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# Blueprint for Expanded and Integrated U.S. Accounts
## Review, Assessment, and Next Steps

Dale W. Jorgenson and J. Steven Landefeld

### 1.1 Introduction

The United States possesses some of the best-developed sets of economic accounts in the world. These accounts have been regularly updated and have served researchers and policymakers well. Certain components of these sets of accounts, however, were developed independently to meet differing policy and analytical needs. As a result, while the flow of funds and balance sheet accounts produced by the Federal Reserve Board (FRB), the productivity statistics produced by the Bureau of Labor Statistics (BLS), and the rest of the national accounts produced by the Bureau of Economic Analysis (BEA) are among the best in the world, they are not completely comprehensive or fully integrated. The lack of integration and problems of consistency have hampered analysis of such issues as the downtrend in personal saving and the sources of the improvement in growth and productivity in the latter half of the 1990s.

Longer-standing issues also raise questions about the scope and structure of the nation's economic accounts. Since their inception, there have been suggestions to expand the scope of the accounts to include nonmarket activities. Simon Kuznets, one of the primary architects of the U.S. accounts, recognized the limitations of focusing on market activities and excluding household production and a broad range of other nonmarket activities and assets that have productive value or yield satisfaction. The need to better understand the sources of economic growth in the postwar era led to the development—much of it by academic researchers—of various supplemental series, such as investments in human capital.

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More recently, some data users have suggested that the overall architecture of the accounts—which has been regularly updated throughout its history but whose basic structure has remained largely unchanged for over fifty years—needs to be reexamined. Alternative structures, such as ownership-based accounting for international transactions or macro accounts that are linked to micro accounts, are examples.

In this chapter, we examine these issues in the context of a review and assessment of the accounts and find that the existing accounts have served the nation well, but they have required continuing incremental updates, supplements, and reconciliation.[1] At this point in time, we believe that there is need not for a new paradigm but for an expansion and integration of the accounts produced by the BEA, BLS, and FRB in coordination with the U.S. Census Bureau ("Census"), a primary supplier of source data. This effort would consist of (a) an expansion and integration of the accounts to include a complete production account for the analysis of growth and productivity; (b) an expansion of the accounts to cover goods and services that are important to the analysis of growth and productivity but not fully captured in the existing accounts, such as mineral resources, human capital, and R&D; and (c) an expansion of the accounts to nonmarket goods and services that are important to the economy, but also have large welfare implications—such as environmental and health accounts.

In the last section of the chapter, we present an illustrative framework and set of estimates that build on the work of Jorgenson et al. and on the BEA's seven-account framework, estimates introduced as part of the BEA's 2003 benchmark revision of the National Income and Product Accounts (NIPAs). The framework's scope is restricted to the existing boundaries of market accounts and is focused on presenting an integrated, complete, and consistent set of accounts, but the framework can be expanded to cover intangible assets important to the analysis of growth and productivity, such as R&D, as well as nonmarket activities, such as household production.

## 1.2 Measuring Economic Activity in the Market Sector

### 1.2.1 Introduction: Overview of Existing Sets of U.S. Accounts

The existing sets of U.S. accounts are already interrelated through their use of and sharing of the same data. The BEA has responsibility for most of the U.S. economic accounts, including the national income, product, and reproducible wealth accounts; the balance of payments and international investment position accounts; the gross domestic product (GDP)–

1. "We" is used to describe the cumulative work discussed in Christensen and Jorgenson (1996), Jorgenson and Fraumeni (1996a, 1996b), and Jorgenson, Gollop, and Fraumeni (1987) to build integrated accounts as well as the continuation of that work discussed in this article.

by-industry and input-output accounts; the regional accounts; and a number of related accounts. These are estimated using Census, BLS, Internal Revenue Service (IRS), U.S. Treasury, FRB, and other data. The FRB uses the BEA's estimates of reproducible wealth and international balance-of-payment flows and positions, in combination with FRB estimates of domestic financial stocks and flows, to produce the nation's flow of funds and balance sheets accounts. The BLS uses BEA estimates of real output, investment, and capital and labor income as inputs into its aggregate, multifactor, and industry estimates of output and productivity.

