FIXED REPRODUCIBLE TANGIBLE WEALTH IN THE UNITED STATES, 1925–94

AUGUST 1999

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Acknowledgments

The text of this volume was primarily written by Arnold J. Katz. He was assisted by Michael Glenn and Shelby W. Herman.

The estimates of fixed reproducible tangible wealth were prepared by the National Income and Wealth Division and the Government Division of the Bureau of Economic Analysis (BEA).

The estimates for the private sector were prepared under the direction of Shelby W. Herman, who was assisted by Michael Glenn. Significant contributions were made by Kurt Kunze, Joyce Northwood, Craig Hargenrader, Brooks Robinson, and Ernest Wilcox.

The estimates for the government sector were prepared under the direction of Tim Dobbs. He was assisted by David Sullivan and Thae S. Park. Significant contributions were made by Jennifer Bennett, Joyce Northwood, Donald Peters, and Charles Robinson.

The chained-dollar indexes and estimates of net stocks and depreciation were prepared by Michael Boehm, who was assisted by Christine Vogan and David B. Wasshausen, under the direction of Christian Ehemann. Arnold J. Katz and Christian Ehemann participated in the analytical work that supported the preparation of these estimates. Barbara M. Fraumeni, BEA's Chief Economist and a professor at Northeastern University when the estimates were developed, served as a consultant and recommended the depreciation profiles that were used.

Alexie Malcolm provided general programming assistance. Duane Hackmann prepared the tables for typesetting.

Overall supervision was provided by Robert P. Parker, BEA's Chief Statistician; by Ralph Kozlow, Chief of the National Income and Wealth Division; by Leon W. Taub, former Chief; by Karl Galbraith, Chief of the Government Division; and by Brent R. Moulton, Associate Director for National Income, Expenditure, and Wealth Accounts.

W. Ronnie Foster of Publication Services in the Current Business Analysis Division coordinated the production of this publication and designed the cover. Eric B. Manning typeset the text.

Introduction

This volume presents estimates of fixed reproducible tangible wealth in the United States for 1925–94 that were prepared by the Bureau of Economic Analysis (BEA). It includes the investment series that were used to construct these estimates; for most assets, the series for 1901–94 are presented. These estimates cover the stock of privately owned and government-owned durable equipment and structures and of durable goods owned by consumers in the United States. These estimates are consistent, definitionally and statistically, with the national income and product accounts (NIPA's). They incorporate the definitional and statistical improvements introduced in the comprehensive revision of the NIPA's that was completed in May 1997, including the use of an improved methodology for calculating depreciation, and the revised NIPA estimates for 1994 published in the September 1997 SURVEY OF CURRENT BUSINESS.[1]

The estimates in this volume supersede those published in the preceding edition of this publication and in the SURVEY prior to May 1997.[2] Wealth estimates for 1995–97, incorporating revised and updated NIPA estimates, were published in the September 1998 SURVEY. (Wealth estimates that were developed using BEA's new methodology for depreciation and that go back to 1925 and are consistent with the latest published estimates have been available on the Internet since October 1997 and on CD-ROM since May 1998.)

The estimates in this volume are part of BEA's work on measuring the tangible wealth of the Nation. Another part of the wealth work covers the stock of inventories owned by business. Estimates of the stock of business inventories appear in tables 5.12 and 5.13 of the following publications: For 1947–94, in *National Income and Product Accounts of the United States, 1929–94*; and for 1995, in the May 1997 SURVEY. Current estimates of the stock of business inventories appear in the "Selected NIPA Tables" published each month in the SURVEY.[3]

Estimates of stocks of U.S. direct investment abroad and of foreign direct investment in the United States that are consistent with the estimates of stocks of fixed reproducible tangible wealth in the United States presented in this volume are also prepared by BEA. Updated and revised estimates are published annually in the July issue of the SURVEY.

The first chapter of the text discusses the conceptual and statistical considerations underlying the BEA wealth estimates. The second chapter explains the calculation of the investment flows used to derive the wealth estimates. The third chapter explains the derivation of capital stocks and related measures from these flows. The final chapter gives an explanation of the terms used in the tables and provides a detailed guide to the tables. The balance of this volume consists of tables containing the BEA wealth estimates and the investment flows used to derive them.

1. The revisions to the BEA wealth estimates made in the comprehensive revision also reflect the incorporation of new source data for investment and a shift in the base period used to calculate real-cost estimates from 1987 to 1992. One of the improvements involves the use of geometric depreciation rates derived from empirical studies instead of the use of the straight-line method. With the previous methodology, all assets were fully depreciated at the end of their (finite) service lives. This method of depreciation allowed BEA to prepare two other "wealth" measures—gross stocks, which is the value of the stock of fixed capital before the deduction of depreciation, and "discards," which is the gross value of the investment that is retired. BEA no longer produces estimates of these two measures because, in using the new methodology, at least some assets in each vintage of the stock have infinite service lives and are never fully depreciated. For a more complete discussion of these improvements, see Arnold J. Katz and Shelby Herman, "Improved Estimates of Fixed Reproducible Tangible Wealth, 1929–95," SURVEY OF CURRENT BUSINESS 77 (May 1997): 69–89. The basis for BEA's improved methodology is described in Barbara M. Fraumeni, "The Measurement of Depreciation in the U.S. National Income and Product Accounts," SURVEY 77 (July 1997): 7–23. Revisions to the investment data are discussed in "Improved Estimates of the National Income and Product Accounts for 1959–95: Results of the Comprehensive Revision," SURVEY 76 (January/February 1996): 1–31. Government purchases of structures and equipment were first treated as investment in the NIPA's in the estimates presented in this issue of the SURVEY, but they had been treated as investment in BEA's wealth estimates for many years. For a discussion of this, see "Preview of the Comprehensive Revision of the National Income and Product Accounts: Recognition of Government Investment and Incorporation of a New Methodology for Calculating Depreciation," SURVEY 75 (September 1995): 33–41.

2. See *Fixed Reproducible Tangible Wealth in the United States, 1925–89* (Washington, DC: U.S. Government Printing Office, January 1993).

3. U.S. Department of Commerce, Bureau of Economic Analysis, *National Income and Product Accounts of the United States, 1929–94: Volume 1* (Washington, DC: U.S. Government Printing Office, May 1998).

Concepts and Methodologies

Wealth, in the broadest sense, consists of resources with the capacity to produce output and income. Fixed reproducible tangible wealth consists of fixed private capital (equipment and structures, including owner-occupied housing) that is owned by private business and nonprofit institutions, fixed government capital (equipment and structures, including national defense, owned by Federal and State and local governments, including government enterprises), and durable goods owned by consumers.[4] Except for national defense equipment, for which coverage is worldwide, the wealth estimates in this volume refer to assets located in the United States.

The primary measure of the value of fixed reproducible tangible wealth is net stock, which is the value of the stock of fixed assets after adjustment for depreciation.[5] Depreciation is the decline in value due to wear and tear, obsolescence, accidental damage, and aging.

In this volume, fixed reproducible tangible wealth is also referred to as "capital stock." Depreciation is also referred to as "capital consumption" and "consumption of fixed capital." The terms "investment" or "fixed investment" denote any addition to fixed reproducible tangible wealth although in the NIPA's, purchases of consumer durable goods by households are treated as consumption expenditures rather than as investment.

Conceptually, the net stock estimates represent the value remaining in the capital stock if the value of assets declines in the manner given by BEA's assumed depreciation patterns. These stock estimates and their associated estimates of depreciation are used in studies of national income, product, and wealth. A different concept of capital stock is that of productive capital stock, which measures the remaining productive services available in the stock and is used to derive estimates of capital input for productivity studies, such as those conducted by the Bureau of Labor Statistics (BLS) and by Edward F. Denison, John W. Kendrick, and Dale W. Jorgenson.[6] For a comparison of these two concepts, see the paper by Jack E. Triplett cited in footnote 5.

For fixed private capital, separate estimates are presented for residential and nonresidential assets: For 1947–94, by industry; and for 1925–94, by major industry group, by legal form of organization, and by type of asset. For fixed government capital, separate estimates of residential and nonresidential assets for 1925–94 are presented by type of government and by type of asset. For durable goods owned by consumers, separate estimates for 1925–94 are presented by type of good.

Classification conventions

In general, the estimates presented in this volume are based on the assumption that assets remain, throughout their lives, in the stock of the sector, industry, and legal form of organization that purchased them. However, transfers between sectors are made for certain types of assets because data are available, including data for used autos sold by private business to consumers, exported

4. Some wealth studies have also included human capital. For example, see John W. Kendrick, *The Formation and Stocks of Total Capital* (New York, NY: Columbia University Press, for the National Bureau of Economic Research, 1976); and Robert Eisner, *The Total Incomes System of Accounts* (Chicago, IL: The University of Chicago Press, 1989).

The definitions of fixed investment and fixed tangible reproducible wealth reflect the definitions in effect for the comprehensive revision of the NIPA's released in January 1996. They do not reflect changes that are planned for the forthcoming comprehensive revision scheduled for late 1999, including a proposal to redefine fixed investment to encompass expenditures on software. Software is not counted as part of fixed investment or fixed assets in this volume.

5. Frameworks used for accounting for capital are developed in Dale W. Jorgenson, "Capital as a Factor of Production," in *Technology and Capital Formation*, ed. Dale W. Jorgenson and Ralph Landau (Cambridge and London: the MIT Press, 1989); Dale W. Jorgenson, "Accounting for Capital," in *Capital Efficiency and Growth*, ed. G. von Furstenberg (Cambridge: Ballinger, 1980); and Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, and World Bank, *System of National Accounts 1993* (Brussels, Luxembourg, New York, Paris, Washington, D.C., 1993). Recent discussions of conceptual issues in the measurement of capital include Charles R. Hulten and Frank C. Wykoff, "Issues in the Measurement of Economic Depreciation: Introductory Remarks," *Economic Inquiry* 34 (January 1996): 10- 23; Arnold J. Katz, "Conceptual Issues in the Measurement of Economic Depreciation, Capital Input, and the Net Capital Stock," BEA Discussion Paper No. 30 (July 1988); and Jack E. Triplett, "Depreciation in Production Analysis and in Income and Wealth Accounts: Resolution of an Old Debate," *Economic Inquiry* 34 (January 1996): 93–115.

6. Bureau of Labor Statistics, U.S. Department of Labor, *Trends in Multifactor Productivity, 1948–81*, BLS Bulletin 2178 (Washington, DC: U.S. Government Printing Office, September 1983); Edward F. Denison, *Accounting for Slower Economic Growth: The United States in the 1970's* (Washington, DC: The Brookings Institution, 1979); John W. Kendrick, *The Formation and Stocks of Total Capital* (New York, NY: Columbia University Press, for the National Bureau of Economic Research, 1976); and Jorgenson, "Accounting for Capital."

used equipment, government surplus assets sold to private business, privately owned public utilities purchased by government, and farm housing shifted to nonfarm use.

Capital assets held under operating leases are recorded in the stock of the lessor (owner) rather than in that of the lessee (user) in order to be consistent with the NIPA measures of product and income by industry; assets held under other leases (that is, capital leases) are recorded in the stock of the lessee because the lessee has effective ownership of them.[7]

For fixed private capital, the industrial classification of the estimates is based on the 1987 Standard Industrial Classification (SIC).[8] These industry estimates are for establishments rather than companies. An *establishment* is an economic unit, generally at a single physical location, where business is conducted or where services or industrial operations are performed. A *company* consists of one or more establishments owned by the same legal entity or group of affiliated entities. Establishments are classified into an SIC industry on the basis of their principal product or service, and companies are classified into an SIC industry on the basis of the principal SIC industry of all their establishments. Because large multiestablishment companies typically own establishments that are classified in different SIC industries, the industrial distributions of investment, capital stock, and capital consumption for establishments and companies can be significantly different. For residential capital, each dwelling is considered to be an establishment, farm dwellings owned by farm operators are classified in the farms industry, and all other dwellings are classified in the real estate industry.

Overview of the estimating methodology

There are two basic methods for measuring capital stocks. The first uses a physical inventory, that is, a direct count of the number of physical units of each type of capital. With this method, the value of a unit of each type of capital is determined in a separate set of calculations. The second method uses a perpetual inventory. With this method, the net stock and depreciation are indirectly estimated by cumulating past investment flows. The physical inventory method was used for autos because the number of units in the stock of each vintage is available from registration data. For all other assets, the perpetual inventory method was used because of the limited availability of the data required to implement a physical inventory. Available stock data are inadequate to implement the physical inventory method because they are usually stated as book values, which do not provide the detailed information about the vintages or types of assets necessary to derive stock estimates on a current-cost and a real-cost basis.

With the perpetual inventory method, the net stock is calculated as the cumulative value of past gross investment less the cumulative value of past depreciation. Consequently, both the net stock and depreciation of any given type of asset are weighted summations of past investment in that asset. The initial calculations are performed in real terms for each type of asset; current-dollar values for each type of asset are estimated by multiplying each real component by the value of the appropriate price index for the current period. Estimates for the various types of assets are then weighted together in the appropriate formulas to obtain the higher level aggregates.

Calculations of net stocks and depreciation are based on real investment data at the type-of-asset level of detail; for private fixed investment, the level of detail is generally the same as that presented in NIPA tables 5.7, 5.9, and 5.15, and for real consumer purchases of durable goods, it generally is the same as that presented in NIPA table 2.7. For government fixed investment, the type-of-asset level of detail is a finer level of detail than that presented in the NIPA tables.

Real investment in a given type of asset is obtained by dividing current-dollar investment in that type by the NIPA price index for purchases of new assets of that type, with 1992 set equal to 100, multiplied by 100. Real depreciation for the asset is then determined by applying an assumed depreciation pattern to this investment.

Most assets are assumed to have depreciation patterns that decline geometrically over time. For a given year, the depreciation charges on existing assets are obtained by multiplying the prior year's charge by one minus the annual depreciation rate.[9] The BEA depreciation rates are generally based on the declining-balance rates for specific types of assets found in the empirical studies of Hulten and Wykoff and the BEA service lives.[10] For a

7. Operating leases are chiefly distinguished from capital leases in that the net present value of the payments during the entire lease period is generally less than the cost of the asset.

Capital stock estimates that record leased assets in the industry of the user may be preferable for certain kinds of analysis, but the data necessary to derive such estimates are not available.

8. BEA's industry wealth estimates published before 1992 were based on the 1972 SIC. For a detailed presentation of the 1987 SIC revisions, see Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987* (Washington, DC: U.S. Government Printing Office, 1987).

9. New assets are assumed, on average, to be placed in service at midyear, so that depreciation on them is equal to one-half the new investment times the depreciation rate.

10. Information on Hulten and Wykoff's methodology is largely found in the following three sources: Frank C. Wykoff and Charles R. Hulten, "Tax and Economic Depreciation of Machinery and Equipment: A Theoretical Appraisal, Phase II Report," in *Economic Depreciation of the U.S. Capital Stock: A First Step* (Washington, DC: U.S. Department of the Treasury, Office of Tax Analysis, July 26, 1979); Charles R. Hulten and Frank C. Wykoff, "The Estimation of Economic Depreciation Using Vintage Asset Prices," *Journal*

few assets, depreciation patterns are directly taken from other empirical studies while for a few other assets, depreciation is estimated using the straight-line method and an assumed distribution of service lives. When depreciation is estimated using the latter method, the real value of depreciation on an asset is the same in each year of its service life so that the real value of its net stock declines over time in a straight-line pattern. However, because some of the assets of a given type have service lives that are less than the mean life, the net stock of an entire vintage of assets of a given type installed in a given year declines over time in a manner that is more accelerated (that is, faster) than that given by a simple straight-line pattern. For each type of asset, depreciation is cumulated over all vintages, and net stocks are estimated by subtracting cumulative depreciation from cumulative gross investment.

Current-cost estimates are obtained by multiplying deflated estimates at the type-of-asset level by the

of Econometrics 15 (April 1981): 367–396; and Charles R. Hulten and Frank C. Wykoff, "The Measurement of Economic Depreciation," in *Depreciation, Inflation, and the Taxation of Income from Capital*, ed. Charles R. Hulten (Washington, DC: The Urban Institute Press, 1981): 81–125. For further elaboration on the specific BEA rates, see Fraumeni, "The Measurement of Depreciation."

Basic Formulas for the Perpetual Inventory Method

Net stocks are estimated using the perpetual inventory method with geometric depreciation. The method begins with the investment for each year i in type of asset j, that is, I_{ij}. For current-cost and real-cost valuation, the investment that is used in the calculation is in 1992 dollars; that is, the investment is in current dollars that have been deflated by the price index for that type of asset with a 1992 reference year. For historical-cost valuation, investment in dollars is used in the calculation so that assets are measured using the prices that existed when they were acquired.

The annual geometric rate of depreciation for type of asset j, δ_j, is related to the declining-balance rate for type of asset j, R_j, (which is the multiple of the comparable straight-line rate) and to the average service life for type of asset j in years, T_j, by:

$$\delta_j = R_j / T_j. \tag{1}$$

Consider the contribution of investment during year i in type of asset j to the real-cost net stock at the end of year t, N_{tij}. New assets are assumed, on average, to be placed in service at midyear, so that depreciation on them is equal to one-half the new investment times the depreciation rate. Therefore, the contribution to the real-cost net stock at the end of year t is given by:

$$N_{tij} = I_{ij}(1 - \delta_j/2)(1 - \delta_j)^{t-i}, \tag{2}$$

where $t \geq i$.

To calculate the real-cost net stock at the end of year t for asset j, N_{tj}, the contributions are summed over all vintages of investment flows for that asset so that:

$$N_{tj} = \sum_{i=1}^{t} N_{tij}. \tag{3}$$

The equations used to estimate historical cost stocks are identical to equations (2) and (3) except that the investment flows are expressed at historical cost rather than at real cost.

Current-cost estimates of the net stock of asset j (in dollars), C_{tj}, are obtained by multiplying the real-cost net stock at the end of year t for asset j by the value at the end of year t of the price index that was used to deflate nominal investment in asset j, P_{tj}, so that:

$$C_{tj} = P_{tj} N_{tj}. \tag{4}$$

The current-cost net stock of assets at the end of year t, C_t, is estimated as the sum of the stocks given above across all types of assets, so that:

$$C_t = \sum_j C_{tj}. \tag{5}$$

Depreciation on an asset j during year t, D_{tj}, equals the net stock of asset j at the end of year $t-1$ plus investment in asset j during year t less the net stock of asset j at the end of year t, so that:

$$D_{tj} = N_{t-1,j} + I_{tj} - N_{tj}. \tag{6}$$

This equation holds under real-cost and historical-cost valuation.

Current-cost depreciation, M_{tj}, is calculated by multiplying real-cost depreciation from equation (6) by the average price of asset j during year t, $\overline{P}_{tj}$, so that:

$$M_{tj} = \overline{P}_{tj} D_{tj}. \tag{7}$$

Current-cost depreciation for an aggregate of assets in year t is calculated by summing across the various types of assets, that is, by:

$$M_t = \sum_j M_{tj}. \tag{8}$$

appropriate price indexes for the current period. Depreciation is converted to current cost using indexes that reflect average prices of new assets for the year; net stock is converted to current cost using indexes of prices of new assets at the current yearend. Current-cost aggregates are obtained by directly summing current-cost estimates for the various types of assets. Finally, estimates by type of asset are adjusted for the net value of assets destroyed in wars and natural disasters.

Year-to-year growth rates for both depreciation and net stocks on a real-cost basis are then computed for higher level aggregates using an annual-weighted Fisher-type index. These rates are chained together to obtain cumulative growth rates, which in turn are used to obtain estimates of levels expressed as indexes (with 1992 set equal to 100) and as chained (1992) dollars.[11]

The main advantage of the perpetual inventory method is that for the most part, comprehensive, detailed, and relatively reliable estimates of flows of new investment are available to implement it. Capital stock estimates derived using this method can be computed according to several different valuations. As explained more fully in the section "Valuation," several measures of net stocks and depreciation that reflect different valuations—historical cost, real cost, and current cost—are shown in this volume.

The main limitations of the perpetual inventory method relate to the accuracy of both the depreciation rates, which are generally a function of the assumed service lives, and to the accuracy of the flows of transfers of used assets that are used to implement it. The information currently available on service lives is deficient, both in terms of asset detail and in terms of changes over time; these deficiencies are discussed in the section "Service lives" in the chapter "Derivation of Stock Estimates." In addition, the information currently available on investment flows of transfers of used assets among owners is largely limited to transfers among private businesses, governments, consumers, and nonresidents; these transfers are discussed in the section "Transfers of used assets" in the chapter "Derivation of Investment Flows." Information is not available on transfers of used assets among industries or among legal forms of organization.

11. For a review of BEA's chain-type measures of output and prices, see J. Steven Landefeld and Robert P. Parker, "BEA's Chain Indexes, Time Series, and Measures of Long-Term Economic Growth," SURVEY 77 (May 1997): 58–68; and Eugene P. Seskin and Robert P. Parker, "A Guide to the NIPA's," SURVEY 78 (March 1998): 36–39.

Adjustments for natural disasters, wars, and obsolescence

In principle, estimates of the stock should reflect all factors that lead to changes in the quantities or prices of fixed assets. As was noted previously, however, the depreciation schedules reflect the typical patterns of wear and tear, obsolescence, accidental damage, and aging, and they may not pick up deviations over time in these patterns.

In the BEA estimates, adjustments are made for natural disasters, such as Hurricane Hugo and the Loma Prieta earthquake in 1989, in which large amounts of fixed capital are destroyed.[12] Adjustments are also made for war losses (the surplusing of military equipment after World War II is treated as if it were a war loss). However, the adjustments for natural disasters and war losses on general government capital are not included in the estimates of consumption of fixed capital that are included in gross domestic product (GDP).

The depreciation rates used to derive the estimates reflect the effects of normal obsolescence over time. They are not adjusted to take account of obsolescence that is unusually or unexpectedly larger than the amounts built in to the depreciation schedules for each type of asset—that is, obsolescence due to events that may have substantially decreased the ability of existing fixed assets to contribute to production. Ideally, the stock estimates should be adjusted for declines in value caused by unusually or unexpectedly large amounts of obsolescence. For example, some analysts argue that government pollution abatement and safety regulations, sudden changes in energy prices, and increased foreign competition since the early 1970's have caused certain capital assets to experience significantly higher than normal amounts of obsolescence. The BEA stock estimates are not adjusted for any of these phenomena because the data necessary to make such adjustments are not available.

