United States, 1789–1945*, Series B-31) as index.

1870–1939: Sum of cols. 1–6.

1940–1949: Interpolated between the 1940 and 1950 entries in Table R-36, col. 7, by the series on population residing in the United States, adjusted for the 0–4 undercount, as given in *Current Population Reports*, Series P-25, No. 98.

1950–1955: Extrapolated from the 1950 entry in Table R-36, col. 7, by the series in *Current Population Reports*, Series P-25, No. 146.

(8) 1869–1939: The number in the armed forces overseas was assumed to be negligible in 1900 and earlier census years, since the number of soldiers, sailors, and marines alone, excluding officers, reported in *Census of Occupations, 1900* is larger than the total number in the armed forces reported in Solomon Fabricant, *The Trend of Government Activity since 1900* (New York, NBER, 1952), Table B-5. The armed forces overseas in 1910, 1920, and 1930 were estimated by subtracting from the total armed forces (*ibid.*), the number resident in the United States. The latter are given for 1910 in *Census of Occupations, 1910;* for 1920 and 1930 they were derived by adding to the number of soldiers, sailors, and marines reported in *Census of Occupations, 1920* and *1930*, the estimated number of officers. The latter were derived on the basis of the ratio of officers to soldiers, sailors, and marines, computed for 1910 and 1940 and interpolated along a straight line. For the 1940 ratio, the number of soldiers, sailors, and marines was taken from *Census of Population, 1940*, Vol. III, Part 1; and the number of officers was derived by subtracting the former from the total armed forces in the United States given in *Census of Population, 1950*, Vol. II, Part 1. The armed forces overseas in 1940 is given in *Current Population Reports*, Series P-25, No. 98. Interpolations between 1900, 1910, 1920, 1930, and 1940 were made along a straight line.

1940–1955: Derived as the difference between total population including and total population excluding armed forces overseas, given in *Current Population Reports*, Series P-25, Nos. 98 and 146.

(9) Sum of cols. 7 and 8.

LABOR FORCE, TEN YEARS OLD AND OVER, EXCLUDING ARMED FORCES OVERSEAS,
CENSUS AND MID-CENSAL DATES, 1870–1950

(numbers in millions)

	Male, 10 Years and Over			Female, 10 Years and Over			
	Popu-lation (1)	Ratio, Labor Force to Popu-lation (2)	Labor Force (3)	Popu-lation (4)	Ratio, Labor Force to Popu-lation (5)	Labor Force (6)	Total (7)
June 1, 1870	14.85	.748	11.11	14.44	.131	1.90	13.01
June 1, 1875	16.83	.768	12.92	16.54	.139	2.30	15.22
June 1, 1880	18.74	.787	14.74	18.03	.147	2.65	17.39
June 1, 1885	21.88	.780	17.06	20.75	.158	3.29	20.35
June 1, 1890	24.35	.773	18.82	23.06	.170	3.91	22.73
June 1, 1895	27.15	.786	21.35	25.74	.179	4.61	25.96
June 1, 1900	29.70	.800	23.75	28.25	.188	5.32	29.07
May 8, 1905	33.27	.806	26.82	31.30	.211	6.60	33.42
Apr. 15, 1910	37.03	.813	30.09	34.55	.234	8.08	38.17
Feb. 22, 1915	40.51	.797	32.30	38.12	.223	8.48	40.78
Jan. 1, 1920	42.29	.782	33.06	40.45	.211	8.55	41.61
Feb. 15, 1925	46.24	.772	35.70	44.72	.216	9.66	45.36
Apr. 1, 1930	49.95	.762	38.08	48.77	.220	10.75	48.83
Apr. 1, 1935	52.87	.743	39.30	52.23	.227	11.85	51.15
Apr. 1, 1940	55.29	.724	40.05	55.16	.233	12.88	52.92
Apr. 1, 1950			43.72			16.54	60.26

Estimates include armed forces stationed in the United States at the time of enumeration.

SOURCE, BY COLUMN

(1) and (4) Sum of native white, foreign white, and nonwhite population.

Native white and nonwhite:

1870, 1875, and later mid-censal dates: For source see notes to Table R-36, cols. 1, 2, 5, and 6.

1880 and later census dates: *Census of Population* for respective years.

Foreign white:

Census dates: *Census of Population* for respective years.