The BEA's NIPAs record the value and composition of national production as measured by expenditures and the distribution of incomes generated in producing that output. The BEA's input-output and industry accounts measure national output by each industry's value added to production, estimate each industry's gross output and intermediate inputs, trace the flow of goods and services among industries in the production process, and provide a detailed commodity breakdown of national production. BLS productivity estimates measure labor productivity, multifactor productivity, and related measures, thereby providing a picture of each industry and labor, capital, and other inputs contributions to productivity growth.

The BEA's wealth accounts measure stocks and changes in stocks of reproducible assets, while the BEA's international investment position accounts measure international assets and liabilities and changes in these assets and liabilities. The FRB's flow-of-funds accounts detail the role of financial institutions and financial instruments in intermediating saving and investment and the changes in assets and liabilities across sectors that result. The FRB balance sheets record the distribution of these assets and liabilities at the end of each quarter.

The BEA's supporting international accounts measure U.S. residents' transactions with the rest of the world and trace those transactions by types of goods and services, incomes, and transfers as well as by type of payment for those transactions. The BEA's regional accounts disaggregate the national accounts by geographic area, providing many of the same types of information and serving the same purposes as the national accounts.

Taken together, these sets of national accounts paint a comprehensive picture of economic activity. The system provides an interconnected set of accounts that measures the flow of current economic transactions (expenditures, incomes, and production), prices, and stocks of productive assets and wealth. The accounts are double-entry accounts that are linked to one another so as to give users an integrated and comprehensive picture of economic activity for macroeconomic monitoring, analysis, and decision making. In an evaluation conducted by the United Nations (UN) and the International Monetary Fund (IMF) in the late 1990s, the United States and Canada were the only countries to receive a rating of 6 out of 6 in terms

of the completeness of their sets of accounts as specified by the internationally recognized System of National Accounts (United Nations et al. 1993; hereafter SNA 1993). The U.S. accounts are also regarded as among the most accurate, up-to-date, and timely sets of accounts (as measured by GDP revisions, incorporation of new measurement concepts and methods, and release of GDP data).

The three most commonly cited difficulties with the U.S. accounts have been (a) incomplete integration, consistency, and gaps in the U.S. accounts that can for certain purposes reduce their analytic value; (b) inconsistency with the sectoring, structure, and presentation recommended by the SNA 1993 that reduces international comparability and analyses (a real problem when the U.S. economy is the benchmark and numeraire for cross-country comparisons); and (c) lack of expanded—and integrated—measures of economic activity (and welfare). A fourth and more recent complaint is that the U.S. accounts have moved ahead too fast in updating concepts and methods to measure the U.S. economy, resulting in reduced comparability of the U.S. accounts with other nations that have been slower in updating their accounts.

### 1.2.2 The BEA's NIPAs

While there are many summary statistics, accounts, and subaccounts in the NIPAs and SNA 1993, the best known is gross domestic product (GDP). GDP is an unduplicated measure of domestic production and can be measured in the following three ways: (a) by final expenditures, (b) by incomes earned in production, or (c) by the production approach, which is measured by industry value added, the value of gross output less the value of intermediate input. In concept, all three measures should be the same; in practice, they differ because they rely on different and incomplete source data.

The BEA prepares variants of all three of these measures of output. The BEA's final expenditures-based estimate is GDP; the income-based measures are gross domestic income (GDI), nominal GDP by industry, and gross state product (GSP); and the production value-added estimates come from BEA's input-output accounts and real GDP by industry.

The BEA's seven summary accounts in the NIPAs feature the GDP and GDI estimates and include quarterly and annual re-estimates in nominal and real terms. The NIPAs are double-entry sets of accounts in which the use of resources (expenditures) recorded in one account for one sector are also recorded as a source of resources (receipts) in the account of another sector or, if it is an intrasectoral transaction, in the same sector.

The first account is the domestic income and product account presented in table 1.1. This shows the consolidated (unduplicated) production of all sectors of the economy as the sum of goods and services sold to final users on the right-hand side of the account and the income generated by that production on the left side of the account. The other six accounts are consistent with and map into the domestic income and product account,