Valuation

The estimates of net stocks and depreciation are presented in historical-cost, real-cost, and current-cost valuations. In historical-cost valuation, assets are valued in the capital stock in terms of the prices prevailing when they were purchased. Historical-cost estimates are prepared using current-dollar investment flows and are generally similar to the book value estimates shown in company financial reports. Historical-cost estimates of the net stock are the depreciated values of these acquisition costs if assets depreciate in the manner given by BEA's assumed

12. See the "Business Situation," SURVEY 69 (October 1989):1–2; and the "Business Situation," SURVEY 70 (January 1990):2.

depreciation patterns. Historical-cost estimates of depreciation are the charges for a given period that are derived from writing off current-dollar investment flows over their service lives using the assumed depreciation patterns.

Real-cost estimates are quantity-type estimates that are often called "real" or "physical-volume" estimates. They are prepared for each type of asset using investment flows that have been deflated; that is, the effects of price change have been removed from the flows by dividing their nominal values by an appropriate price index. At the deflation level, identical assets are valued equally in the capital stock at a base-year price (in this volume, the 1992 price) regardless of their actual prices in the years they were acquired. When valued in terms of real costs, depreciation charges on any individual asset over its lifetime will sum up to the asset's purchase price.[13] Real-cost estimates of the net stock are the depreciated values of these deflated acquisition costs. Real-cost estimates of depreciation are the charges for a given period that are derived by writing off the deflated investment flows. These quantity indexes are aggregated using a Fisher chain-type index formula.

Current-cost valuation expresses all assets in the capital stock in terms of the prices that prevailed in the period to which the stock estimates refer. For instance, the yearend 1994 capital stock estimate in current-cost valuation shows the assets that were in the stock at yearend 1994 expressed at the prices that would have been paid for them if they had been purchased at the market prices prevailing for those assets at yearend 1994; similarly, the yearend 1925 capital stock estimate in current-cost valuation shows the assets that were in the stock at yearend 1925 expressed at the prices that would have been paid for them if they had been purchased at the market prices prevailing for those assets at yearend 1925. Current-cost estimates for the net stock are the depreciated value of all items in the stock at the prices of the current period. They are derived by converting deflated stock estimates to the prices of the current period. In principle, the current-cost net stock is the market value of the stock, that is, the value for which the assets in the stock could be bought or sold. In equilibrium, this market value will equal the present value of all expected future services embodied in existing assets. Current-cost estimates of depreciation are derived by converting the corresponding deflated estimates to the prices of the current period; for the annual estimates, average annual price indexes are used for this conversion.

The relationships among the current-cost and real-cost estimates of investment, net stocks, and depreciation differ somewhat from the relationship among these items in historical-cost valuation. In the historical-cost valuation, when only new investment is involved (that is, when there are no intersector transfers of used assets), the change in net stocks from 1 yearend to the next is equal to annual investment minus annual depreciation. This identity does not apply to estimates in the current-cost and real-cost valuations. It does not apply to current-cost estimates, because yearend price indexes are used to convert estimates of net stocks to current prices, whereas average annual price indexes are used to convert annual estimates of depreciation to current prices. It does not apply to real-cost estimates of aggregates above the type of asset level, because they are estimated using a chain-type price index; the identity also does not hold for some types of assets that are built up from components that have different deflators.[14] In addition, in the historical-cost valuation, the sum of the depreciation charges for an individual asset over its life (or for a group of assets over their lives) is equal to the amount of the original investment.[15] This equality does not hold for estimates in the current-cost valuation because the annual depreciation charges are valued in the prices of the years in which the depreciation is being charged, and the investment is valued in the prices of the year of original acquisition. This equality does hold for the real-cost valuation at the deflation level, but it does not hold at higher levels of aggregation, because a chain-type index is used.

Real-cost measures

In this volume, real-cost measures are estimated using a Fisher chain-type price index and expressed in chained dollars of the base year, 1992, and as index numbers (with 1992 set equal to 100). Since January 1996, estimates derived using this type of measure have been the featured measure of GDP.[16]

Chain indexes are indexes in which the time series of changes is constructed by multiplying ("chaining") to-

13. This principle will not hold if an asset is prematurely retired from the stock of government assets because it is surplused.

14. In general, when "real" estimates are derived using a chain-type quantity index, the sum of the real values of the various components of an aggregate will differ from the aggregate's real value by a "residual."

15. When the depreciation pattern is strictly geometric, some assets have infinite lives so that this relationship only holds asymptotically.

16. Before a Fisher chain-type index was adopted as the featured measure of GDP in 1996, BEA published a series of four articles that compared this measure with other alternative measures of change in real output and prices. See Allan H. Young, "Alternative Measures of Real GDP," Survey 69 (April 1989): 27–34, "Alternative Measures of Change in Real Output and Prices," Survey 72 (April 1992): 32–48, and "Alternative Measures of Change in Real Output and Prices, Quarterly Estimates for 1959–92," Survey 73 (March 1993): 31–41; and Jack E. Triplett, "Economic Theory and BEA's Alternative Quantity and Price Indexes," Survey 72 (April 1992): 49–52. See also Landefeld and Parker, "BEA's Chained Indexes," and Robert P. Parker and Jack E. Triplett, "Chain-Type Measures of Real Output and Prices in the U.S. National Income and Product Accounts: An Update," *Business Economics* (October 1996): 37–43.

gether the separate year-to-year changes for all of the years in the series. The use of a chained index avoids the rewriting of economic history that results from the updating of the base period of a fixed-weighted index. Chained indexes using the Fisher formula produce the most accurate estimates of the growth rate from a given year to the next because they use the most relevant weights, that is, weights that reflect the composition of these 2 years. When a chained index is used, the levels of the estimates change when the base period is updated, but the growth rates of the various series do not. Because the Fisher index formula treats both time periods being compared symmetrically, Fisher chain-type indexes are likely to yield results that are more acceptable in the presence of fluctuations.[17]

The Fisher chain-type indexes provide accurate estimates of quantity changes, but the chained (1992) dollars are not strictly additive, especially for periods far away from the base year. The sum of the components of an aggregate may not equal the aggregate; the difference is called the residual, which may become relatively large in periods far from the base year. In fact, there are a few instances where the chain-dollar value of a component exceeds the chain-dollar value of the aggregate of which it is a part. One consequence of this lack of additivity is that even in the absence of intersector transfers and disaster damage, the stock-flow identity (for any given asset) no longer holds; that is, the beginning-of-year value of the net stock plus gross investment less depreciation no longer equals the end-of-year value of the net stock on a real-cost basis.

One important caveat to the above discussion is that the theoretical literature on index number measurement has dealt exclusively with the measurement of flows, such as consumption or production, rather than of stocks. Diewert specifically recommended that chain-type indexes be used to measure capital input aggregates, but he did not directly address the question of whether these indexes should also be used to measure capital stocks.[18]

Quality change

In order to calculate the estimates of net stocks and depreciation in real-cost and current-cost valuations, current-dollar investment flows must be converted to real flows. This conversion is particularly difficult when new products are introduced or when the quality of existing products is substantially altered, because it can be difficult to value such products at the prices of other periods. The size of the adjustments to measures of price change that are necessary to take account of the effects of quality change have been measured by a number of methods that have differed both in terms of empirical techniques and concept.[19] Further, when depreciation patterns are estimated by empirical methods using transactions prices for used assets, it is important that data on prices of used assets be adjusted for quality in the same manner as are prices of new assets.[20]

The price indexes used in the deflation of equipment are primarily Producer Price Indexes (PPI's), published by BLS; thus, the adjustments for quality change in the resulting real investment flows and capital stocks are determined by the procedures used in estimating the PPI's. Five methods are used by BLS to adjust the PPI's for quality change: The explicit quality adjustment method, the overlap method, linking prices of new and old products, hedonic (that is, regression-based) quality adjustments, and direct comparisons of prices of new and old products.[21] For computers, for which detailed data are available on characteristics of new models beginning with 1991, the PPI's are based on a combination of the explicit quality adjustment method, the price linking method, and a hedonic regression approach.[22]

With the explicit quality adjustment method, the ratio of the producer's cost of the new product to that of the old product provides the basis for evaluating their relative quality. This method is used when quality changes are considered to be significant and when the necessary producer cost data are available. With the overlap method, the ratio of the price of the new model to that of the old model during the overlap period provides the ba-

17. Triplett, "Economic Theory and BEA's Alternative Indexes," 51.

18. See W.E. Diewert, "Aggregation Problems in the Measurement of Capital," in *The Measurement of Capital*, ed. Dan Usher, Studies in Income and Wealth, vol. 45 (Chicago, IL: University of Chicago Press, for the National Bureau of Economic Research, 1980).

19. See Jack E. Triplett, "Concepts of Quality in Input and Output Price Measures: A Resolution of the User-Value Resource-Cost Debate," in *The U.S. National Income and Product Accounts: Selected Topics*, ed. Murray F. Foss, Studies in Income and Wealth, vol. 47 (Chicago, IL: University of Chicago Press, for the National Bureau of Economic Research, 1983). See also Robert J. Gordon, *The Measurement of Durable Goods Prices*, National Bureau of Economic Research Monograph Series, (Chicago and London, University of Chicago Press, 1990).

20. Oliner discussed this problem when he stated that depreciation patterns in the NIPA's should be based on "partial," rather than on "full," depreciation; See Stephen D. Oliner, "Price Change, Depreciation, and Retirement of Mainframe Computers," in *Price Measurements and Their Uses*, ed. Murray F. Foss, Marilyn E. Manser, and Allan H. Young, Studies in Income and Wealth, vol. 57 (Chicago, IL: University of Chicago Press, for the National Bureau of Economic Research, 1993): 48–61.

21. The treatment of quality change in the PPI's is described in John F. Early and James H. Sinclair, "Quality Adjustment in the Producer Price Indexes," in *The U.S. National Income and Product Accounts: Selected Topics*, ed. Murray F. Foss, Studies in Income and Wealth, vol. 47 (Chicago, IL: University of Chicago Press, for the National Bureau of Economic Research, 1983).

22. See James Sinclair and Brian Catron, "An Experimental Price Index for the Computer Industry," *Monthly Labor Review* 113 (October 1990): 16–24. For computers and computer peripheral equipment, BEA also uses price indexes that it has developed using hedonic methods.

sis for evaluating their relative quality. This method is used when quality change is considered to be significant and the data necessary to implement the explicit quality adjustment method are not available.

With the method based on linking prices of new and old models, all of the difference in prices between old and new models is attributed to a change in quality. This method is used when quality changes are considered to be significant, and data are not available to implement either the explicit quality adjustment method or the overlap method. To the extent that price changes are put into effect with the introduction of new models, this method tends to attribute too much of the difference in price between new and old models to quality change.

Hedonic quality adjustment is based on multiple regression analysis, in which changes in the physical characteristics of the fixed asset are used to represent quality changes in it.[23] With the direct price comparison method, quality change is counted as zero, and prices of new and old models are directly compared. This method is used when quality changes are considered to be insignificant.

Distinguishing between price and quality changes is difficult for many assets. For example, serious difficulties are encountered in the estimation of real structures because, as many construction projects are unique, it is difficult to find comparable projects for price comparisons. Deflation of investment in new permanent-site housing units is based on separate hedonic price indexes for single-family housing and for multifamily housing.[24] Residential improvements are deflated by the price indexes for new permanent-site housing units and by a consumer price index published by BLS. For nonresidential structures, no price indexes that incorporate an explicit adjustment for quality change are available for the types of structures being deflated. These types of structures are deflated by a variety of price and cost indexes; the cost indexes are based on labor and materials costs.

Use in the NIPA's

Consumption of fixed capital (CFC) is a charge for the using up of fixed capital, and as such, it is, along with compensation of employees and other components of gross domestic income, one of the costs incurred in the production of GDP. CFC is used in the context of measuring sustainable income and product where it is deducted from GDP to derive net domestic product and net domestic income—a rough measure of that level of income or consumption that can be maintained while leaving capital intact. In this context, CFC is deducted from the appropriate NIPA gross investment flows to obtain net investment in equipment and structures for the total economy, private business, and government. These measures of net investment are rough indicators of whether the corresponding capital stocks have been maintained intact.

The estimates of CFC that are presented in the NIPA's can differ from the corresponding estimates of depreciation that appear in this volume. For private business, the two are generally identical.[25] However, there is a fundamental difference between the government CFC that appears in the NIPA's and the depreciation of fixed tangible reproducible wealth owned by government that appears in this volume. NIPA depreciation does not include the adjustments made to general government capital for natural disasters and war losses. These adjustments are not included in NIPA depreciation, because government consumption expenditures is measured by adding up costs including CFC.[26] Excluding these adjustments avoids increasing the measured output of government fixed assets in GDP when there is war or disaster damage.

The current-cost depreciation (or CFC) estimates for fixed private capital at the all-industry level that are developed in conjunction with the stock estimates are also used to derive the capital consumption adjustment (CCAdj), which is used to estimate corporate profits and other business incomes in the NIPA's. For corporations and for nonfarm sole proprietorships and partnerships, the CCAdj is the difference between tax-return-based capital consumption estimates and the CFC. The CCAdj restates these tax-return-based measures of income in terms of the NIPA concept of profits from current production. (The

23. See Jack E. Triplett, "The Economic Interpretation of Hedonic Methods," Survey 66 (January 1986): 36–40.

24. See "The Comprehensive Revision of the U.S. National Income and Product Accounts: A Review of Revisions and Major Statistical Changes," Survey 71 (December 1991): 40.

25. In one instance, the NIPA estimates of consumption of fixed private capital differ from the corresponding depreciation estimates in this volume. Estimates of writeoffs of abandoned privately owned nuclear power plants are added to the depreciation estimates that are developed in conjunction with the stock estimates to adjust the NIPA estimates of CFC, but not to depreciation of net stocks in this volume. Investment in electric power plants is on a put-in-place basis in the NIPA's but on a put-in-service basis in this volume. If all electric plants put in place go into service, they will eventually be part of the net stock estimates, and over a relevant period of time their depreciation would be accounted for in GDP. However, because there are no inventory accounts for structures in the NIPA's, plants put in place but later abandoned would not be accounted for in either depreciation or inventory change if this adjustment to CFC was not made. This adjustment is described in "A Preview of the Comprehensive Revision of the National Income and Product Accounts: Definitional and Classificational Changes," Survey 71 (September 1991): 23–31.

26. Note that CFC does not provide an estimate of the full value of the services of government fixed assets, because the net return on these assets is not included in this measure. See Robert P. Parker and Jack E. Triplett, "Preview of the Comprehensive Revision of the National Income and Product Accounts: Recognition of Government Investment and Incorporation of a New Methodology for Calculating Depreciation," Survey 75 (September 1995): 36.

industry depreciation estimates in this volume are not appropriate for deriving industry estimates of the CCAdj for use in the NIPA's, because the tax-return-based NIPA estimates of business income and depreciation are compiled on a company basis, whereas the depreciation estimates associated with the stock estimates are compiled on an establishment basis.) For farm sole proprietorships and partnerships and for other private business, the CCAdj is the difference between two capital consumption measures valued on the basis of BEA's depreciation schedules—one at historical cost and the other at current cost.[27]

Other stock measures

Other measures of the Nation's capital stock or of the services that it provides are also estimated by government agencies. As mentioned in the introductory discussion of underlying concepts, BLS estimates a capital services index that is used as a measure of capital input in the estimation of multifactor productivity. Another set of stock estimates are the estimates of federally financed capital stocks, which are published annually by the Office of Management and Budget (OMB) as part of the budget presentations. OMB describes the estimates as "very rough measures over time of three different kinds of capital stocks financed by the Federal Government: public physical capital, research and development, and education."[28] The OMB estimates differ from those presented in this volume because of differences in both coverage and source data. With respect to coverage, in addition to OMB's estimates of "public physical capital," which is similar to the BEA measure of fixed assets, OMB presents separate estimates of research and development capital and education capital. While the coverage of OMB's estimates of "direct federal capital" is similar to that of Federal government stocks in this volume, OMB's estimates of "federally financed physical capital" have a broader coverage as they also include "capital financed by Federal grants," such as highway construction financed by Federal grants-in-aid. Even where the coverage is the same, OMB's estimates differ somewhat from BEA's because the OMB estimates are done at a much more aggregated level of detail: for example, defense equipment is a single category, and OMB uses its own fiscal year historical investment data, which differs somewhat from BEA's.

27. Table 8.13 in the NIPA's presents the capital consumption adjustment by legal form of organization, and the corresponding estimates of CFC are shown in table 8.12. In these tables, estimates for domestic corporate business are broken down into financial and nonfinancial businesses. The estimates of CFC for nonprofit institutions serving households that appear in table 8.12 are also recorded as part of personal consumption expenditures.

28. Office of Management and Budget, "Federal Investment Spending and Capital Budgeting," *Analytical Perspectives, Budget of the United States Government, Fiscal Year 1999* (Washington, DC: U.S. Government Printing Office, 1998.): 146.

Derivation of Investment Flows

This chapter describes the investment flows used to implement the perpetual inventory method. The flows for 1929–94 are taken from the current-dollar and fixed-weighted expenditure series in U.S. Department of Commerce, Bureau of Economic Analysis, *National Income and Product Accounts of the United States, 1929–94,* and the revised investment flows for 1993–94, from the August 1997 SURVEY.[29] The NIPA series are extrapolated back into the 19th century, using the sources described in the section "Investment controls by type of asset."

The NIPA series of new investment in equipment and in structures are modified in some instances, primarily to revalue transfers of used assets between sectors of the economy, and are supplemented to provide detail not available in the NIPA's, primarily detail on the industrial distribution of investment in fixed private capital.

Most of this chapter is devoted to an explanation of the derivation of the industry investment flows for the private sector; the rest of the chapter explains the derivation of the investment flows for fixed government capital and for additions to the stock of durable goods owned by consumers.

Fixed Private Capital

Overview

The investment flows used to implement the perpetual inventory method to derive estimates of fixed private capital by industry are developed in the following manner. First, flows are derived for investment in new capital by type of asset for each industry and for transfers of used assets between private business and other types of owners. Second, the flows for each industry for investment in new assets are distributed by legal form of organization. Finally, the investment flows by type of asset, industry, and legal form of organization are converted to constant (1992) dollars using appropriate price indexes.

The constant-dollar investment data are used to derive net stocks and depreciation measures for each type of asset. These 1992-dollar estimates of net stocks and depreciation by asset are converted to current cost and added together for current-cost aggregates. The current-cost and constant-dollar measures are used to derive chained (1992) dollar levels and chain-weighted indexes (1992=100) for aggregates.

The investment flows by type of asset and by industry, which are developed to derive the estimates of fixed private capital by industry, meet several requirements: The all-industry totals for each type of asset are equal to the NIPA flows for new investment in that type of asset, and the industries are defined on an establishment and ownership basis.

Series on investment by industry are available from five major sources. Because these series do not meet all of the requirements stated above, they are supplemented by data from other sources, as explained later. The first source, economic censuses conducted by the Bureau of the Census (which cover capital expenditures in the mining, construction, manufacturing, wholesale trade, retail trade, and selected service industries), provides data on investment by these industries classified on an establishment basis. These data, however, are available only at intervals of several years (every 5 years since 1967), and prior to the 1987 economic census, the data provide only a two-way split by type of asset (that is, total equipment and total structures). Beginning with the 1987 economic census, equipment expenditures detail includes these categories: Highway vehicles, computers and peripheral equipment, and other equipment.

The second major source of data, capital flow tables prepared by BEA as part of the input-output (I-O) accounts, provide industry distributions of investment by type of asset. These data, which are largely consistent with NIPA definitions, are available only for 1963, 1967, 1972, 1977, and 1982, are on a use rather than an ownership basis, and are classified by I-O industry rather than by NIPA industry. For a list of NIPA industries used for net stocks, see table 3.1 in this volume.

The third source, the Census Bureau's annual survey of manufactures (ASM) provides annual data on investment in equipment and in structures by manufacturing industries. This survey has been available for noncensus years (that is, years in which an economic census was not

29. U.S. Department of Commerce, Bureau of Economic Analysis, *National Income and Product Accounts of the United States, 1929–94*, 2 vols. (Washington, DC: U.S. Government Printing Office, April 1998).