Mid-censal dates: Interpolated with total foreign white population as index. See notes to Table R-36, cols. 3 and 4, for derivation of the latter.

(2) and (5) 1870: Ratio of labor force (gainfully occupied) to population 10 years and over, both as reported in the *Census Compendium, 1870*.

1880 and later census dates: Ratio of col. 3 to col. 1, or col. 6 to col. 4.

Mid-censal dates: Straight-line interpolation between ratios for census dates.

(3) and (6) 1870, 1875, and later mid-censal dates: Col. 1 times col. 2, or col. 4 times col. 5.

(3) and (6) 1880, 1890, 1900, 1910, 1920, 1930: *Census of Occupations* for respective years.

1940 and 1950: Labor force 14 years and over, reported in *Census of Population, 1940,* Vol. III, Part 1, and *1950,* Vol. II, Part 1, plus an estimate of labor force, 10 to 13 years old, by Ann Miller, of the staff of the University of Pennsylvania Study of Population Redistribution and Economic Growth. This estimate was derived separately for male and female, as follows:

1. Participation rates (i.e. gainful workers as a percentage of population) were computed for 10- to 13-year-olds by state, 1930.

2. Participation rates were computed for 14- to 15-year-olds by state, 1930, 1940, 1950.

3. The ratio of the rate obtained in step 1 to that obtained in step 2 for 1930 was computed for each state.

4. The ratio derived in step 3, multiplied by the participation rates for 14- to 15-year-olds for the given state as derived in step 2, yielded the estimated participation rates for 10- to 13-year-olds in 1940 and 1950.

5. The participation rates for 10- to 13-year-olds computed in step 4 was applied to population aged 10–13 for each state in 1940 and 1950 to derive estimates of 10- to 13-year-olds in the labor force in those years.

Originally the procedure called for deriving the ratios obtained in step 3 for the four Censuses 1900 through 1930 and extrapolating, on the basis of these four points, the ratios for 1940 and 1950. When the ratios were computed, however, it appeared that the simpler procedure of using just the 1930 ratios with no further adjustments would yield equally adequate results.

The basic assumption underlying the procedure is that participation rates for the two age groups move together. There seems no reason to doubt the general validity of this assumption, although the relationship between the two is not likely to be as direct as this method implies.

As estimated by this procedure, the total number of workers aged 10–13 in all states combined is 132,800 for 1940 and 201,300 for 1950.

(7) Sum of cols. 3 and 6.

FIVE-YEAR MOVING AVERAGES OF TOTAL LABOR FORCE, TEN YEARS OLD
AND OVER, JULY 1, 1869–1955
(millions)

Year on Which Moving Average Is Centered (July 1)	Male (1)	Female (2)	Total Excluding Armed Forces Overseas (3)	Armed Forces Overseas (4)	Total Including Armed Forces Overseas (5)
1871			13.50	0	13.50
1872	11.84	2.06	13.90	0	13.90
1873	12.20	2.14	14.34	0	14.34
1874	12.56	2.22	14.78	0	14.78
1875	12.93	2.30	15.22	0	15.22
1876	13.29	2.37	15.66	0	15.66
1877	13.66	2.44	16.10	0	16.10
1878	14.03	2.51	16.54	0	16.54
1879	14.41	2.59	17.00	0	17.00
1880	14.82	2.68	17.50	0	17.50
1881	15.24	2.79	18.03	0	18.03
1882	15.68	2.90	18.58	0	18.58
1883	16.14	3.03	19.17	0	19.17
1884	16.59	3.16	19.74	0	19.74
1885	17.01	3.28	20.29	0	20.29
1886	17.41	3.41	20.82	0	20.82
1887	17.78	3.54	21.32	0	21.32
1888	18.13	3.66	21.80	0	21.80
1889	18.52	3.79	22.31	0	22.31
1890	18.93	3.92	22.85	0	22.85
1891	19.37	4.06	23.43	0	23.43
1892	19.85	4.19	24.04	0	24.04
1893	20.35	4.33	24.69	0	24.69
1894	20.85	4.47	25.33	0	25.33
1895	21.35	4.61	25.97	0	25.97
1896	21.84	4.76	26.60	0	26.60
1897	22.33	4.90	27.23	0	27.23
1898	22.81	5.04	27.85	0	27.85
1899	23.32	5.21	28.53	a	28.53
1900	23.86	5.39	29.25	a	29.25
1901	24.42	5.60	30.03	0.01	30.03
1902	25.02	5.84	30.86	0.01	30.87
1903	25.64	6.10	31.74	0.02	31.75
1904	26.27	6.37	32.64	0.02	32.66
1905	26.91	6.64	33.55	0.03	33.58
1906	27.55	6.93	34.48	0.03	34.52
1907	28.21	7.22	35.43	0.04	35.47
1908	28.86	7.51	36.37	0.05	36.42
1909	29.48	7.76	37.24	0.05	37.29
1910	30.06	7.97	38.03	0.06	38.08