**Table 1.1 NIPA summary accounts, 2002**

| Row No. | | |
|---|---|---|
| | *Account 1. Domestic Income and Product Account* | |
| 1 | Compensation of employees, paid | 6,024.3 |
| 2 | Wage and salary accruals | 4,979.8 |
| 3 | Disbursements (3-12 and 5-11) | 4,979.8 |
| 4 | Wage accruals less disbursements (4-9 and 6-11) | 0.0 |
| 5 | Supplements to wages and salaries (3-14) | 1,044.5 |
| 6 | Taxes on production and imports (4-16) | 760.1 |
| 7 | *Less:* Subsidies (4-8) | 38.2 |
| 8 | Net operating surplus | 2,523.2 |
| 9 | Private enterprises (2-19) | 2,520.3 |
| 10 | Current surplus of government enterprises (4-26) | 2.8 |
| 11 | Consumption of fixed capital (6-13) | 1,288.6 |
| 12 | **Gross domestic income** | 10,558.0 |
| 13 | Statistical discrepancy (6-19) | –77.2 |
| 14 | GROSS DOMESTIC PRODUCT | 10,480.8 |
| 15 | Personal consumption expenditures (3-3) | 7,385.3 |
| 16 | Durable goods | 911.3 |
| 17 | Nondurable goods | 2,086.0 |
| 18 | Services | 4,388.0 |
| 19 | Gross private domestic investment | 1,589.2 |
| 20 | Fixed investment (6-2) | 1,583.9 |
| 21 | Nonresidential | 1,080.2 |
| 22 | Structures | 266.3 |
| 23 | Equipment and software | 813.9 |
| 24 | Residential | 503.7 |
| 25 | Change in private inventories (6-4) | 5.4 |
| 26 | Net exports of goods and services | –426.3 |
| 27 | Exports (5-1) | 1,006.8 |
| 28 | Imports (5-9) | 1,433.1 |
| 29 | Government consumption expenditures and gross investment (4-1 and 6 | 1,932.5 |
| 30 | Federal | 679.5 |
| 31 | National defense | 438.2 |
| 32 | Nondefense | 241.2 |
| 33 | State and local | 1,253.1 |
| 34 | GROSS DOMESTIC PRODUCT | 10,480.8 |
| | *Account 2. Private Enterprise Income Account* | |
| 1 | Income payments on assets | 2,316.7 |
| 2 | Interest and miscellaneous payments (3-20 and 4-21) | 2,267.7 |
| 3 | Dividend payments to the rest of the world (5-14) | 42.1 |
| 4 | Reinvested earnings on foreign direct investment in the U.S. (5-15) | 6.9 |
| 5 | Business current transfer payments (net) | 89.8 |
| 6 | To persons (net) (3-24) | 42.6 |
| 7 | To government (net) (4-24) | 46.8 |
| 8 | To the rest of the world (net) (5-19) | 0.4 |
| 9 | Proprietors' income with inventory valuation and capital consumption adjustments (3-17) | 797.7 |
| 10 | Rental income of persons with capital consumption adjustment (3-18) | 173.0 |