Table A.—Source Data for Preparation of Estimates of New Private Nonresidential Investment by Industry

Industry	Years before 1947 (includes census years up to and including 1977)	1947–77	1978–92: Economic census years 1982, 1987, and 1992	1978–92: Noncensus years [1]	Years after 1992 [2]
Agriculture, forestry, and fishing:					
Farms	USDA, Trends	USDA	USDA, NIPA	USDA, NIPA	USDA, NIPA
Agricultural services, forestry, and fishing.	USDA, Trends	P&E	P&E, NIPA	P&E, NIPA	ACES, NIPA, P&E
Mining	HS, EC (CMI and CM), NIPA	EC (CMI), ES, P&E, NIPA, Oil & Gas.	EC (CMI), ES, NIPA	P&E, NIPA	ACES, NIPA, P&E
Construction	Boddy & Gort, HS	EC (CCI), ES, P&E, NIPA	EC (CCI), ES, NIPA	P&E, NIPA	ACES, NIPA, P&E
Manufacturing	Chawner, NIPA, CS, HS, EC (CM), Kuznets, Shaw.	EC (CM), ASM, ES, P&E, NIPA.	EC (CM), ES, NIPA	ASM, NIPA	ASM, ACES, NIPA
Transportation and public utilities:					
Transportation:					
Railroad transportation	ICC, NIPA, Ulmer, TA, CS	ICC, NIPA, TA, P&E	P&E, NIPA, TA , ICC (1982)	P&E, NIPA	ACES, NIPA
Local and interurban passenger transit.	Ulmer, CS, TA, NIPA, ICC	ICC, TA, CS, P&E, NIPA	P&E, NIPA	P&E, NIPA	ACES, NIPA, P&E
Trucking and warehousing	NIPA, Ulmer, TA, ICC	ICC, EC (CWT), EC (CT) [3], P&E.	ICC (1982), P&E, EC (CT) [3]	P&E, TA, NIPA	ACES, NIPA
Water transportation	NIPA, HS, ICC	NIPA, ICC, P&E	P&E, NIPA, TA	P&E, NIPA	ACES, NIPA. P&E
Transportation by air	NIPA, HS	NIPA, DOT, P&E	DOT, NIPA, P&E, TA	DOT, NIPA, P&E	DOT, ACES, NIPA
Pipelines, except natural gas.	ICC, NIPA, CS, HS	ICC, NIPA, P&E	NIPA, P&E	NIPA, P&E	ACES, NIPA
Transportation services	ICC, NIPA, Ulmer, TA, CS	ICC, NIPA, TA, P&E	P&E, NIPA, TA	P&E, NIPA	ACES, NIPA, P&E
Communications:					
Telephone and telegraph	NIPA, CS, USDA, Ulmer	NIPA, TA, CS, USDA, FCC, Crandall, P&E, CAR.	FCC, NIPA, CAR, TA, Crandall, ACES, P&E, USDA.	FCC, NIPA, CAR, TA, Crandall, ACES, P&E, USDA.	ACES, NIPA, FCC, CAR, TA, P&E, USDA
Radio and television	Boddy & Gort	P&E, TA, NIPA	P&E, TA, UC, NIPA	P&E, TA, UC, NIPA	ACES, NIPA
Electric, gas, and sanitary services:					
Electric services	Ulmer, NIPA, CS, USDA, DOE FS.	DOE FS, NIPA, USDA, P&E	DOE FS, DOE EP, NIPA, USDA, UC.	DOE FS, DOE EP, NIPA, USDA, UC.	DOE FS, DOE EP, NIPA, USDA, UC, ACES
Gas services	Ulmer, NIPA, CS, TA, UC	NIPA, CS, UC, TA, P&E	NIPA, P&E, TA	NIPA, P&E, TA	NIPA, ACES
Sanitary services	Ulmer	P&E, DOE FS, TA	P&E, DOE FS, TA	P&E, DOE FS, TA, NIPA	ACES, DOE FS, TA, NIPA
Wholesale trade	Boddy & Gort	EC (CWT) [4], P&E, ES	EC (CWT) [4], ES, TA	P&E, NIPA	ACES, NIPA, P&E, UC
Merchant wholesale	....	EC (CWT) [4], ES	EC (CWT) [4], ES	....	
Nonmerchant wholesale	....	EC (CWT), ES	EC (CWT), ES, TA	....	
Retail trade	CS, HS	EC (CRT) [4], P&E	EC (CRT) [4]	P&E, NIPA	ACES, NIPA, UC
Finance, insurance, and real estate:					
Finance and insurance	SOI, HS	P&E, TA	P&E, TA	P&E, NIPA	ACES, NIPA, P&E
Real estate	SOI, HS, CS, UC, TA	P&E, TA, UC, NIPA, SOI	P&E, TA, NIPA, UC, EC(CCI)	P&E, NIPA	ACES, NIPA, P&E
Services:					
Hotel and other lodging places.	SOI, UC	EC (CSI) [4], P&E, UC	EC (CSI) [4], NIPA	NIPA	ACES, NIPA
Personal services	SOI, UC	EC (CSI) [4], P&E, UC	EC (CSI) [4]	P&E, NIPA	ACES, NIPA
Business services	SOI, UC	EC (CSI) [4], P&E, UC	EC (CSI) [4], TA	P&E, NIPA	ACES, NIPA
Auto repair, services, and parking.	SOI, UC	EC (CSI) [4], P&E, UC	EC (CSI) [4], TA, NIPA	P&E, TA, NIPA	ACES, TA, NIPA, P&E
Miscellaneous repair services.	SOI, UC	EC (CSI) [4], P&E, UC	EC (CSI) [4]	P&E, NIPA	ACES, NIPA
Motion pictures	SOI, UC	EC (CSI) [4], P&E, UC	EC (CSI) [4], UC	P&E, UC, NIPA	ACES, UC, NIPA
Amusement and recreation services.	SOI, UC	EC (CSI) [4], P&E, UC	EC (CSI) [4], UC	P&E, UC, NIPA	ACES, UC, NIPA
Health services	SOI, TA	P&E, TA	EC (CSI) [4], P&E, NIPA, TA	P&E, NIPA	ACES, NIPA, P&E
Legal services	SOI, TA	P&E	EC (CSI) [4], P&E	P&E, NIPA	ACES, NIPA
Education services	NIPA, CS, SOI, USDE	NIPA, P&E, USDE	EC (CSI 1987, 1992) [4], P&E, NIPA, USDE.	P&E, NIPA	ACES, NIPA
Other services [5]	SOI, NIPA, CS	P&E, NIPA	EC (CSI 1987, 1992) [4], P&E, NIPA.	P&E, NIPA	ACES, NIPA

1. Used to interpolate between economic census year estimates .
2. Used to extrapolate forward from 1992.
3. Data are from the truck inventory and use survey taken as part of the Census of Transportation for years 1963, 1967, 1972, 1977, 1982, and 1987; and for 1992 taken as part of the Census of Transportation, Communications, and Utilities.
4. Data are from the capital expenditures survey taken as part of the economic census for the years through 1982 and for 1987 and 1992 from the assets and expenditures survey taken as part of the economic census.
5. ''Other'' services consists of the following industries: Social services; museums; botanical, zoological gardens; membership organizations; engineering and management services; and services, not elsewhere classified.

NOTE.—The source data provided in this table are those used to allocate estimates of private nonresidential investment to the various industries. For most economic census years, the distribution is based on the capital flow tables prepared by BEA as part of the benchmark input-output accounts.

ACES	U.S. Department of Commerce, Bureau of the Census, *Annual Capital Expenditures Survey* (Washington, DC: U.S. Government Printing Office, annually beginning in 1992).
ASM	U.S. Department of Commerce, Bureau of the Census, *Annual Survey of Manufactures* (Washington, DC: U.S. Government Printing Office, annually).
Boddy & Gort	Rayford Boddy and Michael Gort, ''Capital Expenditures and Capital Stocks,'' *Annals of Economic and Social Measurement 2/3* (1973); and ''The Derivation of Investment Expenditures and Capital Stocks'' (typewritten, 1968).
CAR	Data from company annual reports.
Chawner	Lowell J. Chawner, ''Capital Expenditures for Manufacturing Plant and Equipment—1915 to 1940,'' SURVEY OF CURRENT BUSINESS 21 (March 1941): 9–15; ''Capital Expenditures in Selected Manufacturing Industries,'' SURVEY 21 (December 1941): 19–26; and ''Capital Expenditures in Selected Manufacturing Industries, Part II,'' SURVEY 22 (May 1942): 14–23.
Crandall	Robert W. Crandall, *After the Breakup: U.S. Telecommunications in a More Competitive Era* (Washington, DC: The Brookings Institution, 1991).
CS	U.S. Department of Commerce, Business and Defense Services Administration, *Construction Statistics 1915–64: A Supplement to Construction Review* (Washington, DC: U.S. Government Printing Office, 1966).
DOE EP	U.S. Department of Energy, Energy Information Administration, *Electric Power Annual*, 2 vols. (Washington, DC: U.S. Government Printing Office, annually).
DOE FS	U.S. Department of Energy, Energy Information Administration, *Financial Statistics of Selected Investor-Owned Electric Utilities* (Washington, DC: U.S. Government Printing Office, annually).
DOT	U.S. Department of Transportation, *Air Carrier Financial Statistics* (Washington, DC: U.S. Government Printing Office, annually).
EC	U.S. Department of Commerce, Bureau of the Census, *Census of Construction Industries (CCI): 1967, 1972, 1977, 1982, 1987, and 1992; Census of Manufactures (CM): 1947, 1958, 1963, 1967 1972, 1977, 1982, 1987, and 1992; Census of Mineral Industries (CMI): 1954, 1958, 1963, 1967, 1972, 1977, 1982, 1987, and 1992; Census of Retail Trade (CRT): 1958, 1963, 1967, 1972, 1977, 1982, 1987, and 1992; Census of Service Industries (CSI): 1958, 1963, 1967, 1972, 1977, 1982, 1987, and 1992; Census of Transportation (CT): 1963, 1967, 1972, 1977, 1982, 1987, and 1992;* and *Census of Wholesale Trade (CWT): 1958, 1963, 1967, 1972, 1977, 1982, 1987, and 1992* (Washington, DC: U.S. Government Printing Office, quinquennially).
ES	U.S. Department of Commerce, Bureau of the Census, *Enterprise Statistics: 1954, 1958, 1963, 1967, 1972, 1977, 1982, 1987, and 1992* (Washington, DC: U.S. Government Printing Office, quinquennially).
FCC	Federal Communications Commission, *Statistics of Communications Common Carriers* (Washington, DC: Federal Communications Commission, annually).
HS	U.S. Department of Commerce, Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1970*, 2 vols. (Washington, DC: U.S. Government Printing Office, 1975).
ICC	Interstate Commerce Commission, *Transport Statistics in the United States* (Washington, DC: U.S. Government Printing Office, annually).

Kuznets	Simon Kuznets, *Capital in the American Economy: Its Formation and Financing* (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1961).
NIPA	For 1929–94, U.S. Department of Commerce, Bureau of Economic Analysis, *National Income and Product Accounts of the United States, 1929–94*, 2 vols. (Washington, DC: U.S. Government Printing Office, 1998); and for 1995–96, see SURVEY 77 (August 1997): 6–167. See the following tables: Current-dollar expenditures, tables 2.6, 5.6, 5.8, and 5.14 and chain-type quantity and price indexes, tables 7.5, 7.7, 7.8, and 7.13.
Oil & Gas	U.S. Department of Commerce, Bureau of the Census, *Annual Survey of Oil and Gas* (Washington, DC: U.S. Government Printing Office, annually through 1982).
P&E	U.S. Department of Commerce, Bureau of the Census, *Plant and Equipment Survey* (unpublished annual data for 1947–93).
Shaw	William H. Shaw, *Value of Commodity Output Since 1869* (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1947).
SOI	U.S. Department of the Treasury, Internal Revenue Service, *Statistics of Income: Corporation Income Tax Returns; Statistics of Income: Partnership Income Tax Returns;* and *Statistics of Income: Nonfarm Proprietorship Returns* (Washington, DC: U.S. Government Printing Office, annually).
TA	Trade association data (published and unpublished).
Trends	Robert E. Gallman, ‘‘Commodity Output, 1839–99,’’ and Marvin W. Towne and Wayne D. Rasmussen, ‘‘Farm Gross Product and Gross Investment in the Nineteenth Century,’’ both in *Trends in the American Economy in the Nineteenth Century,* Studies in Income and Wealth, vol. 24 (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1960).
UC	Unpublished data from the Bureau of the Census.
Ulmer	Melville J. Ulmer, *Capital in Transportation, Communications, and Public Utilities: Its Formation and Financing* (Princeton, NJ: Princeton University Press for National Bureau of Economic Research, 1960).
USDA	U.S. Department of Agriculture, *Farm Income Statistics; Statistical Report, Rural Telephone Borrowers;* and *Statistical Report, Rural Electric Borrowers* (Washington, DC: U.S. Government Printing Office, all annually).
USDE	U.S. Department of Education data (unpublished).

conducted) since 1949. The fourth source—the Census Bureau's plant and equipment expenditures (P&E) survey, which was discontinued in 1993—provided annual data on investment in nonresidential capital by companies primarily engaged in nonfarm industries for 1947–93. These data are not consistent with the NIPA investment totals (mostly due to industry coverage and definitions of investment), provide only a two-way split by type of asset (total equipment and total structures), and are classified on a company basis. The fifth source, the Census Bureau's annual capital expenditures survey (ACES), which replaced the P&E Survey as of 1994, provides annual capital expenditures for equipment and structures for major activities of the companies surveyed. Periodically, more detailed expenditure data are collected.[30] Beginning in 1994, for most nonmanufacturing industries, estimates are extrapolated using ACES data. For manufacturing industries, ASM data are used wherever possible. More detailed information on how these sources are used follows, and table A lists these sources by industry.

The investment flows for new nonresidential capital by industry are derived in four steps. First, annual investment control series for total equipment and for total structures are derived for each industry primarily from the sources given in table A. Second, flows of new investment by type of asset are derived by modifying the NIPA series, as described in the section "Investment controls by type of asset."

Third, the all-industry totals for equipment and for structures from the annual investment control series by industry are adjusted to equal the corresponding modified NIPA totals. The adjustment process is based on BEA's assessment of the relative quality of the various sources of industry investment data and on the industry totals implied by the capital flow distributions based on industry ownership of specific types of assets.

Finally, capital flow tables are modified to derive investment flows by type of asset for each industry for 1963, 1967, 1972, 1977, and 1982. The distributions from these tables are modified from a use basis to an ownership basis and from an I-O to a NIPA industry classification. Industry classifications are based on the 1987 Standard Industrial Classification (SIC) code system. For 1987, BEA derived a proxy capital flow table on an ownership basis, to estimate industry ownership of specific types of assets. For 1963–86, straight-line interpolations between the nearest capital flow tables are used to distribute the NIPA flows by type of asset; for other years, the capital flow table for the nearest year is used. An iterative procedure is used to derive the individual industry investment flows by type of asset to ensure the following: (1) The asset flows at the all-industry level equal those in the NIPA's; and (2) the industry investment totals for equipment and for structures approximate as closely as possible those derived from the independent industry sources.

New nonresidential investment

This section describes the derivation of the investment flows that are used to derive the stock estimates by industry for 1947–94 and the stock estimates by major industry group for 1925–94. In order to derive stock estimates by industry for 1947–94, it is necessary to derive control totals for investment flows of new nonresidential capital by industry for 1921–94 for equipment and for 1900–94 for structures. To derive stock estimates by major industry group for 1925–46, it is necessary to derive investment control totals for farms, manufacturing, and nonfarm nonmanufacturing back into the 19th century. The data sources used to derive both of these sets of investment flows are given in table A. The procedures used to derive the industry investment control series are explained in the following paragraphs.

30. The Census Bureau did conduct a pilot ACES survey in 1992 and a 1993 survey. For 1992–93, data from either the ACES survey or the P&E survey and NIPA series are used to extrapolate estimates of investment in equipment and in structures by industry. Beginning with the 1994 estimates, investment in most nonmanufacturing industries is extrapolated using ACES data adjusted to a NIPA basis. Estimates for manufacturing industries are extrapolated using ASM data and NIPA series.

Investment controls by industry.—The industry investment control totals are derived from several sources. Some provide information for selected benchmark years; others provide information for post–1947 interpolations between and extrapolations from the benchmark estimates, and because many of these sources began in 1947, still other sources are used to extrapolate the control totals before 1947. Wherever possible, the industry investment estimates are based on capital expenditures data collected from the industry; where capital expenditures data are not available, investment estimates are derived from industry balance sheet data as the change in net stocks plus depreciation. (See table A for the specific data sources.) For the most part, the balance sheet data are from *Statistics of Income* published by the Internal Revenue Service (IRS) and from Federal regulatory agencies.

For years for which neither capital expenditures data nor balance sheet data are available for a particular industry, the investment estimates are interpolated and extrapolated using related series; wherever possible, these related series consist of expenditures for the types of fixed assets purchased by the industry. For the most recent year, where industry capital expenditures data are not available, industry-specific indicator series and NIPA investment data by type of asset are used to estimate investment in equipment and in structures by industry.

The source data for each industry are adjusted so that the control totals conform to the definitions and coverage desired. The data are adjusted for industrial classification, establishment basis, central administrative offices and auxiliaries, ownership basis, and employee-owned autos and trucks. These adjustments include those for

(1) Industrial classification. Establishment-based source data not on the basis of the 1987 SIC are converted to this basis, primarily using data from the 1987 economic censuses.

(2) Establishment basis. Where necessary, industry investment estimates are adjusted to an establishment basis. The Census Bureau's P&E series and series published by the IRS in *Statistics of Income* are adjusted from a company to an establishment basis. The Census Bureau's ACES series is adjusted from an activity basis to an establishment basis. Where principal source data coverage of capital expenditures for an establishment industry is incomplete, industry coverage is completed using estimates of capital expenditures derived using secondary source data.

(3) Central administrative offices and auxiliaries (CAO's). For industries in mining, construction, and manufacturing for 1925–94, and for the wholesale trade industry for 1982 and 1987, capital expenditures data from the economic censuses are adjusted to include capital expenditures by CAO's, using data from the Census Bureau's *Enterprise Statistics*. Industry classifications of auxiliary establishments are determined on the basis of the primary activity of the operating establishments they serve.

(4) Ownership basis. To derive stocks by establishment industry on an ownership basis rather than on a use basis, several conventions are adopted. First, leased assets except those held under capital leases are classified in the industry of the lessor. Assets held under capital leases are classified in the industry of the lessee.[31] Second, for assets used in establishments of multi-industry companies where the legal owner of the assets is the parent company, the assets are classified in the industry of the establishment where they are used. Third, assets owned by manufacturers' sales branches and offices are classified in the wholesale trade industry. Finally, assets owned and used by nonprofit institutions that primarily serve individuals are classified in the real estate industry to provide consistency with the NIPA business-sector treatment and industrial classification of these assets.

(5) Employee-owned autos. The source data for each industry do not include expenditures for autos owned by individuals and used wholly or partly for business purposes; therefore, the expenditures attributable to business use are estimated and included as discussed in the section "Privately owned autos" in the chapter "Derivation of Stock Estimates."

(6) Employee-owned trucks. The source data for each industry do not include expenditures for trucks owned by individuals and used wholly or partly for business purposes; therefore, the industry expenditures attributable to business use are estimated using data available from the census of transportation truck inventory and use survey, NIPA series, the capital flow table for 1982, and *Enterprise Statistics*.

The derivation of the industry investment control totals for equipment and structures is described in the following paragraphs. After these controls are initially estimated, they are adjusted judgmentally so that the all-industry totals for equipment and for structures are equal to the totals

31. Capital expenditures data for the mining, construction, manufacturing, trade, and service industries from the economic censuses include capital leases, which corresponds with NIPA conventions. Capital expenditures for the agriculture, transportation, communication, utilities, and finance industries are adjusted to account for capital leasing. Capital leases are defined here as including "full-payout" and "equity" type leases and are included in the industry of the lessee. Included in the industry of the lessee are assets related to sale and lease back arrangements and assets related to "safe harbor" leases for the period 1981–83. Types of leases other than capital leases are included in the industry of the lessor.

for new investment in equipment and in structures from the NIPA's. In this process, the data from the economic censuses and ASM are assumed to be the most accurate. Controls for census years for census-covered industries are adjusted only where they differ significantly from the totals implied by the NIPA estimates for asset types owned by these industries. For industries not covered by the economic census in census years and for nonmanufacturing industries in noncensus years, differences between totals derived as the sum of the industry controls and the totals implied by the NIPA estimates are allocated to industries so that the individual industry totals for a particular year are consistent with the NIPA totals for the types of assets owned by these industries. The differences between these two sets of totals are due to differences in definition and to measurement problems with both sets of estimates. For the NIPA's, these problems include estimating purchases of equipment from shipments and allocating these purchases among final users; for the industry data, they include gaps in coverage.

Farms. Farm industry investment estimates for 1910–94 are based on investment data available from the U.S. Department of Agriculture (USDA) and NIPA series. Estimates before 1910 are extrapolated using the estimates of Robert E. Gallman and those of Marvin W. Towne and Wayne D. Rasmussen.[32]

Agricultural services, forestry, and fisheries. Agricultural services, forestry, and fisheries industry investment estimates for 1994 are extrapolated using ACES data and NIPA series. For 1947–93, investment estimates are based on P&E data and NIPA series. Before 1947, investment estimates are extrapolated using the investment estimates for the farms industry.

Mining. Mining industry estimates are based on expenditures data for establishments with payroll available from the census of mineral industries for equipment and structures separately for 1954, 1958, 1963, 1967, 1972, 1977, 1982, 1987, and 1992, and for equipment only for 1939. Expenditures for the oil and gas extraction industry are adjusted to include establishments without payroll, using data on the value of shipments from the Census Bureau's annual survey of oil and gas. Expenditures for other mining industries are not adjusted for establishments without payroll because no applicable data are available; investment by these establishments is considered to be very small. The census data for all mining industries are adjusted to include investment by CAO's using investment data from *Enterprise Statistics*.

Structures investment estimates for the oil and gas extraction industry for 1994 are extrapolated using ACES data and NIPA series. For 1947–93, structures estimates for the oil and gas extraction industry, for noncensus years are interpolated and extrapolated from census year estimates using P&E data and the NIPA series. Prior to 1947, structures estimates are extrapolated using the following series: For 1929–46, the NIPA series on investment in petroleum and natural gas exploration, shafts, and wells; for 1900–28, data on the value of petroleum production from the Census Bureau's *Historical Statistics of the United States*. Structures investment estimates include capital expenditures for plant, capitalized drilling and exploration costs, and expensed drilling and exploration costs.

Structures investment estimates for other mining industries for 1994 are extrapolated using ACES data and NIPA series. For noncensus years in 1947–93, structures estimates for other mining industries are interpolated and extrapolated from census year estimates using P&E data and NIPA series. Prior to 1947, estimates are extrapolated using data on the value of mining production by industry from *Historical Statistics*.

Mining industries equipment investment estimates for 1994 are extrapolated using ACES data and NIPA series. For noncensus years in 1947–93, equipment estimates are interpolated and extrapolated from census year estimates using the P&E data and NIPA series. Prior to 1947, estimates are extrapolated using data on the value of shipments of mining and oil field equipment from the census of manufactures for 1925, 1927, 1929, 1933, 1935, and 1939, and annual data on the value of mining production by industry from *Historical Statistics*.

Construction. Construction industry estimates of capital expenditures for establishments with payroll are available from the census of construction industries for 1967, 1972, 1977, 1982, 1987, and 1992. These estimates are adjusted to include establishments without payroll, using receipts data from the censuses, and are adjusted to include CAO's, using investment data from *Enterprise Statistics*. Census estimates for subdividers and developers are excluded, because these establishments are classified in the real estate industry (SIC 65).

Structures investment estimates for 1993–94 are extrapolated using ACES data and NIPA series. For 1947–92, structures estimates for noncensus years are interpolated and extrapolated from census year estimates using P&E data and NIPA series. Prior to 1947, structures estimates are extrapolated using the following series: For 1921–46, the estimates of Rayford Boddy and Michael

32. Robert E. Gallman, "Commodity Output, 1829–1899," and Marvin W. Towne and Wayne D. Rasmussen, "Farm Gross Product and Gross Investment in the Nineteenth Century," both in *Trends in the American Economy in the Nineteenth Century*, Studies in Income and Wealth, vol. 24 (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1960).

Gort; and for 1900–20, the F.W. Dodge series on the value of construction contract awards from *Historical Statistics*.[33]

Equipment investment estimates for 1993–94 are extrapolated using ACES data and NIPA series. For noncensus years in 1947–92, equipment estimates are interpolated and extrapolated from census year estimates using the P&E data and NIPA series. Prior to 1947, equipment estimates are extrapolated using the estimates of Boddy and Gort.