(continued)

Year on Which Moving Average Is Centered (July 1)	Male (1)	Female (2)	Total Excluding Armed Forces Overseas (3)	Armed Forces Overseas (4)	Total Including Armed Forces Overseas (5)
1911	30.59	8.14	38.73	0.06	38.79
1912	31.08	8.26	39.34	0.06	39.41
1913	31.52	8.34	39.86	0.07	39.92
1914	31.89	8.40	40.30	0.07	40.37
1915	32.21	8.46	40.67	0.07	40.74
1916	32.47	8.49	40.96	0.07	41.04
1917	32.67	8.52	41.18	0.08	41.26
1918	32.86	8.55	41.41	0.08	41.49
1919	33.12	8.62	41.74	0.08	41.82
1920	33.45	8.73	42.18	0.09	42.27
1921	33.86	8.88	42.74	0.09	42.83
1922	34.33	9.08	43.41	0.09	43.50
1923	34.85	9.29	44.14	0.09	44.23
1924	35.35	9.51	44.86	0.09	44.95
1925	35.84	9.72	45.56	0.10	45.66
1926	36.32	9.94	46.26	0.10	46.36
1927	36.79	10.15	46.94	0.10	47.04
1928	37.24	10.37	47.61	0.10	47.71
1929	37.65	10.58	48.24	0.10	48.34
1930	38.02	10.80	48.82	0.11	48.93
1931	38.34	11.02	49.36	0.11	49.48
1932	38.62	11.24	49.86	0.12	49.98
1933	38.86	11.46	50.32	0.12	50.45
1934	39.08	11.68	50.76	0.13	50.89
1935	39.29	11.89	51.17	0.14	51.31
1936	39.47	12.10	51.57	0.14	51.71
1937	39.63	12.31	51.94	0.15	52.09
1938	39.94	12.56	52.50	0.16	52.66
1939	40.42	12.86	53.27	0.18	53.46
1940	40.94	13.39	54.33	0.34	54.67
1941	41.46	14.37	55.83	0.81	56.64
1942	41.56	15.40	56.96	1.88	58.83
1943	41.07	16.32	57.39	3.33	60.72
1944	40.94	16.70	57.63	3.55	61.18
1945	41.06	16.82	57.87	3.49	61.37
1946	41.26	16.56	57.82	3.10	60.93
1947	41.93	16.30	58.22	2.10	60.33
1948			59.20	0.70	59.91
1949			60.29	0.63	60.92
1950			61.06	0.75	61.81
1951			61.74	0.91	62.65
1952			62.37	1.05	63.42
1953			63.08	1.15	64.23

Because of rounding, detail will not necessarily add to total.
ᵃ Less than 0.005 million.

(Notes on following page)

Appendix E

SOURCE, BY COLUMN

The description of the series in a given column applies to the annual estimates underlying the five-year moving averages.

(1) and (2) 1870–1939: Logarithmic straight-line interpolation of Table R-38, cols. 3 and 6, respectively.

1940–1949: Interpolation between the 1940 and 1950 estimates in Table R-38, cols. 3 and 6, with the sum of civilian labor force and armed forces in the United States as index. The former is the annual average given in *Current Population Reports*, Series P-50, Nos. 2, 13, 19, 31, and 40, and the latter is for July 1, derived as the difference between the population series including armed forces and that excluding them, given in *Current Population Reports*, Series P-25, No. 98.

(3) 1869: Extrapolation from 1870 with total population (series underlying Table R-37, col. 7) as index.

1870–1949: Sum of cols. 1 and 2.