*(continued)*

**Table 1.1** (continued)

| Row No. | | |
|---|---|---|
| 11 | Corporate profits with inventory valuation and capital consumption adjustments | 904.2 |
| 12 | Taxes on corporate income | 195.0 |
| 13 | To government (4-17) | 185.9 |
| 14 | To the rest of the world (5-19) | 9.2 |
| 15 | Profits after tax with inventory valuation and capital consumption adjustments | 709.1 |
| 16 | Net dividends (3-21 and 4-22) | 398.3 |
| 17 | Undistributed corporate profits with inventory valuation and capital consumption adjustments (6-10) | 310.8 |
| 18 | USES OF PRIVATE ENTERPRISE INCOME | |
| 19 | Net operating surplus (1-9) | 2,520.3 |
| 20 | Income receipts on assets | 1,761.1 |
| 21 | Interest (3-20) | 1,558.7 |
| 22 | Dividend receipts from the rest of the world (5-6) | 81.5 |
| 23 | Reinvested earnings on U.S. direct investment abroad (5-7) | 121.0 |
| 24 | SOURCES OF PRIVATE ENTERPRISE INCOME | 4,281.5 |
| | *Account 3. Personal Income and Outlay Account* | |
| 1 | Personal current taxes (4-15) | 1,053.1 |
| 2 | Personal outlays | 7,674.0 |
| 3 | Personal consumption expenditures (1-15) | 7,385.3 |
| 4 | Personal interest payments (3-20) | 194.7 |
| 5 | Personal current transfer payments | 94.0 |
| 6 | To government (4-25) | 58.6 |
| 7 | To the rest of the world (net) (5-17) | 35.4 |
| 8 | Personal saving (6-9) | 183.2 |
| 9 | PERSONAL TAXES, OUTLAYS, AND SAVING | 8,910.3 |
| 10 | Compensation of employees, received | 6,019.1 |
| 11 | Wage and salary disbursements | 4,974.6 |
| 12 | Domestic (1-3 less 5-11) | 4,971.4 |
| 13 | Rest of the world (5-3) | 3.2 |
| 14 | Supplements to wages and salaries (1-5) | 1,044.5 |
| 15 | Employer contributions for employee pension and insurance funds | 680.4 |
| 16 | Employer contributions for government social insurance | 364.1 |
| 17 | Proprietors' income with inventory valuation and capital consumption adjustments (2-9) | 797.7 |
| 18 | Rental income of persons with capital consumption adjustment (2-10) | 173.0 |
| 19 | Personal income receipts on assets | 1,378.5 |
| 20 | Personal interest income (2-2 and 3-4 and 4-7 and 5-5 less 2-21 less 4-21 less 5-13) | 982.4 |
| 21 | Personal dividend income (2-16 less 4-22) | 396.2 |
| 22 | Personal current transfer receipts | 1,292.2 |
| 23 | Government social benefits (4-4) | 1,249.5 |
| 24 | From business (net) (2-6) | 42.6 |
| 25 | *Less:* Contributions for government social insurance (4-19) | 750.3 |
| 26 | PERSONAL INCOME | 8,910.3 |
| | *Account 4. Government Receipts and Expenditures Account* | |
| 1 | Consumption expenditures (1-29) | 1,595.4 |
| 2 | Current transfer payments | 1,271.1 |

**Table 1.1** (continued)

| Row No. | | |
|---|---|---|
| 3 | Government social benefits | 1,252.3 |
| 4 | To persons (3-23) | 1,249.5 |
| 5 | To the rest of the world (5-18) | 2.7 |
| 6 | Other current transfer payments to the rest of the world (net) (5-18) | 18.8 |
| 7 | Interest payments (3-20) | 319.3 |
| 8 | Subsidies (1-7) | 38.2 |
| 9 | *Less:* Wage accruals less disbursements (1-4) | 0.0 |
| 10 | Net government saving (6-12) | –243.3 |
| 11 | Federal | –240.0 |
| 12 | State and local | –3.2 |
| 13 | GOVERNMENT CURRENT EXPENDITURES AND NET SAVINGS | 2,980.7 |
| 14 | Current tax receipts | 2,006.2 |
| 15 | Personal current taxes (3-1) | 1,053.1 |
| 16 | Taxes on production and imports (1-6) | 760.1 |
| 17 | Taxes on corporate income (2-13) | 185.9 |
| 18 | Taxes from the rest of the world (5-18) | 7.2 |
| 19 | Contributions for government social insurance (3-25) | 750.3 |
| 20 | Income receipts on assets | 116.1 |
| 21 | Interest and miscellaneous receipts (2-2 and 3-20) | 114.0 |
| 22 | Dividends (3-21) | 2.1 |
| 23 | Current transfer receipts | 105.3 |
| 24 | From business (net) (2-7) | 46.8 |
| 25 | From persons (3-6) | 58.6 |
| 26 | Current surplus of government enterprises (1-10) | 2.8 |
| 27 | GOVERNMENT CURRENT RECEIPTS | 2,980.7 |
| | *Account 5. Foreign Transactions Current Account* | |
| 1 | Exports of goods and services (1-27) | 1,006.8 |
| 2 | Income receipts from the rest of the world | 299.1 |
| 3 | Wage and salary receipts (3-13) | 3.2 |
| 4 | Income receipts on assets | 296.0 |
| 5 | Interest (3-20) | 93.5 |
| 6 | Dividends (2-22) | 81.5 |
| 7 | Reinvested earnings on U.S. direct investment abroad (2-23) | 121.0 |
| 8 | CURRENT RECEIPTS FROM THE REST OF THE WORLD | 1,306.0 |
| 9 | Imports of goods and services (1-28) | 1,433.1 |
| 10 | Income payments to the rest of the world | 277.6 |
| 11 | Wage and salary payments (1-3) | 8.4 |
| 12 | Income payments on assets | 269.2 |
| 13 | Interest (3-20) | 220.2 |
| 14 | Dividends (2-3) | 42.1 |
| 15 | Reinvested earnings on foreign direct investment in the U.S. (2-4) | 6.9 |
| 16 | Current taxes and transfer payments to the rest of the world (net) | 59.3 |
| 17 | From persons (net) (3-7) | 35.4 |
| 18 | From government (net) (4-5 and 4-6 less 4-18) | 14.3 |
| 19 | From business (net) (2-8 and 2-14) | 9.6 |
| 20 | Balance on current account, national income and product accounts (7-1) | –464.1 |
| 21 | CURRENT PAYMENTS TO THE REST OF THE WORLD AND BALANCE ON CURRENT ACCOUNT | 1,306.0 |