Manufacturing. Manufacturing industry estimates of capital expenditures for establishments with payroll are available from the census of manufactures for 1947, 1954, 1958, 1963, 1967, 1972, 1977, 1982, 1987, and 1992. Prior to 1978, investment estimates are not adjusted for establishments without payroll because no applicable data are available and because investment by these establishments is very small. For 1977–94, adjustments are made for establishments without payroll. The census data for all manufacturing industries are adjusted to include investment by CAO's, using investment data from *Enterprise Statistics*. Equipment and structures investment estimates for noncensus years in 1947–94 are interpolated and extrapolated from census year estimates using capital expenditures data from the ASM and NIPA series on investment. Prior to 1947, equipment investment estimates are extrapolated using the following series: For 1941–46, the NIPA series for investment in industrial equipment; for 1921–40, the estimates of Lowell J. Chawner, Simon Kuznets, and William H. Shaw.[34] Prior to 1947, structures estimates are extrapolated using the following series: For 1929–46, the NIPA estimates of investment in industrial buildings; for 1915–28, estimates of the value of new construction put in place for industrial buildings from the U.S. Department of Commerce's *Construction Statistics 1915–1964*; and for 1900–14, balance sheet data from the census of manufactures for 1900, 1904, 1909, and 1914, and the F.W. Dodge series on the value of construction contract awards from *Historical Statistics* for the noncensus years.

33. Rayford Boddy and Michael Gort, "Capital Expenditures and Capital Stocks," *Annals of Economic and Social Measurement* 2/3 (1973); and "The Derivation of Investment Expenditures and Capital Stocks," 1968. (Typewritten).

34. Lowell J. Chawner, "Capital Expenditures for Manufacturing Plant and Equipment—1915 to 1940," SURVEY 21 (March 1941): 9–15, "Capital Expenditures in Selected Manufacturing Industries," SURVEY 21 (December 1941): 19–26, and "Capital Expenditures in Selected Manufacturing Industries, Part II," SURVEY 22 (May 1942): 14–23; Simon Kuznets, *Capital in the American Economy: Its Formation and Financing* (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1961); and William H. Shaw, *Value of Commodity Output Since 1869* (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1947).

Motor vehicle industry equipment estimates prior to 1972 are adjusted to include investment in special tools and dies, which is excluded from the pre–1972 census data. Industrial machinery and equipment industry equipment estimates for census years prior to 1982 are adjusted to include the value of computers owned by the manufacturer and leased to other industries.[35]

Railroad transportation. Railroad industry structures investment estimates for 1929–94 are based on the NIPA series on investment in railroad structures. Estimates of replacement track investment for the years prior to 1929 are based on data published by the Interstate Commerce Commission (ICC) in *Transport Statistics in the United States*. Estimates of railroad structures investment other than replacement track for the years prior to 1929 are based on the following series: For 1915–28, the data on value of new construction put in place for railroads from *Construction Statistics, 1915–1964*; and for 1900–14, data from a study by Melville J. Ulmer.[36]

Railroad industry equipment investment estimates for 1994 are extrapolated using ACES data and NIPA series. For 1977–93, equipment estimates are based on P&E and NIPA data; prior to 1977, equipment estimates are based on capital expenditures data from *Transport Statistics* and from the American Association of Railroads, the NIPA series on investment in railroad equipment, and P&E data.

Local and interurban passenger transit. Local and interurban passenger transit industry structures investment estimates for 1994 are extrapolated using ACES data and NIPA series. For 1973–93, structures estimates are based on P&E data and NIPA series; prior to 1973, structures estimates are derived for two categories: Electric railway and trolley and "other." For electric railway and trolley, the following series are used: For 1959–94, balance sheet data from *Transport Statistics* and P&E data; for 1915–58, the series on the value of new construction put in place for local transit from *Construction Statistics, 1915–1964*; and for estimates prior to 1915, data from Ulmer's study. For the "other" category, the following series are used: For estimates for 1940–94, capital expenditures data from *Transport Statistics* and P&E data; and for estimates prior to 1940, data from Ulmer's study.

Local and interurban transit industry equipment investment estimates for 1994 are extrapolated using ACES data and NIPA series. For 1973–93, equipment estimates are based on P&E data and NIPA series. Prior to 1973,

35. These adjustments are not made for the estimates for census years in 1978–94, because leased computers are included in the manufacturing industry equipment expenditures from the census of manufactures and *Enterprise Statistics*.

36. Melville J. Ulmer, *Capital in Transportation, Communications, and Public Utilities: Its Formation and Financing* (Princeton, NJ: Princeton University Press, for National Bureau of Economic Research, 1960).

equipment estimates are derived separately for four categories: Buses, electric railway and trolley, taxicabs, and "all other." For buses, the estimates for 1940–72 are based on capital expenditures data from *Transport Statistics*, capital expenditures data published by the American Public Transit Association in *Transit Fact Book*, and P&E data; the estimates for 1921–39 are based on data from Ulmer's study.[37] For electric railway and trolley equipment, the estimates for 1940–72 are based on capital expenditures data from *Transit Fact Book* and the P&E series; the estimates for 1921–39 are based on data from Ulmer's study. For taxicabs, the estimates for 1929–72 are based on data from the International Taxicab Association, the NIPA series on investment in new autos, and the P&E series; estimates for 1921–28 are based on data from Ulmer's study. For "all other" equipment, estimates for 1940–72 are based on capital expenditures data from *Transport Statistics* and the P&E series; estimates for 1921–39 are based on data from Ulmer's study.

Trucking and warehousing. Trucking and warehousing industry investment estimates for 1993–94 are extrapolated using ACES data and NIPA series. Census year estimates in 1977–92 are based on P&E data. The estimates are adjusted to include the unregulated portion of the industry, using information from the census of wholesale trade and the census of transportation.

Investment estimates for noncensus years are interpolated and extrapolated using the P&E series and NIPA series. For noncensus years in 1940–77, estimates of investment by the regulated portion of the industry are based on balance sheet data from *Transport Statistics*. For noncensus years prior to 1940, estimates are extrapolated using the following series: For 1929–39, the NIPA series on investment in trucks, buses, and truck trailers; and for estimates prior to 1929, data from Ulmer's study and from the American Trucking Association.

Water transportation. Water transportation industry structures investment estimates for 1994 are extrapolated using ACES data and NIPA series. For 1977–93, structures estimates are based on P&E data and NIPA series; estimates for 1940–77 are based on balance sheet data from *Transport Statistics* and on the P&E series; and prior to 1940, estimates are extrapolated using data on the number of ships built from *Historical Statistics*.

Water transportation industry equipment investment estimates for 1993–94 are extrapolated using ACES data and NIPA series. For 1977–92, equipment estimates are based on P&E data and NIPA series; estimates for 1940–77 are based on the following series: Balance sheet data from *Transport Statistics*, the NIPA series on investment in ships and boats, and P&E data; for 1929–39, the NIPA series on investment in ships and boats; and for 1921–28, data on the number of ships built from *Historical Statistics*. The series for equipment is adjusted to include the value of ships and boats owned and leased to other industries.

Transportation by air. Transportation by air industry investment estimates for 1994 are extrapolated using ACES data and NIPA series. For 1965–93, investment estimates are based on balance sheet data published by the U.S. Department of Transportation in *Air Carrier Financial Statistics*, P&E data, and NIPA series.[38] Prior to 1965, estimates are based on the following series: For 1929–64, the NIPA series on investment in aircraft; and for years prior to 1929, data on air carrier operations from *Historical Statistics*.

Pipelines, except natural gas. Pipelines, except natural gas, industry structures investment estimates for 1929–94 are based on the NIPA series on investment in petroleum pipeline structures; for 1915–28, structures estimates are based on the value of new construction put in place for petroleum pipelines from *Construction Statistics, 1915–1964*; and for 1900–14, estimates are extrapolated using data on petroleum production from *Historical Statistics*.

Pipeline, except natural gas, industry equipment investment estimates for 1994 are extrapolated using ACES data and NIPA series. For 1977–93, equipment estimates are based on P&E data and NIPA petroleum pipeline structures; for 1942–76, estimates are based on data on capital expenditures from *Transport Statistics* and P&E; and for 1921–41, equipment estimates are extrapolated using the same data sources as those used for the structures estimates.

Transportation services. Transportation services industry investment estimates for 1993–94 are extrapolated using ACES data and NIPA series. For 1973–92, investment estimates are based on P&E data and NIPA railroad equipment data; for 1945–72, estimates are based on balance sheet data from *Transport Statistics*, trade association data, the NIPA series on investment in railroad equipment, and P&E data. Prior to 1945, estimates are extrapolated using the investment flows for the railroad transportation industry. Most of the investment in this industry consists of expenditures by establishments engaged in freight forwarding and those engaged in rental of railroad cars.

Telephone and telegraph. Telephone and telegraph industry investment estimates for 1994 are extrapolated

37. American Public Transit Association, *1996 Transit Fact Book* (Washington, DC: 1996).

38. For 1973–1993, estimates of investment by medium and small private commercial air carrier operations are developed using U.S. Department of Transportation data and are now included in the estimate of investment by the air transportation industry.

using ACES data and NIPA series. For 1972–92, investment estimates are based on series obtained from the following sources: Industry reports to the Federal Communications Commission (FCC), USDA Rural Utility Service (RUS—formerly the Rural Electrification Administration), trade associations, P&E survey, company annual reports, and the Census Bureau. This industry includes establishments engaged in telephone and nonvocal message communications and in satellite tracking. Online information retrieval services are classified in business services.

Telephone and telegraph structures investment estimates for years prior to 1972 are based on the following series: For 1929–71, the NIPA series on investment in telecommunications structures; for 1915–28, the series on the value of new construction put in place for telephone and telegraph from *Construction Statistics, 1915–1964*; and for 1900–14, data from Ulmer's study.

Telephone and telegraph equipment investment by rural telephone cooperatives for years prior to 1972 is estimated based on RUS data. Estimates of investment in equipment by private business other than by cooperatives prior to 1972 are based on the following series: For 1947–71, industry reports to the FCC, trade association data, P&E data, data from company annual reports, and data from a study by Robert W. Crandall; and for 1921–46, data from Ulmer's study.[39]

Radio and television. Radio and television industry investment estimates for 1993–94 are extrapolated using ACES data and NIPA series. For 1947–92, investment estimates are based on the following series: P&E data, unpublished census data, and trade association data. Prior to 1947, estimates are extrapolated using data from Boddy and Gort's studies. This industry includes establishments providing cable, satellite, and other pay television services. Estimates of investment by radio and television establishments classified as nonprofit institutions primarily serving individuals are derived from Census Bureau data and are reclassified to the real estate industry.

Electric services. Electric services industry investment estimates for 1972–94 are based on U.S. Department of Energy (DOE) data, RUS data, Census Bureau data, the NIPA electric light and power structures series, and ACES data. Included in electric services industry investment estimates are the following types of establishments: Investor-owned, nonpublic cooperative, nonutility, and electric portions of combination utilities. Nonutilities include cogenerators and independent power producers.

39. See Robert W. Crandall, *After the Breakup: U.S. Telecommunications in a More Competitve Era* (Washington, DC: The Brookings Institution, 1991). See also footnote 36.

Prior to 1972, electric industry structures investment estimates are based on the following series: For 1929–71, the NIPA series on investment in electric light and power structures; for 1915–28, the series on value of new construction put in place for electric light and power from *Construction Statistics, 1915–1964*; and for 1900–14, data from Ulmer's study. These series are adjusted from a "value-put-in-place" basis to a "when-completed" basis, as described in the section "Investment controls by type of asset."

Prior to 1972, electric industry equipment investment estimates are based on the following series: For rural electric cooperatives, RUS data; for investment in equipment by private business other than cooperatives for 1937–71, DOE data and the P&E series, and for 1921–36, data from Ulmer's study.

Gas services. Gas services industry structures investment estimates for 1929–94 are based on the NIPA series on investment in gas utility structures. Prior to 1929, structures estimates are based on the following series: For 1915–28, the series on value of new construction put in place for gas from *Construction Statistics, 1915–1964*; and for 1900–14, data from Ulmer's study. Gas services industry investment estimates include the following types of establishments: Natural gas transmission and distribution, certain types of manufactured gas production, and gas portions of combination utilities. Natural gas exploration and natural gas production are classified in oil and gas extraction.

Gas services industry equipment investment estimates for 1994 are extrapolated using ACES data and NIPA series. For 1973–93, equipment estimates are based on P&E data, NIPA series, and trade association data; for 1946–72, industry reports to the Census Bureau and the P&E series; and for 1921–45, data published by the American Gas Association in *Gas Facts*.

Sanitary services. Sanitary services industry investment estimates for 1994 are extrapolated using ACES data and NIPA series. For 1973–93, investment estimates are based on P&E series, DOE data, and trade association data; and for 1947–72, the P&E series. Prior to 1947, these series are extrapolated using data from Ulmer's study.

Sanitary services industry investment estimates include the following types of establishments: Water supply, sanitary services, steam and air-conditioning supply, irrigation systems, and other utility portions of combination utilities.

Wholesale trade. Capital expenditures data for merchant wholesale establishments are available from the capital expenditures survey conducted as part of the census of wholesale trade for 1958, 1963, 1967, 1972, 1977, 1982 and from the assets and expenditures survey (AES) conducted as part of the 1987 and 1992 economic censuses. These surveys include CAO's and establishments with payroll. For 1978–94, the merchant wholesale investment estimates are adjusted to include expenditures related to CAO's and establishments without payroll.[40] Nonmerchant wholesale investment estimates are added to the merchant wholesale estimates to derive total wholesale trade.[41]

Nonmerchant wholesale investment estimates (which include estimates for equipment owned by nonmerchant wholesalers but leased to other industries) are based on the following series: For 1982, 1987, and 1992, data from *Enterprise Statistics*, census of wholesale trade, and trade association data. For census years prior to 1982, the following data series are used: For investment in equipment, employment; and for investment in structures, inventories. The nonmerchant wholesale equipment series is adjusted to include the value of computers owned by manufacturers' sales branches and leased to other industries. No adjustment is made for establishments without payroll, because investment by these establishments is considered to be very small.

Wholesale trade investment estimates for 1994 are extrapolated using ACES data and NIPA series. Investment estimates for noncensus years in 1947–93 are interpolated and extrapolated from census year estimates using P&E data and NIPA series; prior to 1947, estimates are extrapolated using the estimates of Boddy and Gort.

Retail trade. Capital expenditures data for retail trade establishments are available from the capital expenditures survey taken as part of the census of retail trade for 1958, 1963, 1967, 1972, 1977, and 1982 and from the assets and expenditures survey taken as part of the 1987 and 1992 economic censuses. These surveys cover all of retail trade, including establishments with payroll, CAO's, and except for 1982 and 1987, establishments without payroll. Estimates for 1982 and 1987 are adjusted for establishments without payroll.

Retail trade industry investment estimates for 1993–94 are extrapolated using ACES data and NIPA series. Investment estimates for noncensus years in 1947–92 are interpolated and extrapolated from census year estimates using P&E data and NIPA series. Prior to 1947, investment estimates are extrapolated using the following series: For 1915–46, the series on value of new construction put in place for stores, restaurants, and garages from *Construction Statistics, 1915–1964*; and prior to 1915, the F.W. Dodge series on the value of construction contract awards from *Historical Statistics*.

Finance and insurance. Finance and insurance industry investment estimates, in most instances for 1993–94, are extrapolated using ACES data and NIPA series. For 1947–92, investment estimates are derived from the P&E series and from trade association data. Investment estimates for industries in this industry group are adjusted to account for leased assets not accounted for by the source data series. Prior to 1947, estimates are extrapolated using balance sheet data from *Statistics of Income* and data on activities of the finance and insurance industries from *Historical Statistics*. Estimates of investment by insurance and holding company establishments classified as nonprofit institutions primarily serving individuals are derived from Census Bureau data and are reclassified to the real estate industry.

Real estate, with nonprofit institutions serving individuals. This industry consists of real estate industry establishments and establishments from other industries that are classified as nonprofit. Investment estimates for both components of the real estate industry for 1993–94 are extrapolated using ACES data and NIPA series. For 1972–92, investment estimates are based on the following series: P&E real estate, data from the census of construction industries, NIPA data, trade association data, and the series for investment by nonprofit institutions serving individuals as described for the radio and television, finance and insurance, and services industries. For 1947–71, investment estimates are derived from the following series: For nonprofit institutions that primarily serve individuals, the series described for the services industries; for entities reporting rental income on IRS Schedule E, percentages of the total industry investment from data from *Statistics of Income* on investment for 1977 and depreciation for 1960, 1961, 1967, and 1973 and the NIPA series for investment in commercial structures; and for sole proprietorships, partnerships, and corporations, the P&E series. For 1915–46, estimates are extrapolated using the following series on value of new construction put in place from *Construction Statistics, 1915–1964*: For nonprofit institutions that primarily serve individuals, the total of religious, educational, hospital and institutional, and amusement and recreational buildings; and for the remainder of the industry, commercial buildings. For 1900–14, the structures estimates are extrapolated using the F.W. Dodge series on the value of construction contract awards from *Historical Statistics*.

40. Although CAO's are included in the AES results for merchant wholesalers, the capital expenditures related to them may be reduced when the AES results are adjusted to the results of the census of wholesale trade (which excludes CAO's). Beginning with 1982, BEA adjusts for merchant wholesale CAO's in the wholesale trade estimate.

41. Merchant wholesalers are wholesale entities that take title to the assets they sell. Nonmerchant wholesalers consist of manufacturers' sales branches, sales offices and agents, brokers, and commission merchants.

Services except health, legal, educational, and "other." Capital expenditures data for these services industries are available for equipment and for structures for 1972, 1977, 1982, 1987, and 1992; and for the total of equipment and structures for 1958, 1963, and 1967, from the capital expenditures survey taken as part of the census of service industries through 1982 and from the assets and expenditures survey taken as part of the census for 1987 and 1992.

The investment estimates include CAO's, establishments with payroll, and establishments without payroll. Selected service industry investment estimates are also adjusted for the value of certain types of equipment owned by these industries and leased to other industries as follows: Autos, trucks, and trailers in the auto repair, services, and parking industry; and aircraft, furniture and fixtures, construction machinery (except tractors), computers (other than those leased by the manufacturers or by manufacturers' sales branches), and other types of equipment in the business services industry. Estimates of investment by nonprofit institutions in the hotel and amusement and recreation industries that primarily serve individuals are derived from Census Bureau data and are reclassified to the real estate industry.

Investment estimates for these service industries, in most instances for 1993–94, are extrapolated using ACES data and NIPA series. Investment estimates for noncensus years in 1977–92 are interpolated and extrapolated from census year estimates using one or more of the following series: P&E data, various types of NIPA structures or equipment investment data, trade association data, census value-put-in-place structures data, and other indicator series based on NIPA or trade association data where two-digit SIC industry-specific capital expenditures series are not available.[42] For noncensus years in 1947–77, investment estimates are interpolated and extrapolated from census year estimates using P&E data and NIPA series; prior to 1947, estimates are extrapolated using balance sheet data from *Statistics of Income*.

Health services. The health services industry consists of two components: Hospitals and "other" health services. "Other" health services capital expenditures are available from the Capital Expenditures Survey taken as part of the Census of Service Industries for 1982 and from the assets and expenditures survey taken as part of the census of service industries for 1987 and 1992. Hospital capital expenditures are available for 1987 and 1992. Hospital capital expenditures for other census years are derived from P&E and NIPA data.

42. SIC Industries 70–79 are all included in the single P&E series "personal and business services."

The investment estimates include CAO's, establishments with payroll, and establishments without payroll.

Investment estimates for the health services industry for 1994 are extrapolated using ACES data and NIPA series. Investment estimates for noncensus years in 1947–93 are interpolated and extrapolated from census year estimates using P&E data and NIPA series. Prior to 1947, investment estimates are extrapolated using balance sheet data from *Statistics of Income*. Estimates of investment by hospital and other health services establishments classified as nonprofit institutions primarily serving individuals are derived from Census Bureau and trade association data and are reclassified to the real estate industry.

Legal services. Capital expenditures data for legal services are available from the Capital Expenditures Survey taken as part of the Census of Service Industries for 1982 and from the assets and expenditures survey taken as part of the census of service industries for 1987 and 1992. Investment for other census years is derived using P&E and NIPA data.

Legal services industry investment estimates for 1993–94 are extrapolated using ACES data and NIPA series. Investment estimates for noncensus years in 1947–92 are interpolated and extrapolated from census year estimates using P&E data and NIPA series. Prior to 1947, investment estimates are extrapolated using balance sheet data from *Statistics of Income*. Investment by legal services establishments classified as nonprofit institutions primarily serving individuals are derived from Census Bureau data and are reclassified to the real estate industry.

Educational and "other" services. Capital expenditures data for selected portions of educational services (correspondence and vocational schools), selected portions of "other" services (engineering, research, and management services), and selected portions of social services (job training and vocational rehabilitation, child day care, and residential care) are available from the Assets and Expenditures Survey taken as part of the Census of Service Industries for 1987.[43] Coverage was expanded in the Assets and Expenditures Survey for 1992 to include capital expenditures by the following industry components: Libraries, museums and art galleries, part of membership organizations, and accounting and other professional services. The investment estimates include CAO's, establishments with payroll, and establishments without payroll. Census tabulations are supplemented

43. "Other" services industries consists of the following industries: Social services; museums and botanical and zoological gardens; membership organizations; engineering and management services; and services not elsewhere classified.

as necessary with P&E data and NIPA fixed investment series for 1982 and 1987.

Investment estimates for 1993–94 are extrapolated using the ACES data and NIPA series. Investment estimates for noncensus years in 1982–93 are interpolated and extrapolated from census year estimates using P&E data, NIPA series, or trade association data.

Structures investment estimates for years prior to 1982 are extrapolated using the following series: For 1947–81, P&E data and NIPA series; for 1929–46, NIPA investment in educational buildings and religious buildings; for 1915–28, the series on value of new construction put in place for educational buildings and religious buildings from *Construction Statistics, 1915–1964*; and for 1900–14, balance sheet data from *Statistics of Income*.

Equipment investment estimates for years prior to 1982 are extrapolated using the following series: For 1947–81, P&E data and NIPA series; and prior to 1947, the same sources as those used for structures. Estimates of investment by educational and “other” services establishments by nonprofit institutions that primarily serve individuals are derived from U.S. Department of Education and Census Bureau data and are reclassified to the real estate industry.