1950–1955: Extrapolation of 1950 total in Table R-38, col. 7 by the index described in the above notes to cols. 1 and 2, 1940–1949. The sources of the underlying data are *Current Population Reports*, Series P-50, Nos. 40 and 45; Series P-57, No. 138; and Series P-25, No. 146.

(4) Table R-37, col. 8.

(5) Sum of cols. 3 and 4.

FIVE-YEAR MOVING AVERAGES OF NATIONAL PRODUCT AND FLOW OF GOODS
TO CONSUMERS, VARIANTS I AND III, 1929 PRICES, PER CAPITA
AND PER MEMBER OF LABOR FORCE, 1869–1955

(dollars)

Year on Which Moving Average Is Centered	Per Capita			Per Member of Labor Force	
	Gross National Product (1)	Net National Product (2)	Flow of Goods to Consumers (3)	Gross National Product (4)	Net National Product (5)
A. VARIANT I					
1871	211	192	161	657	597
1872	219	199	167	679	616
1873	228	207	174	703	637
1874	241	218	182	737	668
1875	247	224	189	751	679
1876	256	231	196	771	696
1877	272	246	208	809	731
1878	295	268	226	871	790
1879	314	285	241	921	837
1880	332	302	255	969	881
1881	345	314	266	1,003	913
1882	354	322	274	1,024	930
1883	354	320	275	1,018	921
1884	358	323	278	1,024	924
1885	360	324	279	1,024	921
1886	361	323	279	1,021	915
1887	362	323	280	1,022	911
1888	369	328	278	1,037	922
1889	374	331	280	1,049	930
1890	384	340	282	1,074	951
1891	391	346	285	1,090	963
1892	393	346	284	1,089	959
1893	399	351	291	1,097	966
1894	399	350	293	1,092	959
1895	400	351	298	1,086	952
1896	407	357	303	1,096	960
1897	425	373	318	1,135	998
1898	436	383	326	1,156	1,018
1899	459	406	343	1,209	1,069
1900	475	421	355	1,242	1,100
1901	495	440	370	1,282	1,139
1902	504	448	378	1,294	1,150
1903	517	460	390	1,316	1,170
1904	531	472	401	1,340	1,192
1905	545	485	412	1,364	1,215
1906	543	481	413	1,349	1,197
1907	556	493	423	1,372	1,218
1908	563	499	429	1,380	1,224
1909	559	494	431	1,366	1,207
1910	561	495	434	1,367	1,205

(continued)

Year on Which Moving Average Is Centered	Per Capita			Per Member of Labor Force	
	Gross National Product (1)	Net National Product (2)	Flow of Goods to Consumers (3)	Gross National Product (4)	Net National Product (5)
A. VARIANT I, CONCLUDED					
1911	579	511	446	1,411	1,246
1912	572	503	447	1,400	1,231
1913	569	499	446	1,397	1,225
1914	581	509	449	1,434	1,258
1915	584	511	449	1,450	1,270
1916	580	506	448	1,451	1,265
1917	601	523	453	1,510	1,315
1918	619	539	463	1,564	1,362
1919	613	532	470	1,558	1,350
1920	620	537	481	1,578	1,367
1921	644	560	499	1,643	1,429
1922	658	575	519	1,680	1,466
1923	675	592	533	1,723	1,509
1924	708	622	551	1,804	1,586
1925	733	646	568	1,866	1,646
1926	743	656	579	1,890	1,667
1927	761	672	591	1,932	1,706
1928	763	673	602	1,932	1,705
1929	739	650	596	1,869	1,644
1930	693	605	577	1,749	1,527
1931	645	559	556	1,624	1,408
1932	597	513	532	1,499	1,289
1933	574	491	514	1,436	1,230
1934	579	498	515	1,448	1,244
1935	622	540	534	1,552	1,346
1936	656	573	553	1,637	1,429
1937	693	608	574	1,729	1,518
1938	732	645	600	1,818	1,603
1939	776	687	625	1,912	1,693
1940	799	706	640	1,943	1,716
1941	828	728	656	1,968	1,730
1942	852	740	670	1,971	1,715
1943	865	741	685	1,962	1,682
1944	887	754	708	2,024	1,720
1945	915	772	735	2,112	1,782
1946	949	798	761	2,237	1,881
1947	969	812	785	2,336	1,958
1948	1,008	847	809	2,477	2,081
1949	1,023	855	815	2,515	2,103
1950	1,038	869	824	2,560	2,142
1951	1,053	883	837	2,604	2,185
1952	1,075	907	849	2,671	2,255
1953	1,091	926	862	2,723	2,311