*(continued)*

**Table 1.1** (continued)

| Row No. | | |
|---|---|---|
| | *Account 6. Domestic Capital Account* | |
| 1 | Gross domestic investment | 1,926.3 |
| 2 | Private fixed investment (1-20) | 1,583.9 |
| 3 | Government fixed investment (1-29) | 337.1 |
| 4 | Change in private inventories (1-25) | 5.4 |
| 5 | Capital account transactions (net) (7-2) | 1.3 |
| 6 | Net lending or net borrowing (–), national income and product accounts (7-3) | –465.4 |
| 7 | GROSS DOMESTIC INVESTMENT, CAPITAL ACCOUNTS TRANSACTIONS, AND NET LENDING | 1,462.2 |
| 8 | Net saving | 250.8 |
| 9 | Personal saving (3-8) | 183.2 |
| 10 | Undistributed corporate profits with inventory valuation and capital consumption adjustments (2-17) | 310.8 |
| 11 | Wage accruals less disbursements (private) (1-4) | 0.0 |
| 12 | Net government saving (4-10) | –243.3 |
| 13 | *Plus:* Consumption of fixed capital (1-11) | 1,288.6 |
| 14 | Private | 1,077.8 |
| 15 | Government | 210.8 |
| 16 | General government | 177.6 |
| 17 | Government enterprises | 33.2 |
| 18 | *Equals:* Gross saving | 1,539.4 |
| 19 | Statistical discrepancy (1-13) | –77.2 |
| 20 | GROSS SAVING AND STATISTICAL DISCREPANCY | 1,462.2 |
| | *Account 7. Foreign Transactions Capital Account* | |
| 1 | BALANCE ON CURRENT ACCOUNT, NATIONAL INCOME AND PRODUCT ACCOUNTS (5-20) | –464.1 |
| 2 | Capital account transactions (net) (6-5) | 1.3 |
| 3 | Net lending or net borrowing (–), national income and product accounts (6-6) | –465.4 |
| 4 | CAPITAL ACCOUNT TRANSACTIONS (NET) AND NET LENDING, NATIONAL INCOME AND PRODUCT ACCOUNTS | –464.1 |

*Source:* BEA (2004a).

*Note:* Table 1.1 is consistent with the 2002 benchmark revision of the U.S. National Accounts, while subsequent tables and figures are based on the 2003 annual revision, which appears in BEA (2004b).

providing additional detail on the aggregates presented in account 1. These supporting summary accounts include nearly 300 detailed supporting tables and subaccounts.

Accounts 2 through 5 present the receipts and expenditures of the major sectors of the economy. The second account, for example, is the private enterprise income account that provides additional information on the sources of funds (receipts) to private companies and other business enterprises on the right-hand side and information on the uses of those funds (payments) on the left-hand side. Account 3 is the personal-sector account

(including households and nonprofit institutions serving households); account 4 is the government sector, and account 5 is the external, or foreign, sector.

Account 6, the domestic capital account, shows the sources of domestic saving and their use in domestic investment and capital transfers. Net borrowing from the foreign sector is the balancing item that fills the shortfall between domestic investment and domestic saving. Account 7 is the external, or foreign, sector capital account.

The United States has a rich set of monthly and quarterly indicators on both the income and the expenditure side of the U.S. accounts. As a result, while the U.S. national accounts are benchmarked to the U.S. benchmark input-output accounts every five years, the expenditure and income estimates in the quarterly and annual NIPAs are estimated independently from the annual production (value-added) estimates of GDP by industry and input-output estimates, which in turn are benchmarked to each other but also estimated separately. The result is a set of interrelated accounts that are highly consistent with the current indicators of the economy normally associated with each set of estimates (such as the expenditure estimates and the current data from Census on trade sales, inventories, capital goods shipments, international trade, and corporate profits). This relationship is very important to U.S. financial markets, business analysts, and planners who focus heavily on the most recent data.