Investment controls by type of asset.—For 1929–94, the flows for investment in new nonresidential capital by type of asset are derived from the NIPA series on the nonresidential fixed investment component of gross private domestic investment. For the years prior to 1929, the NIPA flows are extrapolated back into the 19th century using data from various public and private sources.[44]

The NIPA investment series for electric light and power structures is modified to produce stock and depreciation estimates consistent with the availability of the capital assets to contribute to income and output and with the timing of tax depreciation. The NIPA flows for these structures are modified from a “value-put-in-place” basis (that is, the value of new construction put in place in a particular year for both completed plants and plants under construction in that year) to a “when-completed” basis (that is, the value of plants actually completed and put into service during the year). NIPA flows for other types of structures are not modified, because the value of uncompleted plants has been both small and stable relative to the value of completed plants. For electric light and power structures, however, the value of uncompleted plants has been large, and the ratio of this value to the value of completed plants has fluctuated significantly over time. (The NIPA’s do not have an “inventory account” for construction work in progress for any types of structures.)

Distribution by type of asset and industry.—The NIPA flows for investment in new nonresidential capital by type of asset are distributed by industry using data from BEA’s capital flow tables for 1963, 1967, 1972, 1977, and 1982.[45] However, the capital flow tables provide the distribution of assets on an I-O industry classification and use basis rather than on an SIC industry and ownership basis. To convert capital flow industry estimates from an I-O industry classification to NIPA industry definitions, investment by nonprofit institutions that primarily serve individuals is reclassified from their original establishment industry to the real estate industry; investment in mining exploration, shafts, and wells is reclassified from the construction industry to the mining industries; and force-account construction is reclassified from the construction industry to the industries performing the construction.[46] The detailed type-of-asset-by-industry distributions are then converted from a use basis to an ownership basis using data from unpublished I-O studies, industry trade associations, and secondary sources. These modifications yield the detailed type-of-asset-by-industry distributions for equipment and structures for 1963, 1967, 1972, 1977, and 1982. For 1987, a proxy capital flow table on an ownership basis was developed

44. These sources are as follows: William H. Shaw, *Value of Commodity Output Since 1869* (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1947); U.S. Department of Labor and U.S. Department of Commerce, *Construction Volume and Costs 1915–1956: Statistical Supplement to Construction Review* (Washington, DC: U.S. Government Printing Office, 1958); Simon Kuznets, *Capital in the American Economy: Its Formation and Financing* (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1960); U.S. Department of Agriculture, *Farm Income Situation* (Washington, DC: U.S. Government Printing Office, 1965); and Gallman, “Commodity Output,” and Towne and Rasmussen, “Farm Gross Product and Gross Investment.”

45. Information on the BEA capital flow tables for various years is found in a variety of sources. See the following: For the unpublished 1982 table, call the Industry Economics Division at (202) 606–5584; the 1977 table, in “New Structures and Equipment by Using Industries, 1977,” SURVEY 65 (November 1985): 26–35; the 1972 table, in U.S. Department of Commerce, Bureau of Economic Analysis, *New Structures and Equipment by Using Industries, 1972: Detailed Estimates and Methodology*, BEA Staff Paper No. 35 (Washington, DC: U.S. Government Printing Office, 1980); and the 1963 and 1967 tables, in U.S. Department of Commerce, Bureau of Economic Analysis, *Interindustry Transactions in New Structures and Equipment, 1963 and 1967*, 2 vols. (Springfield, VA: National Technical Information Service, 1975).

The capital flow tables show the industry distribution of gross private domestic fixed investment by type of asset. A proxy capital flow table on an ownership basis was developed for 1987 for use in the BEA wealth measures. This proxy table is based on the 1982 table, 1987 economic census data, P&E survey data, and other secondary source data. BEA has subsequently produced a 1992 capital flow table consistent with the 1992 I-O accounts that will be incorporated into the capital stock estimates at the next comprehensive revision of the NIPA estimates; see Belinda Bonds and Tim Aylor, “Investment in New Structures and Equipment in 1992 by Using Industry,” SURVEY 78 (December 1998): 26–51.

46. Force-account construction is that performed by a business or government entity acting as its own builder or contractor. Examples of force-account construction are expenditures on engineers employed by State highway departments to design highways and remodeling crews employed by realtors.

by BEA, based on the following: the BEA 1982 capital flow table, 1987 economic census data, P&E data, I-O studies, trade association data, the NIPA's, and other data sources.

For years not covered by capital flow tables, the NIPA investment flows by type of asset are distributed by industry as follows. Each type of asset is distributed by industry using the following interpolated or extrapolated, modified capital flow distributions: For 1962 and all prior years, the 1963 table; for 1964–66, interpolations between the 1963 and 1967 tables; for 1968–71, interpolations between the 1967 and 1972 tables; for 1973–76, interpolations between the 1972 and 1977 tables; for 1978–82, interpolations between the 1977 and 1982 tables; for 1983–86, interpolations between the 1982 table and the 1987 proxy table; and for 1988–94, the 1987 proxy table.

For years prior to 1972, detailed structures and equipment investment by type of asset and by industry is estimated in the following four major steps. First, NIPA investment by type of asset is allocated to each industry, using the interpolated or extrapolated capital flow distributions (as described in the previous paragraph), and it is then totaled for equipment and for structures within each industry. Second, these allocations are adjusted so as to equal, in total, the industry controls for equipment and for structures. Third, the detailed type-of-asset-by-industry estimates are then totaled by type of asset and adjusted to equal the NIPA totals for each asset type. Fourth, these last two steps are repeated so that the following two balancing conditions are met: (1) All industry totals for investment in each type of asset equal the NIPA new investment by type of asset totals; and (2) totals for industry investment for equipment and for structures approximate as closely as possible the industry control totals derived from independent sources.

For 1972–94, detailed investment in new equipment by type of asset and by industry is estimated in the following five major steps. First, NIPA investment by type of equipment is allocated to each industry, using the interpolated or extrapolated capital flow distributions and initial industry equipment controls. Second, residual differences between NIPA new investment in equipment by type of asset and all industry investment in equipment by type of asset are allocated to nonmanufacturing industries on the basis of the initial allocations performed using the interpolated and extrapolated capital flow distributions. Third, each nonmanufacturing initial industry equipment control is adjusted by the difference between industry total equipment with, and without, the distribution of the residuals to derive the final equipment control for each industry, so that the all industry total of the adjusted industry equipment controls now equals total NIPA new investment in equipment.[47] Fourth, detailed estimates by type of equipment and by industry based on the final industry equipment controls are derived by applying interpolated or extrapolated capital flow-based type of asset distributions for each industry to the final industry equipment totals. Fifth, several iterations may be performed until investment is balanced by industry and asset type.

For 1972–92, detailed investment in new structures by type of asset and by industry is estimated in the following three major steps. First, NIPA investment by type of structure is allocated to each industry, using the interpolated or extrapolated capital flow distributions and initial industry structures controls. Second, the detailed estimates of structures by type of asset and by industry are modified through an iterative balancing process, using the initial industry structures controls and NIPA controls for new structures by type of asset until additional iterations yield only small improvements in the allocations by type of asset and by industry. Third, for nonmining and nonutilities industries, the remaining residual differences between NIPA new structures by type of asset and all industry structures by type of asset are assigned to the real estate industry.[48] For the mining and utilities industries, remaining residual differences for structures are allocated to these industries. These steps yield conformity of the estimates to the two balancing conditions specified above. For 1993–94, detailed investment in new structures by type of asset and by industry is estimated using the same procedure as that described for equipment above.

New residential investment

For 1929–94, the flows for investment in new residential capital by industry are derived from the NIPA series on the residential fixed investment component of gross private domestic investment. For the years before 1929, the flows are based on data from various public and private sources.[49]

47. Distributions are only made to nonmanufacturing industries; the estimates for manufacturing industries are interpolations or extrapolations of census year estimates using ASM establishment data that more closely approximate BEA industry definitions in terms of coverage than nonmanufacturing industries.

48. For 1972–92, adjustments are made to real estate industry structures and equipment investment based on the P&E real estate industry series to correct for P&E undercoverage of both the number of establishments and the growth of real estate industry capital expenditures in structures and equipment. Mining and utilities structures types are treated as exceptions in that residual values for mining and utilities structures are distributed to selected industries that own those types of structures.

49. These sources are as follows: U.S. Department of Labor and U.S. Department of Commerce, *Construction Volume and Costs 1915–1956: Statistical Supplement to Construction Review* (Washington, DC: U.S. Government Printing Office, 1958); David M. Blank, *The Volume of Residential Construction, 1889–1950* (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1954); and *Historical Statistics.*

In the distribution of residential investment flows by industry, investment in farm and nonfarm structures is allocated between owner-occupied and tenant-occupied structures; other nonfarm residential structures (dormitories, fraternity and sorority houses, nurses' homes, etc.) are grouped separately. Investment in farm residential structures is allocated between owner occupied and tenant occupied, both for 1-to–4-unit structures and for mobile homes, using USDA data. All owner-occupied farm residential structures are included in the farms industry; for tenant-occupied farm residential structures, those owned by farm operators are included in the farms industry, and those owned by nonfarm landlords are included in the real estate industry.

Investment in nonfarm residential structures is allocated between owner occupied and tenant occupied separately for 1-to–4-unit structures, 5-or-more-unit structures, and mobile homes, using information from the Census Bureau's census of housing (decennial) and American housing survey (biennial). All nonfarm residential structures are included in the real estate industry, as is all residential equipment, which consists of equipment owned by landlords and rented to tenants.

Transfers of used assets

The value of transfers of used assets is estimated and added to the flows of new investment by industry. Data are available only to adjust for transfers among different types of owners (private business, governments, households, and nonresidents). These data are based for the most part on modified NIPA flows for net purchases of used assets. Data are not available to adjust for transfers among industries or among legal forms of organization.

***Nonresidential investment*.**—The largest transfers of used nonresidential capital assets between private business and other types of owners involve sales of used autos by private business to households, exports of used equipment, purchases of government surplus assets, and government purchases of privately owned public utilities. For autos, annual data are available on stocks and unit values of autos by type of owner; therefore, it is not necessary to make explicit adjustments for net transfers of autos among types of owners.

In the NIPA's, exports of used equipment and purchases of government surplus assets by private business are valued at secondhand sales prices. For the stock estimates, however, these exports and most of the government surplus assets are valued at estimated original acquisition prices, so that the transferred assets are valued consistently with those remaining in the stock of the original owner. Government surplus assets built during wartime with special characteristics that added to their cost but that were of no use to their new owners in peacetime are valued at estimates of the prices that private business would have paid for new assets of equal productivity that were designed for the uses to which the surplus assets would be put.[50] After the estimates of exports of used equipment and of purchases of government surplus assets are revalued, they are distributed by year of transfer and type of asset to the industries involved, using the following sources: For exports of used equipment, data from the Census Bureau's foreign trade statistics; and for purchases of government surplus assets, surplus property reports from the General Services Administration and the U.S. Department of Defense. Estimates of transfers of power plants between the private sector and the Federal Government during the 1980's are derived from Department of Energy (DOE) data. A similar revaluation is performed for purchases by State and local governments of privately owned railroads, transit systems, electric utilities, and water systems. Annual estimates of the original value of assets purchased by government are derived for each type of public utility, separately for equipment and for structures; these assets are transferred from the stock of the selling industry to the State and local government stock in the year of purchase. The estimates are based on data from the following sources: For railroads, Moody's transportation manuals; for transit, Moody's transportation manuals and the American Public Transit Association; for electric utilities, Moody's public utility manuals and two U.S. Department of Energy publications, *Statistics of Privately Owned Electric Utilities in the United States* and *Statistics of Publicly Owned Electric Utilities in the United States*; and for water systems, Moody's public utility manuals.

***Residential investment*.**—The largest transfers of used residential capital among private business and other types of owners and among industries involve purchases of private housing by State and local governments, conversions of Federal military housing to private ownership, and transfers of farm housing to nonfarm ownership. The estimates of transfers between private business and government are derived from the NIPA flows; and the estimates of conversions of farm housing are derived from data from the census of housing. Net transfers of existing residential structures between government and private business consist primarily of State and local government acquisitions of private housing to acquire land for new

50. The derivation of the modified investment flows for exports of used equipment and business purchases of government surplus assets is explained in more detail in Robert C. Wasson, John C. Musgrave, and Claudia Harkens, "Alternative Estimates of Fixed Business Capital in the United States, 1925–1968," SURVEY 50 (April 1970): 18–36.

roads or buildings. In the NIPA's, these transfers are offsetting in government and private fixed investment and are valued at sales prices. In the stock estimates, however, these transferred structures are treated as permanent losses from the housing stock rather than as shifts from the private to the public stock; the housing involved in these purchases is removed from the stock of the real estate industry in the year of government acquisition. World War II Federal military housing converted to private ownership after the war is estimated using NIPA data and transferred from the Federal Government stock to the stock of the real estate industry in the year of conversion.

The post-World War II shift of farm housing in urban fringe areas to nonfarm housing affects the industry stock estimates, but not the NIPA estimates of investment. Estimates of the value of these transfers are derived from the census of housing and moved from the farms industry to the real estate industry in the year of transfer.

Investment by legal form of organization

The estimates of investment in new and used assets for each industry are distributed by legal form of organization—corporate, sole proprietorships and partnerships, and other private business (see the "Glossary"). These investment flows are then used to derive stock estimates by legal form for each industry. This procedure does not take into account the shifts of existing assets from one legal form to another (for example, when an unincorporated enterprise incorporates), because the information necessary to account for these shifts is not available.

Data Availability

Summary tables of aggregate estimates presented in this volume are available on the Economic Bulletin Board or the Internet from the Commerce Department's STAT-USA. These summary tables include net stocks, consumption of fixed capital (CFC), and investment in current dollars and chain-type quantity indexes. To subscribe, call 202–482–1986 or visit the Internet site at <www.stat-usa.gov>. These estimates are also available on diskettes from BEA for $60.00 (product number NDN–0216).

In addition, a CD-ROM is available from BEA for $35.00 (product number NCN–0229). The CD-ROM contains all of the above estimates plus detailed estimates of investment, CFC, and net stocks by industry and type of asset at current cost and real cost. To order using Visa or MasterCard, call the BEA Order Desk at 1–800–704–0415 (outside of the United States, call 202–606–9666). To order by mail, send a check payable to "Bureau of Economic Analysis, BE–53" to the BEA Order Desk, BE–53, Bureau of Economic Analysis, Washington, DC 20230.

Nonresidential investment.—Investment in nonresidential capital is distributed annually by legal form of organization within industries by subtracting estimates of investment by other private business and then distributing the remainder between corporations and sole proprietorships and partnerships.

For other private business, investment by tax-exempt cooperatives is estimated from RUS data for the telephone and telegraph and the electric services industries and from the census of wholesale trade for the wholesale trade industry; investment by entities reporting rental income on nonresidential property in IRS Schedule E is derived from data on investment and depreciation from *Statistics of Income*. Investment by nonprofit institutions that primarily serve individuals is derived from data from the economic censuses for 1982, 1987, and 1992; Census Bureau data on the value of new construction put in place; trade association data; American Hospital Association data; and from DOE. For the farms industry, for 1973–94, the percentages by legal form of organization are based on capital expenditures data from USDA's annual farm costs and returns survey, and prior to 1973, on assets data from the census of agriculture. For industries covered by the economic censuses for census years prior to 1992 (mining, construction, manufacturing, wholesale trade, retail trade, and selected services) and for those that were initially covered in 1992 (selected transportation, communication, utility, finance, insurance, and real estate industries), the legal-form percentages for corporations and for sole proprietorships and partnerships for census years are based, when possible, on distributions of capital expenditures from the censuses. When capital expenditures by legal form of organization are not available, revenue, sales, or receipts data from economic censuses are used to derive legal-form percentages. When necessary, adjustments are made for establishments without payroll and CAO's. For noncensus years, the percentages are based on distributions of expenditures interpolated by depreciation data from *Statistics of Income*. For telephone and telegraph, the percentages for years prior to 1993 are based on capital expenditures data from RUS, the FCC, the United States Telephone Association, and company annual reports, and those for 1993–94 are based on estimates derived from the economic censuses. For electric services, the percentages for years prior to 1993 are based on capital expenditures data from RUS and DOE, and those for 1993–94 are based on estimates derived from census data. For industries not covered by the economic census, estimates of percentages by legal form of organization are based on the distribution of depreciation data by legal form from *Statistics of Income*.

Residential investment.—For the farms industry, investment in owner-occupied residential capital is assigned to sole proprietorships and partnerships, and investment in tenant-occupied residential capital is distributed by legal form of organization, using USDA data. For the real estate industry, investment in owner-occupied residential capital is assigned to other private business, investment in tenant-occupied residential capital is distributed by legal form using data from the Census Bureau's survey of residential finance, and investment in other nonfarm residential structures (such as dormitories, fraternity and sorority houses, and nurses' homes) is assigned to other private business.

Fixed Government Capital

The investment flows for 1929–94 are derived from the NIPA series on gross government investment and are modified for revaluation of used asset transfers, as described in the section "Transfers of used assets." For the years prior to 1929, the flows are extrapolated using data from Raymond W. Goldsmith.[51]

Durable Goods Owned by Consumers

Additions to the stock of durable goods owned by consumers for 1929–94 are derived from the NIPA series on personal consumption expenditures for durable goods. For the years prior to 1929, these additions are extrapolated using data from William H. Shaw.[52]

51. Raymond W. Goldsmith, *A Study of Saving in the United States*, 3 vols. (Princeton, NJ: Princeton University Press, 1955).

52. William H. Shaw, *Value of Commodity Output Since 1869* (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1947).

Derivation of Stock Estimates

Depreciation patterns and depreciation profiles

In the perpetual inventory method, the pattern of depreciation charges for a given asset is determined by its "depreciation profile." The depreciation profile for a given type of asset describes the pattern of how, in the absence of inflation, the price of an asset of that type declines as it ages. Although the profile for a given type of asset of a given vintage is assumed to be constant over time, some vintages of a given type of asset have profiles that differ from those of other vintages of the same type of asset.

BEA's net stock and depreciation methodology uses depreciation profiles that are based on empirical evidence on used asset prices. Ideally, the profiles for each type of asset should be estimated using prices for used assets in resale markets, but such studies have not been conducted for some types of assets. For autos and for computers and computer peripheral equipment, two classes of assets for which information on used asset prices is extensive, the actual empirical profiles, which are given in table B, are used. For autos, the profiles are derived from new-car prices and used-car prices (from the National Automobile Dealer Association's *Official Wholesale Used Car Trade-In Guide*) for a sample of models. For computers and peripheral equipment, the profiles are taken from studies prepared by Stephen Oliner.[53] For missiles and nuclear fuel rods, depreciation is estimated using a straight-line pattern (to reflect the pattern of rotation and replacement of nuclear fuel in the core) and a Winfrey retirement pattern.[54]

Geometric profiles are used for all other assets because the available empirical studies of used asset prices suggest that, in general, depreciation profiles are more closely approximated by a geometric pattern of price declines than by a straight-line one.[55] For a given type of asset, the appropriate rate of declining-balance depreciation is taken from the work of Hulten and Wykoff and other empirical studies of similar classes of assets. The depreciation rates for specific types of assets are then determined by dividing the appropriate declining-balance rate for each asset by the asset's assumed service life.

The declining-balance rates used by BEA are derived from estimates made by Hulten and Wykoff under the auspices of the U.S. Department of the Treasury and are shown in table C.[56] For the purposes of determining the appropriate rates, assets are divided into three major types. Type A assets are assets for which Hulten and Wykoff had extensive data and estimated geometric rates of depreciation. These assets consist of the following categories of producers' durable equipment and nonresidential structures: Tractors, construction machinery, metalworking machinery, general industrial equipment, trucks, autos, industrial buildings, and commercial buildings.[57] In 1977, these categories accounted for about 55 percent of investment expenditures on producers' durable equipment and 42 percent of spending on nonresidential structures.

For type B assets, there were some existing studies on depreciation or some data existed. Hulten and Wykoff concluded that defensible estimates of the rate of geometric depreciation for these assets could not be generated solely on the basis of the data. They used the results of empirical research by others, the treatment of depreciation by BEA, Dale Jorgenson, the Bureau of Labor Statistics, and Jack Faucett Associates, and their own judgement in order to determine the geometric rate of depreciation for these assets on a case by case basis.

For the remaining assets, called type C assets, Hulten and Wykoff had no data whatsoever. For these assets,

53. A general description of this work appears in Stephen D. Oliner, "Constant-Quality Price Change, Depreciation, and Retirement of IBM Mainframe Computers," in *Price Measurements and Their Uses*, ed. Murray F. Foss, Marilyn E. Manser, and Allan H. Young (Chicago, IL: University of Chicago Press, for the National Bureau of Economic Research, 1993). The depreciation profiles used by BEA were taken from that article and from unpublished detail provided by Oliner.

54. This pattern is discussed in the section "Retirement patterns" in this chapter.

55. Except for missiles and nuclear fuel rods, where an explicit retirement pattern and distribution of service lives is used, the BEA depreciation profiles are for an entire cohort of assets of a given type. When different assets within a cohort have different service lives, the profile for the cohort as a whole will be more convex (accelerated) than the profile for a single asset. For further discussion of this point, see Wykoff, "Economic Depreciation and the User Cost of Business-Leased Automobiles," 262–265.

56. The following discussion is extracted from Fraumeni's "The Measurement of Depreciation."

57. As noted above, the actual empirical profile is used for autos rather than the geometric rate estimated by Hulten and Wykoff.

average declining-balance rates were estimated from the information from the eight categories of type A assets combined with information on the lifetime of the type B assets. Hulten and Wykoff determined that, on average, the declining-balance rate for producers' durable equipment was 1.65 and that for private nonresidential structures was 0.91.