(continued)

Year on Which Moving Average Is Centered	Per Capita			Per Member of Labor Force	
	Gross National Product (1)	Net National Product (2)	Flow of Goods to Consumers (3)	Gross National Product (4)	Net National Product (5)
		B. VARIANT III			
1871	216	197	166	673	613
1872	224	204	172	695	632
1873	233	212	179	720	654
1874	247	224	188	755	686
1875	253	230	195	770	698
1876	263	238	203	790	715
1877	278	252	215	829	751
1878	302	275	233	892	811
1879	321	293	248	942	858
1880	340	310	263	991	904
1881	353	322	274	1,026	936
1882	362	330	282	1,047	954
1883	362	329	283	1,042	945
1884	367	332	287	1,048	948
1885	369	333	287	1,048	945
1886	370	332	288	1,046	939
1887	371	332	288	1,046	936
1888	377	337	287	1,061	946
1889	382	340	289	1,073	954
1890	393	349	291	1,098	975
1891	400	355	294	1,114	987
1892	402	355	293	1,113	983
1893	407	360	299	1,122	990
1894	408	360	302	1,117	984
1895	409	360	307	1,111	977
1896	417	366	313	1,122	986
1897	435	384	328	1,163	1,025
1898	446	394	337	1,185	1,046
1899	470	417	354	1,239	1,099
1900	487	433	367	1,273	1,131
1901	507	452	383	1,315	1,171
1902	517	461	392	1,328	1,184
1903	531	474	404	1,351	1,205
1904	546	487	415	1,376	1,229
1905	560	501	428	1,403	1,254
1906	559	498	430	1,389	1,237
1907	573	510	439	1,413	1,259
1908	580	516	446	1,422	1,266
1909	577	512	449	1,408	1,249
1910	579	512	452	1,409	1,247
1911	597	529	464	1,454	1,290
1912	590	521	465	1,443	1,275
1913	586	516	464	1,441	1,269
1914	599	527	467	1,479	1,303
1915	602	530	468	1,497	1,317

(continued)

Year on Which Moving Average Is Centered	Per Capita			Per Member of Labor Force	
	Gross National Product (1)	Net National Product (2)	Flow of Goods to Consumers (3)	Gross National Product (4)	Net National Product (5)
	B. VARIANT III, CONCLUDED				
1916	600	525	467	1,500	1,314
1917	621	544	474	1,562	1,368
1918	641	561	485	1,621	1,418
1919	637	555	493	1,618	1,411
1920	644	561	505	1,641	1,429
1921	670	586	525	1,709	1,494
1922	686	602	546	1,750	1,536
1923	703	619	561	1,793	1,579
1924	736	651	579	1,876	1,657
1925	762	676	597	1,940	1,719
1926	773	686	609	1,966	1,743
1927	791	702	620	2,006	1,780
1928	789	699	628	1,997	1,770
1929	765	677	622	1,935	1,710
1930	720	633	604	1,817	1,596
1931	670	584	580	1,687	1,470
1932	622	538	557	1,561	1,350
1933	608	526	548	1,521	1,316
1934	621	539	556	1,551	1,347
1935	668	586	580	1,667	1,462
1936	708	624	604	1,765	1,557
1937	748	663	628	1,865	1,653
1938	784	698	652	1,947	1,733
1939	823	735	673	2,030	1,811
1940	844	751	685	2,053	1,826
1941	874	773	702	2,076	1,838
1942	899	787	717	2,080	1,824
1943	914	790	734	2,072	1,793
1944	939	806	760	2,143	1,839
1945	971	828	791	2,241	1,911
1946	1,009	858	820	2,378	2,022
1947	1,032	876	848	2,488	2,109
1948	1,074	913	875	2,640	2,244
1949	1,091	923	883	2,682	2,270
1950	1,107	938	893	2,730	2,312
1951	1,122	953	907	2,777	2,358
1952	1,146	978	920	2,847	2,431
1953	1,163	997	934	2,903	2,490

SOURCE: Averages of annual series calculated from the annual aggregates underlying Table R-26, and the annual series on population and labor force underlying Tables R-37 and R-39.

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