A number of countries—many with less current period indicators and direct measures—depend heavily on their input-output accounts to develop current-period GDP and GDI estimates tied more directly to the production or value-added approach. The result is a highly consistent set of national accounts, but one in which current period estimates are based on fixed proportions of value added to gross output by industry. This method may be inconsistent with direct measures of wages and profits or of final expenditures from monthly or quarterly indicators, which are likely to vary from month to month and quarter to quarter. Although lacking direct measures for these variables, it is often impossible to tell. Sometime after the initial estimates—often once a year—such countries balance their production accounts with their expenditure and income-based estimates.

The NIPAs feature the expenditure-based GDP and income-based GDI estimates mainly because BEA believes that the quality of the U.S. source data for expenditures and income are, in general, superior to the value-added estimates (mainly due to inadequacies in the data on intermediate inputs). Clearly, a better approach would be the joint estimation of the expenditure, income, and production (value-added) estimates on a concurrent basis using a methodology that weights the relative quality of the source data and methods used in each technique. This would produce a common and, presumably, more accurate set of estimates that is balanced on an ongoing basis and consistent over time.

### 1.2.3 The BEA's Other Flow Accounts

BEA international and regional accounts map into the NIPAs, providing further detail on the associated components that appear in the NIPAs. The concepts, source data, and methods used are generally consistent across the accounts, although there are still some differences and reconciliation tables are available to compare the alternative estimates. The remaining differences largely reflect the differing needs in these areas. These differences have been reduced over time, particularly in the international area, as a result of efforts to harmonize the IMF's balance-of-payments manual and SNA 1993.

### 1.2.4 The BEA's Capital and Financial Accounts

The BEA produces what SNA 1993 describes as capital stocks. These estimates include real, current-cost, and historical-cost estimates of reproducible household, business, and government wealth, including opening and closing net stocks, investment flows, depreciation, average age, and valuation adjustments. The estimates are available by type of asset, by sector, and by industry. They are all consistent with the NIPAs.

The BEA also produces capital and financial accounts as part of its international accounts. Within the balance of payments, the current account records flows of goods and services, income, and transfers, while the capital account records transactions related to tangible assets—such as the transfer of the assets of the Panama Canal to Panama. The financial account records changes in U.S. international assets and liabilities, and the international investment position displays the year-end levels for those assets and liabilities.

### 1.2.5 BLS Productivity Estimates

The NIPAs and the associated industry accounts contain many components of a production account, but they, like SNA 1993, lack a measure of capital services. The BLS multifactor productivity estimates address this gap and present estimates for the value of capital services based on imputed rental prices, as well as measures of labor services that adjust for differences in labor quality and measures of intermediate inputs, all within the structure of a neoclassical production function. The BLS multifactor productivity estimates build on the large body of work by U.S. researchers, notably Denison and later Jorgenson and his colleagues, that extended and reformulated the NIPAs in an attempt to better explain the sources of economic growth.[2] The BLS accounts follow this tradition, and the estimates are largely consistent with the NIPAs.

2. See Denison (1967), Jorgenson (1996b), and Christensen and Jorgenson (1996).

### 1.2.6 FRB Flow-of-Funds and Balance Sheet Accounts

The NIPAs and the BEA's wealth estimates contain stock and flow data on reproducible wealth by sector. The BEA's balance-of-payments accounts contain stock and flow data on international financial assets and liabilities, but neither set of accounts contains data on domestic financial assets and liabilities. The FRB takes these data and adds estimates on domestic financial assets and liabilities and changes in those balances to create the flow-of-funds and balance sheet accounts. These accounts are generally consistent with the NIPAs, with the balance-of-payments accounts, and with the wealth accounts and cover most of the economy.

### 1.2.7 Overview of the International System of National Accounts

SNA 1993 is a highly articulated integrated accounts structure that is the international guideline for national accounts around the world. The accounts are jointly sponsored by the UN, IMF, the Organisation for Economic Co-operation and Development (OECD), and the European Union (EU). As shown in table 1.2, they present flow and stock information similar to that presented in the U.S. accounts. The structure of SNA 1993 differs from the U.S. accounts mainly with respect to its focus on the production account, the degree of consolidation, and its sectoring.