The geometric depreciation rates and the associated declining-balance depreciation rates and service lives used by BEA to derive the estimates of net stocks and depreciation are shown in table C. Separate depreciation rates and service lives are used for each type of asset—the same asset detail for which annual data are available from the national income and product accounts. For the

Table B.—Depreciation Schedules for Autos, Computers, and Computer Peripherals

[In values relative to the price of a new asset]

Age in years	Year asset was initially installed				
	Automobiles	Computer mainframes			Personal computers
	All years	1958–69	1970–79	1980–94	All years
1	0.8208	0.9787	0.9787	0.8980	0.9920
2	.5890	.9074	.8917	.6893	.9510
3	.4862	.7779	.7411	.4901	.8690
4	.4063	.6429	.5575	.2989	.6950
5	.3258	.4891	.4002	.1732	.5320
6	.2414	.3498	.2694	.0894	.3510
7	.1811	.2412	.1666	.0434	.2000
8	.1280	.1618	.0968	.0197	.1150
9	.0749	.1090	.0549	.0087	.0700
10	.0363	.0734	.0302	.0035	.0390
11	.0184	.0483	.0164	.0015	.0230
12	.0092	.0323	.0089	.0007	.0140
13	.0000	.0222	.0056	.0004	.0080
14	.0000	.0118	.0029	.0003	.0070
15	.0000	.0057	.0017	.0002	.0050
16	.0000	.0000	.0000	.0000	.0000
17	.0000	.0000	.0000	.0000	.0000
18	.0000	.0000	.0000	.0000	.0000
19	.0000	.0000	.0000	.0000	.0000
20	.0000	.0000	.0000	.0000	.0000

Age in years	Year asset was initially installed				
	Computer printers				
	1958–69	1970–75	1976–80	1981–85	1986–94
1	0.9274	0.9255	0.9004	0.8750	0.8478
2	.7870	.7808	.7109	.6410	.5678
3	.6534	.6434	.5415	.4470	.3570
4	.5277	.5189	.4031	.3049	.2205
5	.4206	.4174	.3002	.2075	.1343
6	.3333	.3333	.2231	.1403	.0822
7	.2606	.2606	.1656	.0955	.0516
8	.2017	.2017	.1237	.0662	.0335
9	.1559	.1559	.0936	.0452	.0220
10	.1217	.1217	.0722	.0321	.0144
11	.0960	.0960	.0553	.0247	.0093
12	.0752	.0752	.0411	.0178	.0059
13	.0576	.0576	.0299	.0128	.0037
14	.0426	.0426	.0210	.0090	.0024
15	.0302	.0302	.0141	.0062	.0015
16	.0208	.0208	.0092	.0041	.0010
17	.0140	.0140	.0059	.0025	.0006
18	.0088	.0088	.0035	.0014	.0004
19	.0053	.0053	.0020	.0008	.0002
20	.0020	.0020	.0007	.0003	.0001

Age in years	Year asset was initially installed				
	Computer terminals and displays				
	1958–69	1970–75	1976–80	1981–85	1986–94
1	0.9793	0.9777	0.9749	0.9704	0.9208
2	.9061	.9006	.8887	.8702	.7318
3	.7799	.7707	.7450	.7084	.5216
4	.6265	.6180	.5834	.5388	.3474
5	.4786	.4754	.4404	.3957	.2220
6	.3558	.3558	.3250	.2821	.1377
7	.2586	.2586	.2359	.1986	.0851
8	.1854	.1854	.1712	.1407	.0538
9	.1333	.1333	.1261	.1023	.0352
10	.0979	.0979	.0958	.0776	.0237
11	.0750	.0750	.0750	.0614	.0164
12	.0603	.0603	.0603	.0507	.0118
13	.0505	.0505	.0505	.0438	.0088
14	.0442	.0442	.0442	.0400	.0069
15	.0402	.0402	.0402	.0387	.0058
16	.0381	.0381	.0381	.0381	.0055
17	.0368	.0368	.0368	.0368	.0055
18	.0355	.0355	.0355	.0355	.0058
19	.0342	.0342	.0342	.0342	.0049
20	.0264	.0264	.0264	.0264	.0037

Age in years	Year asset was initially installed				
	Computer tape drives				
	1958–69	1970–75	1976–80	1981–85	1986–94
1	0.9229	0.9205	0.9175	0.9139	0.9094
2	.7741	.7671	.7566	.7437	.7272
3	.6333	.6228	.6031	.5795	.5516
4	.5010	.4907	.4655	.4369	.4045
5	.3875	.3805	.3544	.3251	.2921
6	.2948	.2902	.2661	.2372	.2060
7	.2184	.2144	.1958	.1700	.1435
8	.1576	.1542	.1419	.0755	.0998
9	.1113	.1086	.1015	.0602	.0698
10	.0776	.0755	.0723	.0418	.0483
11	.0535	.0519	.0504	.0402	.0325
12	.0358	.0347	.0335	.0282	.0210
13	.0229	.0221	.0213	.0182	.0129
14	.0138	.0132	.0127	.0112	.0075
15	.0077	.0074	.0071	.0065	.0042
16	.0040	.0038	.0037	.0028	.0023
17	.0020	.0019	.0018	.0012	.0012
18	.0009	.0008	.0008	.0008	.0005
19	.0004	.0003	.0003	.0003	.0002
20	.0001	.0001	.0001	.0001	.0001

Age in years	Year asset was initially installed				
	Computer storage devices				
	1958–69	1970–75	1976–80	1981–85	1986–94
1	0.9975	0.9925	0.9800	0.9700	0.9549
2	.9875	.9775	.9400	.9100	.7806
3	.9753	.9598	.9026	.8426	.5326
4	.8538	.8376	.7736	.6913	.3231
5	.6269	.6213	.5585	.4779	.1767
6	.4255	.4255	.3737	.3063	.0911
7	.2692	.2692	.2369	.1877	.0459
8	.1623	.1623	.1456	.1134	.0229
9	.0958	.0958	.0890	.0687	.0111
10	.0569	.0569	.0553	.0417	.0053
11	.0343	.0343	.0343	.0255	.0025
12	.0210	.0210	.0210	.0160	.0012
13	.0130	.0130	.0130	.0103	.0006
14	.0082	.0082	.0082	.0069	.0003
15	.0054	.0054	.0054	.0050	.0002
16	.0038	.0038	.0038	.0038	.0001
17	.0029	.0029	.0029	.0029	.0001
18	.0023	.0023	.0023	.0023	.0001
19	.0022	.0022	.0022	.0022	.0001
20	.0011	.0011	.0011	.0011	.0000

Table C.—BEA Rates of Depreciation, Service Lives, Declining-Balance Rates, and Hulten-Wykoff categories

Type of asset	Rate of deprecia-tion	Service life (years)	Delining-balance rates	Hulten-Wykoff category[1]
Private nonresidential equipment				
Office, computing, and accounting machinery[2]:				
Years before 1978	0.2729	8	2.1832	B
1978 and later years	.3119	7	2.1832	B
Communications equipment:				
Business services[3]	.1500	11	1.6500	C
Other industries[3]	.1100	15	1.6500	C
Instruments[4]	.1350	12	1.6203	C
Photocopy and related equipment[5]	.1800	9	1.6203	C
Nuclear fuel[6]	...	4	...	...
Other fabricated metal products[7]	.0917	18	1.6500	C
Steam engines and turbines[8]	.0516	32	1.6500	C
Internal combustion engines[8]	.2063	8	1.6500	C
Metalworking machines[9]	.1225	16	1.9600	A
Special industrial machinery, n.e.c.	.1031	16	1.6500	C
General industrial, including materials handling equipment	.1072	16	1.7150	A
Electrical transmission, distribution, and industrial apparatus	.0500	33	1.6500	C
Trucks, buses, and truck trailers:				
Local and interurban passenger transit[10]	.1232	14	1.7252	A
Trucking and warehousing; and auto repair, services, and parking[10]	.1725	10	1.7252	A
Other industries	.1917	9	1.7252	A
Autos[11]	...	...	...	...
Aircraft:				
Transportation by air, depository institutions, and business services:				
Years before 1960	.1031	16	1.6500	C
1960 and later years	.0825	20	1.6500	C
Other industries:				
Years before 1960	.1375	12	1.6500	C
1960 and later years	.1100	15	1.6500	C
Ships and boats	.0611	27	1.6500	B
Railroad equipment	.0589	28	1.6500	C
Household furniture and fixtures[12]	.1375	12	1.6500	C
Other furniture[12]	.1179	14	1.6500	C
Farm tractors[13]	.1452	9	1.3064	A
Construction tractors[13]	.1633	8	1.3064	A
Agricultural machinery, except tractors	.1179	14	1.6500	C
Construction machinery, except tractors	.1550	10	1.5498	A
Mining and oil field machinery	.1500	11	1.6500	C
Service industry machinery:				
Wholesale and retail trade[14]	.1650	10	1.6500	C
Other industries[14]	.1500	11	1.6500	C
Household appliances[15]	.1650	10	1.6500	C
Other electrical equipment[16]	.1834	9	1.6500	C
Other[4]	.1473	11	1.6230	C
Private nonresidential structures				
Industrial buildings	.0314	31	.9747	A
Mobile offices[17]	.0556	16	.8892	A
Office buildings[17]	.0247	36	.8892	A
Commercial warehouses[17]	.0222	40	.8892	A
Other commercial buildings[17]	.0262	34	.8892	A
Religious buildings	.0188	48	.9024	C
Educational buildings	.0188	48	.9024	C
Hospital and institutional buildings	.0188	48	.9024	B
Hotels and motels[18]	.0281	32	.8990	B
Amusement and recreational buildings[18]	.0300	30	.8990	B
All other nonfarm buildings[18, 19]	.0249	38	.8990	B
Railroad replacement track[19 20]	.0275	38	.9480	C
Other railroad structures[19 20]	.0166	54	.9480	C
Telecommunications[20]	.0237	40	.9480	C
Electric light and power[20]:				
Years before 1946	.0237	40	.9480	C
1946 and later years	.0211	45	.9480	C
Gas[20]	.0237	40	.9480	C
Petroleum pipelines[20]	.0237	40	.9480	C
Farm[21]	.0239	38	.9100	C
Mining exploration, shafts, and wells:				
Petroleum and natural gas[22]:				
Years before 1973	.0563	16	.9008	C
1973 and later years	.0751	12	.9008	C
Other[22]	.0450	20	.9008	C
Local transit[23]	.0237	38	.8990	C
Other[23]	.0225	40	.8990	C
Residential capital (private and government)				
1-to-4-unit structures-new[21]	.0114	80	.9100	A
1-to-4-unit structures-additions and alterations[21]	.0227	40	.9100	A
1-to-4-unit structures-major replacements[21]	.0364	25	.9100	A
5-or-more-unit structures-new[21]	.0140	65	.9100	A
5-or-more-unit structures-additions and alterations[21]	.0284	32	.9100	A
5-or-more-unit structures-major replacements[21]	.0455	20	.9100	A
Mobile homes[21]	.0455	20	.9100	A
Other structures[21]	.0227	40	.9100	A
Equipment[24]	.1500	11	1.6500	C
Durable goods owned by consumers[25]				
Furniture, including mattresses and bedsprings	.1179	14	1.6500	B
Kitchen and other household appliances	.1500	11	1.6500	C
China, glassware, tableware, and utensils[26]	.1650	10	1.6500	C
Other durable house furnishings[26]	.1650	10	1.6500	C
Video and audio products, computers and peripheral equipment, and musical instruments[27]	.1833	9	1.6500	B
Jewelry and watches[26]	.1500	11	1.6500	C
Ophthalmic products and orthopedic appliances[26]	.2750	6	1.6500	C
Books and maps[26]	.1650	10	1.6500	C
Wheel goods, sports and photographic equipment, boats, and pleasure aircraft[28]	.1650	10	1.6500	C
Autos[11]	...	...	...	...
Other motor vehicles[29]	.2316	8	1.8530	A
Tires, tubes, accessories, and other parts[29]	.6177	3	1.8530	A
Government nonresidential equipment[30]				
Federal:				
National defense:				
Aircraft:				
Airframes:				
Bombers	.0660	25	1.6500	C
F-14 type	.0868	19	1.6500	C
Attack, F-15 and F-16 types	.0825	20	1.6500	C
F-18 type	.1100	15	1.6500	C
Electronic warfare	.0717	23	1.6500	C
Cargo and trainers	.0660	25	1.6500	C
Helicopters	.0825	20	1.6500	C
Engines	.2750	6	1.6500	C
Other:				
Years before 1982	.1179	14	1.6500	C
1982 and later years	.1650	10	1.6500	C
Missiles:[31]				
Strategic	...	20	...	...
Tactical	...	15	...	...
Torpedoes	...	15	...	...
Fire control equipment	...	10	...	...
Space programs	...	20	...	...
Ships:				
Surface ships	.0550	30	1.6500	C
Submarines	.0660	25	1.6500	C
Government furnished equipment:				
Electrical	.1834	9	1.6500	C
Propulsion	.0825	20	1.6500	C
Hull, mechanical	.0660	25	1.6500	C
Ordnance	.1650	10	1.6500	C
Other	.1650	10	1.6500	C
Vehicles:				
Tanks, armored personnel carriers, and other combat vehicles	.0825	20	1.6500	C
Noncombat vehicles:				
Trucks	.2875	6	1.7252	C
Autos[32]	...	...	...	...
Other	.2465	7	1.7252	C

Table C.—BEA Rates of Depreciation, Service Lives, Declining-Balance Rates, and Hulten-Wykoff categories—
Continued

Type of asset	Rate of depreciation	Service life (years)	Delining-balance rates	Hulten-Wykoff category [1]
Electronic equipment:				
Computers and peripheral equipment [33]	....	....	....	....
Electronic countermeasures	.2357	7	1.6500	C
Other	.1650	10	1.6500	C
Other equipment:				
Medical	.1834	9	1.6500	C
Construction	.1550	10	1.5498	C
Industrial	.0917	18	1.6500	C
Ammunition plant	.0868	19	1.6500	C
Atomic energy	.1375	12	1.6500	C
Weapons and fire control	.1375	12	1.6500	C
General	.1650	10	1.6500	C
Other	.1375	12	1.6500	C
Nondefense:				
General government:				
Computers and peripheral equipment [33]	....	....	....	....
Aerospace equipment	.1100	15	1.6500	C
Vehicles	.4533	5	2.2664	C
Other	.1650	10	1.6500	C
Enterprises:				
U.S. Postal Service:				
Computers and peripheral equipment [33]	....	....	....	....
Vehicles	.3238	7	2.2664	C
Other	.1100	15	1.6500	C
Tennessee Valley Power Authority	.0500	33	1.6500	C
Bonneville Power Authority	.0500	33	1.6500	C
Other	.0660	25	1.6500	C
State and local:				
Power tools, lawn and garden equipment	.1650	10	1.6500	C
Miscellaneous metal products	.0917	18	1.6500	C
Agricultural machinery and equipment	.1833	9	1.6500	C
Construction machinery and equipment	.1650	10	1.6500	C
Metalworking machinery and equipment	.1031	16	1.6500	C
General purpose machinery and equipment	.1500	11	1.6500	C
Special industry machinery and equipment	.1500	11	1.6500	C
Integrating and measuring instruments	.1375	12	1.6500	C
Motors, generators, motor generator sets	.0516	32	1.6500	C
Switchgear and switchboard equipment	.0500	33	1.6500	C
Electronic components and accessories	.1833	9	1.6500	C
Miscellaneous electrical machinery	.1375	12	1.6500	C
Calculating and accounting machines	.2357	7	1.6500	C
Typewriters	.2357	7	1.6500	C
Computers and peripheral equipment	....	....	....	....
Machine shop products	.2063	8	1.6500	C
Wood commercial furniture	.1179	14	1.6500	C
Metal commercial furniture	.1179	14	1.6500	C
Household appliances	.1500	11	1.6500	C
Home electronic equipment	.1500	11	1.6500	C
Motor vehicles	.1650	10	1.6500	C
Motorcycles	.1650	10	1.6500	C
Aircraft	.1100	15	1.6500	C
Railroad equipment	.0590	28	1.6500	C
Sporting and athletic goods	.1650	10	1.6500	C
Photographic and photocopying equipment	.1650	10	1.6500	C
Mobile classrooms, mobile offices, etc	.1650	10	1.6500	C
Musical instruments	.1834	9	1.6500	C
Other equipment	.1375	12	1.6500	C
Government nonresidential structures [34]				
Federal, State, and local:				
Buildings:				
Industrial	.0285	32	.9100	C
Educational	.0182	50	.9100	C
Hospital	.0182	50	.9100	C
Other	.0182	50	.9100	C
Nonbuildings:				
Highways and streets	.0152	60	.9100	C
Conservation and development	.0152	60	.9100	C
Sewer systems	.0152	60	.9100	C
Water systems	.0152	60	.9100	C
Military facilities	.0182	50	.9100	C
Other	.0152	60	.9100	C

1. This column refers to Hulten-Wykoff categories. Type A assets are types of assets for which Hulten-Wykoff specifically estimated age-price profiles. Type B assets are those for which Hulten-Wykoff used empirical research by others and their judgement to estimate the depreciation rate. Type C assets are assets for which Hulten-Wykoff estimated an average declining-balance rate from data for all type A and B assets.
2. The depreciation rate for this type of asset is not used for computers and peripheral equipment. Depreciation rates for these assets are taken from Oliner as described in the text.
3. The declining-balance rate is from the Hulten-Wykoff communications equipment aggregate.
4. Instruments and other private nonresidential equipment, called producer durable equipment by Hulten-Wykoff, are classified by them to be of type C, but appear to be of type B as they were given a declining-balance rate of 1.6203.
5. The declining-balance rate is from the Hulten-Wykoff other producer durable equipment aggregate.
6. The depreciation rates for nuclear fuel are based on a straight-line rate pattern and a Winfrey retirement pattern.
7. The declining-balance rate is from the Hulten-Wykoff fabricated metal products aggregate.
8. The declining-balance rate is from the Hulten-Wykoff engines and turbines aggregate.
9. The depreciation rate and service life listed apply to nonmanufacturing industries; the service lives and depreciation rates used for manufacturing industries differ by industry. The Hulten-Wykoff type of asset listed applies to all industries.
10. The declining-balance rate is from the Hulten-Wykoff trucks, buses and truck trailer aggregate.
11. Depreciation rates for autos are derived from data on new and used auto prices.
12. The declining-balance rate is from the Hulten-Wykoff furniture and fixtures aggregate.
13. The declining-balance rate is from the Hulten-Wykoff tractors aggregate.
14. The declining-balance rate is from the Hulten-Wykoff service industry machinery aggregate.
15. The declining-balance rate is set to the Hulten-Wykoff producer durable equipment default.
16. The declining-balance rate is from the Hulten-Wykoff electrical equipment (not elsewhere classified) aggregate.
17. The declining-balance rate is from the Hulten-Wykoff commercial aggregate.
18. The declining-balance rate is from the Hulten-Wykoff other private nonresidential structures aggregate, which consists of buildings used primarily for social and recreational activities and buildings not elsewhere classified.
19. The depreciation rate for this type of asset is not consistent with its declining-balance rate. This inconsistency, which is likely to be very small, will be corrected at the next comprehensive revision.
20. The declining-balance rate is from the Hulten-Wykoff public utilities aggregate.
21. The declining-balance rate is set to the Hulten-Wykoff private nonresidential structures default.
22. The declining-balance rate is from the Hulten-Wykoff mining exploration, shafts and wells aggregate.
23. The declining-balance rate is from the Hulten-Wykoff other private nonresidential structures aggregate, which consists of streets, dams and reservoirs, sewer and water facilities.
24. The declining-balance rate is set to the Hulten-Wykoff producer durable equipment default.
25. For all consumer durables except for motor vehicles and parts and computing equipment, the declining-balance rate is set to the Hulten-Wykoff producer durable equipment default.
26. The corresponding Hulten-Wykoff consumer durables category is other.
27. Depreciation rates for computers and peripheral equipment are taken from Oliner as described in the text. The information listed applies to video and audio products and musical instruments. The corresponding Hulten-Wykoff aggregate is radio and television receivers, recorders, and musical instruments. Radio and television receivers, recorders, and musical instruments are classified by Hulten-Wykoff to be of type B, but are indistinguishable from type C as their declining-balance rate is 1.65.
28. The corresponding Hulten-Wykoff consumer durables category is wheel goods, durable toys, sports equipment.
29. The declining-balance rate is from the Hulten-Wykoff motor vehicles and parts aggregate. The declining-balance rate for this category is calculated under the assumption that the service life for consumer durables motor vehicles and parts is equal to the service life for producer durable equipment autos previously used by BEA.
30. For most government nonresidential equipment, the declining-balance rate is set to the Hulten-Wykoff producer durable equipment default. Where possible, the rate is set equal to the rate used for comparable equipment in the private sector.
31. Missiles are depreciated using straight-line patterns of depreciation and a Winfrey retirement pattern.
32. Depreciation rates for government-owned autos are derived from data on autos that are privately owned.
33. Depreciation rates for these assets are taken from Oliner as described in the text.
34. For all government nonresidential structures, the declining-balance rate is set to the Hulten-Wykoff private nonresidential structures default.

estimates of fixed private capital, separate depreciation rates and service lives are also used in different industries for certain types of assets.

Service lives

As noted above, the service lives used to derive the stock estimates are shown in table C. Ideally, service lives (and depreciation rates) should reflect actual experience as closely as possible. Because of data limitations, the service lives BEA uses to derive estimates of fixed private capital fall short of this ideal in two ways. First, separate lives should be used for each industry in which a particular type of asset is purchased; however, such lives could be computed only for those types of assets and industries so indicated. Second, service lives should be varied over time to account for changes in business conditions and technology; however, service lives could be varied over time only for those types of assets and industries so indicated. All other service lives by type of asset and industry are held constant over time, because the information necessary to estimate such changes is not available. Book value comparisons suggest that the use of constant service lives has not produced any systematic bias in the BEA estimates of fixed private capital for the comparison period (1959–81).[58]

As indicated in table C, the service lives for some types of fixed government capital are varied over time while others are held constant. The lives used for durable goods owned by consumers are held constant over time, because the information necessary to estimate changing lives over time is not available.

Private equipment.—The stock estimates for private equipment are based on service lives obtained from industry studies conducted during the 1970's by the former Office of Industrial Economics (OIE) of the U.S. Department of the Treasury and from industry studies conducted during the 1980's and 1990's by the Office of Tax Analysis (OTA) of the U.S. Department of the Treasury, with the following exceptions: Nuclear fuel; office, computing, and accounting machinery; autos; and railroad equipment.[59] The OIE results are particularly useful for manufacturing industries, because they provide separate industry estimates of service lives for production-type equipment: Metalworking machinery; special industry machinery, not elsewhere classified; and general industrial, including materials handling, equipment. The information on the service life for nuclear fuel was obtained from Professor Madeline Feltus of the Pennsylvania State University. The service life for office, computing, and accounting machinery is derived, in part, from a study by Stephen D. Oliner based on industry data.[60] The derivation of stocks of autos does not require an explicit service life assumption, as explained in the section "Privately owned autos." The service life for railroad equipment is derived from information on service lives submitted by railroads to the Interstate Commerce Commission as part of their 1983 annual reports.

Private nonresidential structures.—For farm structures, the average service life is derived from U.S. Department of Agriculture studies. For telephone and telegraph, electric light and power, gas, and petroleum pipelines structures, the service lives are derived by comparing book value data provided by regulatory agencies with various perpetual inventory estimates calculated using alternative service lives. For railroad structures, the lives are derived from the same source as those for railroad equipment (see previous paragraph). For petroleum and natural gas exploration, shafts, and wells, the lives are based on data from the Census Bureau's annual surveys of oil and gas for 1979–82. For other types of nonfarm structures, the lives are based on published and unpublished data from studies conducted during the 1960's and 1970's by the U.S. Department of the Treasury.[61]

Residential structures.—The average service lives for most types of new residential structures are taken from a study by Raymond W. Goldsmith and Robert Lipsey.[62] Improvements to residential structures are assigned the following lives: Additions and alterations are assumed to have lives one-half as long as those for new structures; and lives for residential major replacements are based on industry estimates for items replaced during the 1970's.

58. Book value data, which relate directly to capital stocks, can be used as checks on the validity of the information used to implement the perpetual inventory method. Examples of such checks on the BEA estimates are given in John A. Gorman, John C. Musgrave, Gerald Silverstein, and Kathy A. Comins, "Fixed Private Capital in the United States: Revised Estimates, 1925–81 and Estimates by Industry, 1947–81," SURVEY OF CURRENT BUSINESS 65 (July 1985): 36–59.

59. The results of the OIE studies are given in David W. Brazell, Lowell Dworin, and Michael Walsh, *A History of Federal Tax Depreciation Policy*, U.S. Department of the Treasury, OTA Paper 64 (Springfield, VA: National Technical Information Service, May 1989): 33–58. The results of the OTA studies that are used in the BEA wealth calculations are given in U.S. Department of the Treasury, *Report to the Congress on Depreciation of Scientific Instruments* (Washington, DC: March 1990); U.S. Department of the Treasury, *Report to the Congress on Depreciation of Business-Use Passenger Cars* (Washington, DC: April 1991); and U.S. Department of the Treasury, *Report to the Congress on Depreciation of Business-Use Light Trucks* (Washington, DC: September 1991).

60. See Oliner, "Price Change, Depreciation, and Retirement of Mainframe Computers."

61. See U.S. Department of the Treasury, Office of Industrial Economics, *Business Building Statistics* (Washington, DC: U.S. Government Printing Office, August 1975).

62. See Raymond W. Goldsmith and Robert Lipsey, *Studies in the National Balance Sheet of the United States*, vol. 1 (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1963).

Mobile homes are assigned a life of 20 years, based on trade association data.

Fixed government capital.—Service lives for most government assets are derived from those used for corresponding assets owned by private businesses. For some Federal Government equipment (primarily military equipment), depreciation patterns are based on service lives estimated from U.S. Government administrative sources (primarily U.S. Department of Defense data).

Durable goods owned by consumers.—For durable goods owned by consumers, the average service lives are based on unpublished trade association data, the assumptions of other researchers, several USDA studies, and the age distribution of the stock of various consumer durables reported in the 1960–61 and 1972–73 BLS surveys of consumer expenditures.[63]

Retirement patterns

Assets are "retired" from the stock when their value declines to zero. This normally occurs at the end of their assumed service lives. However, some assets are retired prematurely because of damage due to wars and natural disasters and, for military equipment and structures, because of surplusing by Government. For the few types of assets for which the depreciation profile is assumed to decline to zero in a straight-line manner—that is, missiles and nuclear fuel rods—all assets of each type are not assumed to have the same life. Instead, each vintage of a given type of asset is divided into several dozen cohorts, each of which is assumed to have a different service life. These lives are assumed to be distributed about the mean according to a pattern calculated using a modified version of a curve developed by Robley Winfrey; this pattern is shown in table D.[64] Specifically, a Winfrey S–3 curve, which is a bell-shaped distribution centered on the average service life of the asset, is modified so that retirements start at 45 percent and end at 155 percent of the average service life. Because of the use of this retirement pattern, the net stock of an entire vintage of missiles or nuclear fuel rods declines over time in a manner that is somewhat more accelerated than that given by the simple straight-line pattern.

For all other assets, no explicit retirement patterns are used in constructing the estimates of the stocks, but the depreciation rates that are used are based on empirical estimates that reflect the pattern of actual retirements. Retirements of autos are determined from vehicle registration data, and all autos that are more than 12 years old are fully depreciated. Computer equipment is implicitly retired at the age when it is fully depreciated, according to the assumed empirical profile. All remaining assets are assumed to have geometric depreciation profiles; their assumed service lives only serve to help determine the appropriate depreciation rates. Here, assets may still have a sizable undepreciated value even when they are two or three times the average age assumed for their type. In fact, with geometric depreciation, at least some of the assets must have infinite lives as their aggregate value declines to zero only asymptotically, and they are never fully depreciated.

63. See Lenore A. Epstein, "Consumers' Tangible Assets," Studies in Income and Wealth, vol. 12 (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1950): 410–460; Raymond W. Goldsmith, *The National Wealth of the United States in the Postwar Period* (Princeton, NJ: Princeton University Press, for the National Bureau of Economic Research, 1962); Marilyn Doss Ruffin and Katherine S. Tippett, "Service-Life Expectancy of Household Appliances: New Estimates from USDA," *Home Economics Research Journal* 3 (March 1975): 159–170; and U.S. Bureau of Labor Statistics, "Survey of Consumer Expenditures, 1960–61, Expanding Ownership of Household Equipment," BLS Report No. 238–7 (November 1964), and "Consumer Expenditure Survey Series: Interview Survey, 1972–73, Inventories of Vehicles and Selected Household Equipment, 1973," BLS Report No. 455–5 (1978).

64. See Robley Winfrey, *Statistical Analyses of Industrial Property Retirements*, Bulletin 125, rev. (Ames, IA: Engineering Research Institute, Iowa State University, April 1967); and J.G. Russo and H.A. Cowles, "Revalidation of the Iowa Type Survivor Curves," *The Engineering Economist* 26 (Fall 1980): 1–16.

Table D.—Modified Winfrey S-3 Retirement Pattern for Missiles and Nuclear Fuel Rods

Percent of average service life	Cumulative percent of expenditures discarded	Percent of average service life	Cumulative percent of expenditures discarded
Less than 45	0	105	61.6
45	1.2	110	68.8
50	2.4	115	75.4
55	4.1	120	81.3
60	6.5	125	86.3
65	9.7	130	90.3
70	13.7	135	93.5
75	18.7	140	95.9
80	24.6	145	97.6
85	31.2	150	98.8
90	38.4	155	100.0
95	46.1	More than 155	100.0
100	53.9		

Price indexes

The price indexes used to derive the stock estimates in real-cost and current-cost valuations are the same as those used to derive real GDP. [65]

Privately owned autos[66]

Numbers and ages of autos-in-use are estimated using registration data by model year tabulated each year by R.L. Polk and Company. This information is used to derive estimates of the total stock of autos owned by private business, government, and consumers. The allocation of unit stocks (measured in numbers of vehicles) among sectors uses new-auto sales by sector and assumed retention rates for private business and government autos. Estimates of the stock of consumer autos are based on the difference between the total stock and the stocks owned by business and government. As a result, it is not necessary to assume a service life or retirement pattern for autos or to make explicit adjustments to the investment data for sales of used autos from one type of owner to another.

The first step in deriving estimates of stocks of business, government, and consumer autos involves the calculation of the total stock of autos-in-use, regardless of ownership. This stock is calculated as follows: (1) The number of new autos entering the stock each year is estimated from trade source data; (2) survival rates for each year of original registration are estimated using annual Polk tabulations;[67] and (3) these survival rates are applied to the new autos series to derive annual estimates of the total stock of autos-in-use by year of original sale.

The second step involves separating the total stock of autos into stocks of consumer, government, and business autos, using Polk tabulations of registrations of new autos by businesses, by government, and by individuals and BLS and Census Bureau data on autos owned by individuals but used wholly or partly for business purposes. New autos owned by businesses are assigned to the business stock, and new autos owned by individuals that are used exclusively for personal purposes are assigned to the consumer stock. New autos owned by individuals that are used wholly or partly for business purposes are allocated between consumer and business stocks, according to the share of business usage of these autos.[68] The portion of these autos allocated to the business stock provides the estimates of employee-owned autos discussed in the section "Investment controls by type of industry" in the chapter "Derivation of Investment Flows." These estimates are adjusted for transfers of autos from business and government to consumers, using assumed retention rates, which are based on an average retention period of slightly more than a year for rental autos and between 3 and 4 years for other autos owned by business and government.

Third, the average unit values for business and consumer autos in each year of original sale are derived from list prices by model (including options) from trade sources; these prices are adjusted for transportation costs, discount factors, rebates, and sales taxes. Average unit values are deflated using the price indexes for the new-auto components of producers' durable equipment and personal consumption expenditures, which are based on the consumer price index for new autos, to obtain the average unit values in 1992 prices. The annual real-cost net stocks of business and consumer autos are obtained by multiplying the number of business and consumer autos for each year of original sale by the corresponding deflated unit values, which are then adjusted for age, according to the estimated depreciation profile.

Finally, the total business stock of autos is distributed by industry using data from capital flow tables that have been adjusted to the NIPA industry classification and to an ownership basis.

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65. These price indexes are described in "The Comprehensive Revision of the U.S. National Income and Product Accounts: A Review of Revisions and Major Statistical Changes," SURVEY 71 (December 1991): 37–40 and "Annual Revision of the U.S. National Income and Product Accounts," SURVEY 72 (July 1992): table 8, 37–42. For personal consumption expenditures for durable goods, see U.S. Department of Commerce, Bureau of Economic Analysis, *Personal Consumption Expenditures,* NIPA Methodology Paper No. 6 (Washington, DC: U.S. Government Printing Office, June 1990): 67–73; and for government investment, see U.S. Department of Commerce, Bureau of Economic Analysis, *Government Transactions,* NIPA Methodology Paper No. 5 (Washington, DC: U.S. Government Printing Office, November 1988): 50–64.

For investment in electric light and power structures, the NIPA price indexes are modified to reflect price changes in the value of completed plant, in accordance with the modifications to the NIPA investment data described in the section "Investment control totals by type of asset" in the chapter "Derivation of Investment Flows."

66. The estimates of stocks of autos are derived from data used to estimate purchases of autos by private business and by consumers in the NIPA's. A detailed description of these data is given in *Personal Consumption Expenditures,* 55–58.

67. Survival rates for autos that are 4 years or older are directly computed from Polk cars-in-use data; survival rates for autos less than 4 years old are assumed.

68. The data on business usage of household-owned autos are derived from U.S. Department of Labor, Bureau of Labor Statistics, *Survey of Consumer Expenditures* (Washington, DC: U.S. Government Printing Office, 1964); U.S. Department of Commerce, Bureau of the Census, *Consumer Buying Indicators* (Washington, DC: U.S. Government Printing Office, July 1971) and U.S. Department of Commerce, Bureau of the Census, *Current Population Reports: Household and Family Characteristics*, series P–20) (Washington, DC: U.S. Government Printing Office, annually).

Glossary

This glossary is presented in three sections: Wealth estimates; gross investment, depreciation, net stock, and average age of net stock; and valuation of the estimates.

Wealth estimates

Fixed reproducible tangible wealth consists of fixed private capital, fixed government capital, and durable goods owned by consumers.

Fixed private capital consists of equipment and structures, including owner-occupied housing, that are owned by private business or nonprofit institutions and that are located in the United States.[69]

Fixed government capital consists of equipment and structures that are owned by the Federal Government and by State and local government agencies, including government enterprises, and that are located in the United States (except for national defense equipment, for which coverage is worldwide).[70]

Durable goods owned by consumers are the goods that are purchased by households for their nonbusiness use and that have a life expectancy of at least 3 years.

Capital stock consists of fixed private capital and fixed government capital.

All of the wealth estimates are classified by type of asset. In addition, estimates of fixed private capital are further classified by *legal form of organization*.

Corporate business consists of all entities required to file Federal corporate income tax returns (IRS Form 1120 series), including mutual financial institutions and cooperatives subject to Federal income tax, private noninsured pension funds, nonprofit organizations that primarily serve business, Federal Reserve banks, and Federally sponsored credit agencies.

Sole proprietorships consists of all entities that are required to file IRS Schedule C (Profits or Loss From Business) or Schedule F (Farm Income and Expenses) if the proprietor meets the filing requirements and of owner-occupied farm housing.

Partnerships consists of all entities required to file Federal partnership income tax returns, IRS Form 1065 (U.S. Partnership Return of Income).

Other private business consists of all entities that are required to report rental and royalty income on the individual income tax return in IRS Schedule E (Supplemental Income and Loss) if the individual meets the filing requirements, tax-exempt cooperatives, owner-occupied nonfarm housing, and buildings and equipment owned and used by nonprofit institutions that primarily serve individuals.

Estimates for fixed private capital are also presented by *industry* on the basis of the 1987 Standard Industrial Classification (SIC). Industry data are presented on an "establishment" basis; an *establishment*, as defined for the purposes of the SIC, is an economic unit, generally at a single location, where business is conducted or where services or industrial operations are performed.

In addition, the corporate business stock estimates are presented in two groups of SIC industries. *Financial industries* consists of the following SIC industries: Depository institutions, nondepository institutions, security and commodity brokers, insurance carriers, regulated investment companies, small business investment companies, and real estate investment trusts.[71] *Nonfinancial industries* consists of all other private industries.

Estimates of residential capital are also classified by "tenure group"—that is, tenant-occupied residential capital and owner-occupied residential capital. *Tenant-occupied residential capital* consists of rental housing, including all government-owned residential capital. *Owner-occupied residential capital* consists of housing occupied by private owners.

In the distributions of capital by type of owner, legal form of organization, and industry presented here, capital assets are classified on an ownership basis; that is, capital assets held under operating leases are recorded in the stock of the lessor, while capital assets held under capital

69. For private business and government, equipment is defined as assets with a life expectancy of at least 1 year.

70. Purchases of fixed assets by government were first treated by BEA as investment in the national income and product accounts (NIPA's) in the comprehensive NIPA revision released in January 1996. See Robert P. Parker and Jack E. Triplett, "Preview of the Comprehensive Revision of the NIPA's: Recognition of Government Investment and a New Methodology for Calculating Depreciation," SURVEY OF CURRENT BUSINESS 75 (September 1995): 33–41.

71. Regulated investment companies, small business investment companies, and real estate investment trusts are included in the SIC classification "holding and other investment offices" and are not shown separately in the NIPA tables or in the estimates presented here.

leases are recorded in the stock of the lessee. The ownership basis is used in order to be consistent with the NIPA's and because the data necessary to compute capital stock estimates on a use basis are not available annually.[72].

Estimates of fixed capital for the Federal Government are further classified by national defense and nondefense. *National defense* fixed capital consists of equipment and structures owned by the U.S. Department of Defense; it excludes family housing for the armed forces, civil works construction by the Army Corps of Engineers, industrial facilities, military hospitals, and the Soldiers' and Airmen's Home. *Nondefense* fixed capital consists of all other fixed capital owned by the Federal Government.

Gross investment, depreciation, net stock, and average age of net stock

Gross investment is the value of purchases of new fixed capital assets. For a given type of owner, it also includes net purchases of used assets from other types of owners (private business, governments, households, and nonresidents). Data are not available to adjust for transfers of used assets among industries or among legal forms of organization.

Depreciation is the decline in value due to wear and tear, obsolescence, accidental damage, and aging.[73] For the estimates presented here, most assets are assumed to have depreciation patterns that decline geometrically over time so that, for a given year, the depreciation charges on existing assets are obtained by multiplying the prior year's charge by one minus the annual depreciation rate.

Net stock is the value of fixed reproducible tangible wealth after adjustment for depreciation. With the perpetual inventory method that is used to derive the estimates presented here, the net stock in the historical-cost valuation and (at the deflation level) in the real-cost valuation is calculated as the cumulative value of past gross investment less the cumulative value of past depreciation.[74] Net stock in current-cost valuation is the value of the items in the real-cost net stock measured in the prices of the current yearend.[75]

Average age of net stock at a given yearend is a weighted average of the ages of all investment in the stock at that yearend. The weight for each age is based on its value in the net stock.

Valuation of the estimates

The estimates of private net stocks and depreciation presented here are computed in historical-cost, real-cost, and current-cost valuations, using investment data in historical-cost and real-cost valuations. The average ages of net stocks are presented only for the current-cost and historical-cost valuations. Estimates for government capital are presented on a similar basis except that estimates of net stocks and depreciation are not presented in a historical-cost valuation.

Historical-cost valuation measures the value of fixed assets in the prices of the periods in which the assets were purchased new.

Real-cost valuation measures the value of these assets after the effects of price change have been removed. For this valuation, estimates for aggregate series are presented as chain-type quantity indexes, with 1992 equal to 100. These indexes are computed using annual-weighted Fisher-type indexes to obtain year-to-year growth rates, which are chained together to obtain cumulative growth rates. Estimates for selected higher level aggregates are also presented in chained (1992) dollars.[76]

Current-cost valuation measures the value of these assets in the prices of the given period, which are yearends for net stocks and annual averages for depreciation.[77]

72. The I-O table and capital flow table classify assets in the industry using the assets (lessees), but these data are only available every 5 years. Other series classify assets in the owning industry (lessor).

73. BEA uses the terms depreciation and consumption of fixed capital synonymously. For private business, the estimates of depreciation that are obtained in calculating net stocks are also presented as part of the NIPA's (as consumption of fixed capital). However, the estimates of government consumption of fixed capital that appear in the NIPA's differ from the estimates of depreciation of fixed tangible reproducible wealth owned by government that appear in this volume because the NIPA estimates do not include the adjustments made to general government capital for natural disasters and war losses. (See Parker and Triplett, "Preview of the Comprehensive Revision," 36 and the discussion in the section "Use in the NIPA's" of the foregoing text.)

74. This method assumes that all assets that are retired (or discarded) are fully depreciated, that is, have a value of zero. If this is not the case (because of disaster damage or intersector transfers of used assets), then the value of the net stock must be adjusted.

75. For all years since 1947, yearend prices are derived as the average of fourth-quarter prices in the current year and first-quarter prices in the following year. For earlier years, yearend prices are derived as the average of the annual average price of the current year and the annual average price of the following year.

76. The detailed estimates presented in this volume are generally at the deflation level, the lowest level of detail for which investment price indexes exist. Estimates presented at this level are equivalent to estimates measured in constant 1992 prices. However, a few of the detailed investment series within private producers' durable equipment are aggregated from the deflation level of detail; where the detailed components have different deflators, the estimates are measured in constant (1992) prices and differ slightly from comparable estimates measured in chained (1992) dollars. For a discussion of the difference between chained-dollar and constant-price estimates, see J. Steven Landefeld and Robert P. Parker, "BEA's Chain Indexes, Time Series, and Measures of Long-Term Economic Growth," SURVEY 77 (September 1997): 58–68.

77. Average annual price indexes are equal to 100 in the base period, 1992. Thus, the 1992 values of real-cost and current-cost depreciation (and of discards) are equal, because these are average annual values. The 1992 values of real-cost and current-cost net stocks are usually not equal, because these are yearend values and prices usually change during the year.

Guide to the Tables

This guide shows the tables in which specific series are located. The tables are presented in eight sections. Section 1, which consists of seven tables, presents summary estimates of fixed private and government capital and of fixed reproducible tangible wealth. Section 2, which consists of five tables, presents estimates of fixed private capital, equipment and structures, by type. Section 3, which consists of five tables, presents estimates of fixed private capital, nonresidential and residential, by industry, equipment and structures. Section 4, which consists of five tables, presents estimates of fixed nonresidential private capital, by major industry group and legal form of organization. Section 5, which consists of five tables, presents estimates of residential capital, by type of owner, legal form of organization, industry, and tenure group. Section 6, which consists of five tables, presents estimates of fixed private capital, by legal form of organization and industry. Section 7, which consists of four tables, presents estimates of fixed government capital. Section 8, which consists of four tables, presents estimates of durable goods owned by consumers, by type.