Whereas the U.S. accounts feature GDP as measured by the expenditure approach, the SNA 1993 structure features value-added measurement as estimated by the production approach. Like the NIPAs, it then details the distribution of the incomes earned in production by sector and details the sources and uses of those funds. The familiar GDP as measured by $C + I + G + (X - M)$ is not presented, except in a disaggregated fashion in the auxiliary goods and services transactions accounts. In practice, while most countries (as described above) use the production approach in estimating value-added output and GDP, when reporting national accounts estimates and GDP estimates, countries—and organizations including the UN, OECD, and IMF—feature GDP and its expenditure components, which are balanced to their production-based estimates, in their presentations of the national accounts. Also, most countries do not produce all of the highly detailed information specified by SNA 1993.

The U.S. accounts differ from SNA 1993 in that they are more consolidated. SNA 1993, for example, presents household incomes in several separate accounts (generation of income, allocation of primary income, secondary distribution of income, redistribution of income, and use of income accounts). In NIPA account 3, the personal income and outlay account, all sources of personal income are consolidated. For example, wages, salaries, dividends, taxes, and transfer payments are all included in the consolidated personal income and outlay account. There are also counterentries for

**Table 1.2** **System of national accounts 1993**

| | Nonfinancial corporations | Financial corporations | General government | Households | NPISHs | Total economy | Rest of the world | Total |
|---|---|---|---|---|---|---|---|---|
| Current accounts | | | Uses & resources | | | | | |
| Production/external account of goods and services | | | | | | | | |
| Distribution and use of income accounts | | | | | | | | |
| Generation of income account | | | | | | | | |
| Allocation of primary income account | | | | | | | | |
| Secondary distribution of income account | | | | | | | | |
| Redistribution of income in kind account | | | | | | | | |
| Use of income account | | | | | | | | |
| Accumulation accounts | | | Changes in assets & changes in liabilities and net worth | | | | | |
| Capital account | | | | | | | | |
| Financial account | | | | | | | | |
| Other changes in volume of assets account | | | | | | | | |
| Revaluation account | | | | | | | | |
| Balance sheets | | | Assets & liabilities | | | | | |
| Opening balance sheet | | | | | | | | |
| Changes in balance sheet | | | | | | | | |
| Closing balance sheet | | | | | | | | |

*Source:* United Nations et al. (1993), pp. 28, 60–65.
*Note:* NPISH = nonprofit institutions serving households.

these transactions in the other sectoral accounts (private enterprise, government, and foreign).

Finally, the U.S. accounts differ from SNA 1993 in sectoring. SNA 1993, for example, breaks out nonprofit institutions serving households (NPISH) from households. The U.S. accounts are moving in this general direction, in this area, with the introduction of such a separation in the 2003 comprehensive revision. The BEA introduced separate estimates of the income and outlays of the households and of the NPISHs. However, in other areas, institutional arrangements in the United States suggest that current BEA definitions are better suited for the United States than SNA 1993.

### 1.2.8 Evolution of the U.S. National Income and Product Accounts: Responses to Changes in the Economy and Policy Needs

Prior to the development of the NIPAs, policymakers had to guide the economy using limited and fragmentary information—such as stock prices, freight car loadings, and incomplete indexes of industrial production—about the state of the economy. The Great Depression and the growing role of government in managing the economy during World War II underlined the problems of incomplete data and led to the development of the national accounts.

In response to the lack of economic data in the 1930s, the Department of Commerce commissioned Nobel laureate Simon Kuznets to develop national income estimates, which later evolved into a set of national economic accounts. This work was a coordinated effort with the National Bureau of Economic Research (NBER), and the Conference on Research in Income and Wealth (CRIW) was founded—with Simon Kuznets as its first chair—to assist in the formation of the accounts. Kuznets headed a small group within the Bureau of Foreign and Domestic Commerce's Division of Economic Research. Kuznets coordinated the work of researchers at the NBER in New York and his staff at Commerce. The original set of accounts was presented in a report to Congress in 1934 and in a research report, *National Income, 1929–32.*

Early in 1942, annual estimates of gross national product (GNP) were introduced to complement the estimates of national income and to facilitate wartime planning. Wartime planning needs also helped to stimulate the development of input-output accounts. Nobel laureate Wassily Leontief developed the U.S. input-output accounts that subsequently became an integral part of the NIPAs. In commenting on the usefulness of the national accounts, Wesley C. Mitchell, director, NBER, said: "Only those who had a personal share in the economic mobilization for World War I could realize in how many ways and how much estimates of national income covering twenty years and classified in several ways facilitated the World War II effort."