Tables 1.1–1.7.—Fixed Private and Government Capital and Fixed Reproducible Tangible Wealth

	Line	Page references for estimates						
		Table 1.1	Table 1.2	Table 1.3	Table 1.4	Table 1.5	Table 1.6	Table 1.7
		Current-cost net stock, depreciation, and average age, 1925–94	Chain-type quantity indexes for net stock and depreciation, 1925–94	Historical-cost investment, 1901–94	Chain-type quantity indexes for investment, 1901–94	Real net stock, 1959–94	Real depreciation, 1959–94	Real investment, 1959–94
Total fixed reproducible tangible wealth	1	**1**	**4**	**6–8**	**9–10**	**11**	**12**	**13**
Total fixed capital	2	**1**	**4**	**6–8**	**9–10**	**11**	**12**	**13**
Private	3	**1**	**4**	**6–8**	**9–10**	**11**	**12**	**13**
Nonresidential	4	1	4	6–8	9–10	11	12	13
Equipment	5	1	4	6–8	9–10	11	12	13
Structures	6	1	4	6–8	9–10	11	12	13
Residential	7	2	4	6–8	9–10	11	12	13
Government	8	**2**	**4**	**6–8**	**9–10**	**11**	**12**	**13**
Nonresidential	9	2	4	6–8	9–10	11	12	13
Equipment	10	2	4	6–8	9–10	11	12	13
Structures	11	2	4	6–8	9–10	11	12	13
Residential	12	2	5	6–8	9–10	11	12	13
Durable goods owned by consumers	13	**2**	**5**	**6–8**	**9–10**	**11**	**12**	**13**
Addenda:								
Total nonresidential and residential capital:								
Nonresidential	14	3	5	6–8	9–10	11	12	13
Equipment	15	3	5	6–8	9–10	11	12	13
Structures	16	3	5	6–8	9–10	11	12	13
Residential	17	3	5	6–8	9–10	11	12	13
Fixed government capital:								
Federal	18	3	5	6–8	9–10	11	12	13
State and local	19	3	5	6–8	9–10	11	12	13

Tables 2.1–2.5.—Fixed Private Capital, Equipment and Structures, by Type

	Line	Page references for estimates				
		Table 2.1	Table 2.2	Table 2.3	Table 2.4	Table 2.5
		Current-cost net stock, depreciation, and average age, 1925–94	Chain-type quantity indexes for net stock and depreciation, 1925–94	Historical-cost net stock, depreciation, and average age, 1925–94	Historical-cost investment, 1901–94	Chain-type quantity indexes for investment, 1901–94
Fixed private capital	1	**14**	**26**	**34**	**46-51**	**52-57**
Private producers' durable equipment	2	**14**	**26**	**34**	**46-51**	**52-57**
Nonresidential equipment	3	**14**	**26**	**34**	**46-51**	**52-57**
Information processing and related equipment	4	14	26	34	46-51	52-57
Office, computing, and accounting machinery	5	14	26	34	46-51	52-57
Computers and peripheral equipment	6	14	26	34	46-51	52-57
Other office equipment	7	14	26	34	46-51	52-57
Communication equipment	8	15	26	35	46-51	52-57
Instruments	9	15	26	35	46-51	52-57
Photocopy and related equipment	10	15	26	35	46-51	52-57
Industrial equipment	11	15	27	35	46-51	52-57
Fabricated metal products	12	15	27	35	46-51	52-57
Engines and turbines	13	15	27	35	46-51	52-57
Steam engines	14	16	27	36	46-51	52-57
Internal combustion engines	15	16	27	36	46-51	52-57
Metalworking machinery	16	16	27	36	46-51	52-57
Special industry machinery, n.e.c	17	16	27	36	46-51	52-57
General industrial, including materials handling, equipment	18	16	27	36	46-51	52-57
Electrical transmission, distribution, and industrial apparatus	19	16	27	36	46-51	52-57
Transportation and related equipment	20	16	27	36	46-51	52-57
Trucks, buses, and truck trailers	21	17	28	37	46-51	52-57
Autos	22	17	28	37	46-51	52-57
Aircraft	23	17	28	37	46-51	52-57
Ships and boats	24	17	28	37	46-51	52-57
Railroad equipment	25	17	28	37	46-51	52-57
Other equipment	26	17	28	37	46-51	52-57
Furniture and fixtures	27	17	28	37	46-51	52-57
Household furniture	28	18	28	38	46-51	52-57
Other furniture	29	18	28	38	46-51	52-57
Tractors	30	18	28	38	46-51	52-57
Farm tractors	31	18	29	38	46-51	52-57
Construction tractors	32	18	29	38	46-51	52-57
Agricultural machinery, except tractors	33	18	29	38	46-51	52-57
Construction machinery, except tractors	34	18	29	38	46-51	52-57
Mining and oilfield machinery	35	19	29	39	46-51	52-57
Service industry machinery	36	19	29	39	46-51	52-57
Electrical equipment, n.e.c	37	19	29	39	46-51	52-57
Household appliances	38	19	29	39	46-51	52-57
Other	39	19	29	39	46-51	52-57
Other nonresidential equipment	40	19	29	39	46-51	52-57
Residential equipment	41	**19**	**30**	**39**	**46-51**	**52-57**
Private structures	42	**20**	**30**	**40**	**46-51**	**52-57**
Nonresidential structures	43	**20**	**30**	**40**	**46-51**	**52-57**
Nonresidential buildings, excluding farm	44	20	30	40	46-51	52-57
Industrial buildings	45	20	30	40	46-51	52-57
Office buildings [1]	46	20	30	40	46-51	52-57
Commercial buildings	47	20	30	40	46-51	52-57
Mobile structures	48	21	30	41	46-51	52-57
Other commercial [2]	49	21	30	41	46-51	52-57
Religious buildings	50	21	30	41	46-51	52-57
Educational buildings	51	21	31	41	46-51	52-57
Hospital and institutional buildings	52	21	31	41	46-51	52-57
Other	53	21	31	41	46-51	52-57
Hotels and motels	54	21	31	41	46-51	52-57
Amusement and recreational buildings	55	22	31	42	46-51	52-57
Other nonfarm buildings [3]	56	22	31	42	46-51	52-57
Utilities	57	22	31	42	46-51	52-57
Railroad	58	22	31	42	46-51	52-57
Telecommunications	59	22	31	42	46-51	52-57
Electric light and power	60	22	31	42	46-51	52-57
Gas	61	23	32	43	46-51	52-57
Petroleum pipelines	62	23	32	43	46-51	52-57
Farm related buildings and structures	63	23	32	43	46-51	52-57
Mining exploration, shafts, and wells	64	23	32	43	46-51	52-57
Petroleum and natural gas	65	23	32	43	46-51	52-57
Other mining	66	23	32	43	46-51	52-57
Other nonfarm structures [4]	67	23	32	43	46-51	52-57
Residential structures	68	**24**	**32**	**44**	**46-51**	**52-57**
Housing units	69	24	32	44	46-51	52-57
Permanent site	70	24	32	44	46-51	52-57
1-to-4-unit	71	24	33	44	46-51	52-57
Farm	72	24	33	44	46-51	52-57
Nonfarm	73	24	33	44	46-51	52-57
5-or-more-unit	74	25	33	45	46-51	52-57
Mobile homes	75	25	33	45	46-51	52-57
Farm	76	25	33	45	46-51	52-57
Nonfarm	77	25	33	45	46-51	52-57
Improvements	78	25	33	45	46-51	52-57
Other residential [5]	79	25	33	45	46-51	52-57

1. Consists of office buildings, except those occupied by electric and gas utility companies.
2. Consists of stores, restaurants, garages, service stations, warehouses, and other buildings used for commercial purposes.
3. Consists of buildings not elsewhere classified, such as passenger terminals, greenhouses, and animal hospitals.
4. Consists primarily of streets, dams, reservoirs, sewer and water facilities, parks, and airfields.
5. Consists primarily of dormitories and fraternity and sorority houses.
n.e.c. Not elsewhere classified.

Tables 3.1–3.5.—Fixed Private Capital, Nonresidential and Residential, by Industry, Equipment and Structures

	Line	Page references for estimates				
		Table 3.1	Table 3.2	Table 3.3	Table 3.4	Table 3.5
		Current-cost net stock, depreciation, and average age, 1947–94	Chain-type quantity indexes for net stock and depreciation, 1947–94	Historical-cost net stock, depreciation, and average age, 1947–94	Historical-cost investment, 1947–94	Chain-type quantity indexes for investment, 1947–94
Fixed private capital	1	**58**	**96**	**122**	**160**	**173**
Nonresidential	2	**58**	**96**	**122**	**160**	**173**
Agriculture, forestry, and fishing	3	**59**	**96**	**123**	**160**	**173**
Farms	4	59	97	123	160	173
Agricultural services, forestry, and fishing	5	60	97	124	160	173
Mining	6	**60**	**97**	**124**	**160**	**173**
Metal mining	7	61	98	125	161	174
Coal mining	8	61	98	125	161	174
Oil and gas extraction	9	62	98	126	161	174
Nonmetallic minerals, except fuels	10	62	99	126	161	174
Construction	11	**63**	**99**	**127**	**161**	**174**
Manufacturing	12	**63**	**99**	**127**	**161**	**174**
Durable goods	13	64	100	128	162	175
Lumber and wood products	14	64	100	128	162	175
Furniture and fixtures	15	65	100	129	162	175
Stone, clay, and glass products	16	65	101	129	162	175
Primary metal industries	17	66	101	130	162	175
Fabricated metal products	18	66	101	130	162	175
Industrial machinery and equipment	19	67	102	131	163	176
Electronic and other electric equipment	20	67	102	131	163	176
Motor vehicles and equipment	21	68	102	132	163	176
Other transportation equipment	22	68	103	132	163	176
Instruments and related products	23	69	103	133	163	176
Miscellaneous manufacturing industries	24	69	103	133	163	176
Nondurable goods	25	70	104	134	164	177
Food and kindred products	26	70	104	134	164	177
Tobacco products	27	71	104	135	164	177
Textile mill products	28	71	105	135	164	177
Apparel and other textile products	29	72	105	136	164	177
Paper and allied products	30	72	105	136	164	177
Printing and publishing	31	73	106	137	165	178
Chemicals and allied products	32	73	106	137	165	178
Petroleum and coal products	33	74	106	138	165	178
Rubber and miscellaneous plastics products.	34	74	107	138	165	178
Leather and leather products	35	75	107	139	165	178
Transportation and public utilities	36	**75**	**107**	**139**	**165**	**178**
Transportation	37	76	108	140	166	179
Railroad transportation	38	76	108	140	166	179
Local and interurban passenger transit	39	77	108	141	166	179
Trucking and warehousing	40	77	109	141	166	179
Water transportation	41	78	109	142	166	179
Transportation by air	42	78	109	142	166	179
Pipelines, except natural gas	43	79	110	143	167	180
Transportation services	44	79	110	143	167	180
Communications	45	80	110	144	167	180
Telephone and telegraph	46	80	111	144	167	180
Radio and television	47	81	111	145	167	180
Electric, gas, and sanitary services	48	81	111	145	167	180
Electric services	49	82	112	146	168	181
Gas services	50	82	112	146	168	181
Sanitary services	51	83	112	147	168	181
Wholesale trade	52	**83**	**113**	**147**	**168**	**181**
Retail trade	53	**84**	**113**	**148**	**168**	**181**
Finance, insurance, and real estate	54	**84**	**113**	**148**	**168**	**181**
Depository institutions	55	85	114	149	169	182
Nondepository institutions	56	85	114	149	169	182
Security and commodity brokers	57	86	114	150	169	182
Insurance carriers	58	86	115	150	169	182
Insurance agents, brokers, and service	59	87	115	151	169	182
Real estate [1]	60	87	115	151	169	182
Holding and other investment offices	61	88	116	152	170	183
Services	62	**88**	**116**	**152**	**170**	**183**
Hotels and other lodging places	63	89	116	153	170	183
Personal services	64	89	117	153	170	183
Business services	65	90	117	154	170	183
Auto repair, services, and parking	66	90	117	154	170	183
Miscellaneous repair services	67	91	118	155	171	184
Motion pictures	68	91	118	155	171	184
Amusement and recreation services	69	92	118	156	171	184
Other services	70	92	119	156	171	184
Health services	71	93	119	157	171	184
Legal services	72	93	119	157	171	184
Educational services	73	94	120	158	172	185
Other [2]	74	94	120	158	172	185
Residential	75	**95**	**121**	**159**	**172**	**185**
Farms	76	95	121	159	172	185
Real estate [1]	77	95	121	159	172	185

1. Fixed capital of nonprofit organizations serving individuals is included in the real estate industry.
2. Consists of social services; museums, botanical and zoological gardens; membership organizations; engineering and management services; and services, not elsewhere classified.

NOTE.—Estimates in this table are based on the 1987 Standard Industrial Classification (SIC).

Tables 4.1–4.5.—Fixed Nonresidential Private Capital, by Major Industry Group and Legal Form of Organization

	Line	Page references for estimates				
		Table 4.1	Table 4.2	Table 4.3	Table 4.4	Table 4.5
		Current-cost net stock, depreciation, and average age, 1925–94	Chain-type quantity indexes for net stock and depreciation, 1925–94	Historical-cost net stock, depreciation, and average age, 1925–94	Historical-cost investment, 1901–94	Chain-type quantity indexes for investment, 1901–94
Fixed nonresidential private capital	1	**186**	**195**	**201**	**210-215**	**216-221**
Equipment	2	186	195	201	210-215	216-221
Structures	3	186	195	201	210-215	216-221
By major industry group:						
Farms	4	**186**	**195**	**201**	**210-215**	**216-221**
Equipment	5	186	195	201	210-215	216-221
Structures	6	186	195	201	210-215	216-221
Manufacturing	7	**187**	**195**	**202**	**210-215**	**216-221**
Equipment	8	187	195	202	210-215	216-221
Structures	9	187	195	202	210-215	216-221
Nonfarm nonmanufacturing	10	**187**	**196**	**202**	**210-215**	**216-221**
Equipment	11	187	196	202	210-215	216-221
Structures	12	187	196	202	210-215	216-221
By legal form of organization:						
Corporate	13	**188**	**196**	**203**	**210-215**	**216-221**
Equipment	14	188	196	203	210-215	216-221
Structures	15	188	196	203	210-215	216-221
By major industry group:						
Farms	16	188	196	203	210-215	216-221
Equipment	17	188	196	203	210-215	216-221
Structures	18	188	196	203	210-215	216-221
Manufacturing	19	189	197	204	210-215	216-221
Equipment	20	189	197	204	210-215	216-221
Structures	21	189	197	204	210-215	216-221
Nonfarm nonmanufacturing	22	189	197	204	210-215	216-221
Equipment	23	189	197	204	210-215	216-221
Structures	24	189	197	204	210-215	216-221
By financial and nonfinancial:						
Financial	25	190	197	205	210-215	216-221
Equipment	26	190	197	205	210-215	216-221
Structures	27	190	197	205	210-215	216-221
Nonfinancial	28	190	198	205	210-215	216-221
Equipment	29	190	198	205	210-215	216-221
Structures	30	190	198	205	210-215	216-221
Noncorporate	31	**191**	**198**	**206**	**210-215**	**216-221**
Equipment	32	191	198	206	210-215	216-221
Structures	33	191	198	206	210-215	216-221
By major industry group:						
Farms	34	191	198	206	210-215	216-221
Equipment	35	191	198	206	210-215	216-221
Structures	36	191	198	206	210-215	216-221
Manufacturing	37	192	199	207	210-215	216-221
Equipment	38	192	199	207	210-215	216-221
Structures	39	192	199	207	210-215	216-221
Nonfarm nonmanufacturing	40	192	199	207	210-215	216-221
Equipment	41	192	199	207	210-215	216-221
Structures	42	192	199	207	210-215	216-221
By detailed legal form of organization:						
Sole proprietorships and partnerships	43	193	199	208	210-215	216-221
Equipment	44	193	199	208	210-215	216-221
Structures	45	193	199	208	210-215	216-221
Nonprofit institutions	46	193	200	208	210-215	216-221
Equipment	47	193	200	208	210-215	216-221
Structures	48	193	200	208	210-215	216-221
Persons	49	194	200	209	210-215	216-221
Equipment	50	194	200	209	210-215	216-221
Structures	51	194	200	209	210-215	216-221
Tax-exempt cooperatives	52	194	200	209	210-215	216-221
Equipment	53	194	200	209	210-215	216-221
Structures	54	194	200	209	210-215	216-221

Tables 5.1–5.5.—Residential Capital, by Type of Owner, Legal Form of Organization, Industry, and Tenure Group

	Line	Page references for estimates				
		Table 5.1	Table 5.2	Table 5.3	Table 5.4	Table 5.5
		Current-cost net stock, depreciation, and average age, 1925–94	Chain-type quantity indexes for net stock and depreciation, 1925–94	Historical-cost net stock, depreciation, and average age, 1925–94	Historical-cost investment, 1901–94	Chain-type quantity indexes for investment, 1901–94
Residential capital	1	**222**	**225**	....	**229-230**	**231-232**
Private	2	**222**	**225**	**227**	**229-230**	**231-232**
By type of owner and legal form of organization:						
Corporate	3	222	225	227	229-230	231-232
Noncorporate	4	222	225	227	229-230	231-232
Sole proprietorships and partnerships	5	222	225	227	229-230	231-232
Nonprofit institutions	6	222	225	227	229-230	231-232
Persons	7	223	225	227	229-230	231-232
By industry:						
Farms	8	223	225	227	229-230	231-232
Real estate	9	223	225	228	229-230	231-232
By tenure group [1]:						
Owner-occupied	10	223	226	228	229-230	231-232
Farm	11	223	226	228	229-230	231-232
Nonfarm	12	223	226	228	229-230	231-232
Tenant-occupied	13	224	226	228	229-230	231-232
Farm	14	224	226	228	229-230	231-232
Nonfarm	15	224	226	228	229-230	231-232
Government	16	**224**	**226**	....	**229-230**	**231-232**
Federal	17	224	226	....	229-230	231-232
State and local	18	224	226	....	229-230	231-232

1. Excludes other nonfarm residential capital, which consists primarily of dormitories and fraternity and sorority houses.

NOTE.—Historical-cost estimates for net stock, depreciation, and average age of government-owned capital are not available.

Tables 6.1–6.5.—Fixed Private Capital, by Legal Form of Organization and Industry

	Line	Page references for estimates				
		Table 6.1	Table 6.2	Table 6.3	Table 6.4	Table 6.5
		Current-cost net stock, depreciation, and average age, 1925–94	Chain-type quantity indexes for net stock and depreciation, 1925–94	Historical-cost net stock, depreciation, and average age, 1925–94	Historical-cost investment, 1901–94	Chain-type quantity indexes for investment, 1901–94
Fixed private capital	1	**233**	**235**	**237**	**239-240**	**241-242**
By legal form of organization:						
Corporate	2	233	235	237	239-240	241-242
Financial	3	233	235	237	239-240	241-242
Nonfinancial	4	233	235	237	239-240	241-242
Noncorporate	5	233	235	237	239-240	241-242
Sole proprietorships and partnerships	6	233	235	237	239-240	241-242
Nonprofit institutions	7	234	236	238	239-240	241-242
Persons	8	234	236	238	239-240	241-242
Addenda:						
By industry:						
Farms	9	234	236	238	239-240	241-242
Real estate	10	234	236	238	239-240	241-242
Agriculture, forestry, and fishing	11	234	236	238	239-240	241-242
Finance, insurance, and real estate	12	234	236	238	239-240	241-242

Tables 7.1–7.4.—Fixed Government Capital

	Line	Page references for estimates: Table 7.1 Current-cost net stock, depreciation, and average age, 1925–94	Table 7.2 Chain-type quantity indexes for net stock and depreciation, 1925–94	Table 7.3 Historical-cost investment, 1901–94	Table 7.4 Chain-type quantity indexes for investment, 1901–94
Fixed government capital [1]	1	**243**	**254**	**262-267**	**268-273**
Equipment	2	243	254	262-267	268-273
Structures	3	243	254	262-267	268-273
Buildings	4	243	254	262-267	268-273
Residential	5	243	254	262-267	268-273
Industrial	6	243	254	262-267	268-273
Educational	7	244	254	262-267	268-273
Hospital	8	244	254	262-267	268-273
Other [2]	9	244	255	262-267	268-273
Highways and streets	10	244	255	262-267	268-273
Military facilities [3]	11	244	255	262-267	268-273
Conservation and development	12	244	255	262-267	268-273
Sewer systems structures	13	245	255	262-267	268-273
Water supply facilities	14	245	255	262-267	268-273
Other structures [4]	15	245	255	262-267	268-273
Federal	16	**245**	**255**	**262-267**	**268-273**
National defense	17	**245**	256	262-267	268-273
Equipment	18	245	256	262-267	268-273
Aircraft	19	246	256	262-267	268-273
Missiles	20	246	256	262-267	268-273
Ships	21	246	256	262-267	268-273
Vehicles	22	246	256	262-267	268-273
Electronic equipment	23	246	256	262-267	268-273
Other equipment	24	246	256	262-267	268-273
Structures	25	247	257	262-267	268-273
Buildings	26	247	257	262-267	268-273
Residential	27	247	257	262-267	268-273
Industrial	28	247	257	262-267	268-273
Military facilities [3]	29	247	257	262-267	268-273
Nondefense	30	**247**	**257**	**262-267**	**268-273**
Equipment	31	248	257	262-267	268-273
Structures	32	248	257	262-267	268-273
Buildings	33	248	258	262-267	268-273
Industrial	34	248	258	262-267	268-273
Educational	35	248	258	262-267	268-273
Hospital	36	248	258	262-267	268-273
Other [2]	37	249	258	262-267	268-273
Highways and streets	38	249	258	262-267	268-273
Conservation and development	39	249	258	262-267	268-273
Other structures [4]	40	249	258	262-267	268-273
State and local	41	**249**	**259**	**262-267**	**268-273**
Equipment	42	249	259	262-267	268-273
Structures	43	250	259	262-267	268-273
Buildings	44	250	259	262-267	268-273
Residential	45	250	259	262-267	268-273
Educational	46	250	259	262-267	268-273
Hospital	47	250	259	262-267	268-273
Other [2]	48	250	259	262-267	268-273
Highways and streets	49	251	260	262-267	268-273
Conservation and development	50	251	260	262-267	268-273
Sewer systems structures	51	251	260	262-267	268-273
Water supply facilities	52	251	260	262-267	268-273
Other structures [4]	53	251	260	262-267	268-273
Addenda:					
Total fixed general government capital	54	252	260	262-267	268-273
Equipment	55	252	260	262-267	268-273
Structures	56	252	260	262-267	268-273
Total fixed government enterprise capital	57	252	261	262-267	268-273
Equipment	58	252	261	262-267	268-273
Structures	59	252	261	262-267	268-273
Total fixed nonresidential government capital	60	253	261	262-267	268-273
Total government equipment	61	253	261	262-267	268-273
Total government nonresidential structures	62	253	261	262-267	268-273
Federal defense nonresidential structures	63	253	261	262-267	268-273
Federal nondefense nonresidential structures	64	253	261	262-267	268-273
State and local government nonresidential structures	65	253	261	262-267	268-273

1. Consists of the fixed capital of general government and government enterprises.
2. Consists primarily of general office buildings, police and fire stations, courthouses, auditoriums, garages, and passenger terminals.
3. Consists of Department of Defense structures, except family housing.
4. Consists primarily of electric and gas facilities, transit systems, and airfields.

NOTE.—Estimates for military equipment by type begin in 1972 because data concerning war losses by type during World War II and the disposition of surplus equipment by type after that war are very limited.

Tables 8.1–8.4.—Durable Goods Owned by Consumers, by Type

	Line	Page references for estimates			
		Table 8.1	Table 8.2	Table 8.3	Table 8.4
		Current-cost net stock, depreciation, and average age, 1925–94	Chain-type quantity indexes for net stock and depreciation, 1925–94	Historical-cost investment, 1914–94	Chain-type quantity indexes for investment, 1914–94
Durable goods owned by consumers	1	**274**	**277**	**279-280**	**281-282**
Motor vehicles	2	**274**	**277**	**279-280**	**281-282**
Autos	3	274	277	279-280	281-282
Trucks	4	274	277	279-280	281-282
Other [1]	5	274	277	279-280	281-282
Furniture and household equipment	6	**274**	**277**	**279-280**	**281-282**
Furniture, including mattresses and bedsprings	7	275	277	279-280	281-282
Kitchen and other household appliances [2]	8	275	277	279-280	281-282
China, glassware, tableware, and utensils	9	275	277	279-280	281-282
Other durable house furnishings [3]	10	275	278	279-280	281-282
Video and audio products, computing equipment, and musical instruments	11	275	278	279-280	281-282
Computing equipment	12	275	278	279-280	281-282
Video and audio equipment and musical instruments	13	275	278	279-280	281-282
Other	14	**276**	**278**	**279-280**	**281-282**
Jewelry and watches	15	276	278	279-280	281-282
Opthalmic products and orthopedic appliances	16	276	278	279-280	281-282
Books and maps	17	276	278	279-280	281-282
Wheel goods, sports and photographic equipment, boats, and pleasure aircraft	18	276	278	279-280	281-282

1. Consists of recreational vehicles and accessories and parts.
2. Consists of refrigerators and freezers, cooking ranges, dishwashers, laundry equipment, stoves, air conditioners, sewing machines, vacuum cleaners, and other appliances except for built-in appliances, which are classified as part of residential stuctures.
3. Includes floor coverings, comforters, quilts, blankets, pillows, picture frames, mirrors, art products, portable lamps, and clocks. Also includes writing equipment and hand, power, and garden tools.