Over time, in response to policy needs and changes in the economy, the accounts have been expanded to provide quarterly estimates of GDP and monthly estimates of personal income and outlays, regional accounts, wealth accounts, industry accounts, and expanded international accounts.

In the 1940s, World War II planning needs were the impetus for the development of product or expenditure estimates (at that time gross national product). By 1947, the accounts had evolved into a consolidated set of income and product accounts, providing an integrated bird's-eye view of the economy. In the late 1950s and early 1960s, interest in stimulating economic growth and in the sources of growth led to the development of official input-output tables, capital stock estimates, and more detailed and timely state and local personal income estimates. In the late 1960s and 1970s, accelerating inflation prompted the development of improved measures of prices and inflation-adjusted output.

In the 1980s, the internationalization of trade in services led to an expansion of the estimates of international trade in services in the NIPAs. In response to rapid technological innovation and the increasing importance in computers—and problems in measuring their prices—the BEA did pioneering work with IBM in the development of quality-adjusted price and output measures for computers. In the 1990s, the BEA introduced more accurate chain-weighted measures of prices and inflation-adjusted output, developed estimates of investments in computer software, and incorporated updated measures of high-tech products and banking output.

The BEA has continued to update its accounts in recent years, developing more accurate measures of changing aspects of the economy ranging from finance and insurance to corporate profits and pensions. The BEA has worked to improve the accuracy, expand the scope, and improve the timeliness of the BEA's industry (production-based) accounts. Finally, the BEA has—as noted above—changed the basic national accounts structure to increase international comparability and to provide expanded information in an easier to use format.

In general, most observers reviewing the history of the accounts have concluded that the basic structure and concepts are sound and that the Department of Commerce and BEA have done a good job of updating the accounts to keep pace with changes in the economy and in policy needs. As Federal Reserve Board Chairman Alan Greenspan said in reviewing the history of the accounts:

> the Department of Commerce has treated the national income accounts, and specifically the GDP, as living documents; that is, an endeavor to recognize that the American economy is continuously changing. Its nature is being altered by technology and all sorts of other institutional effects. And as a result, how one measures the notion of what is the market value of goods and services produced, of necessity, has been chang-

ing over the years. And I must say that it is really quite impressive the extent to which the Department of Commerce has been able to keep up with the various changes that have evolved.[3]

### 1.2.9 Remaining Challenges

Although over time the accounts have mainly addressed users' needs, there have been gaps relating to scope, to integration, and to nonmarket goods and services. As economists attempted to chronicle and analyze the sources of economic growth in the post-WWII era, it became clear that important sources of economic growth were omitted from the accounts. The accounts were directed more to issues of Keynesian fiscal policy than to accounting for the sources of growth. As a result, the focus was on expenditure and income flows with limited focus on capital inputs and capital stocks.

Lacking complete data from the NIPAs, Denison, Jorgenson, Griliches, and other researchers used the national accounts data on income shares, investment, and other information to build a rich set of data and analytical findings on the sources of economic growth. As noted above, the BLS multifactor productivity estimates built upon this important work and developed a comprehensive and consistent official framework and data set for the analysis of productivity growth.

The BEA NIPA and industry account data and the BLS productivity data are widely used to study economic growth, productivity, and structural change. The general picture of economic activity is consistent regardless of which data sources are used, but there are some differences. These differences largely arise from the disparate purposes for which the data are constructed, which are reflected in agency choices on methodology, coverage, and index number procedures.

For example, within the BEA sets of accounts, the current-period NIPAs, as noted above, are—except for benchmarking—estimated independently from the annual production-based input-output accounts and GDP by industry. This independence reflects decisions about the focus of each of the accounts, the quality of the underlying source data, and the need for each set of accounts to be consistent with its own set of methods and current indicators—Census data in the case of the input-output accounts and income data in the case of the GDP-by-industry accounts. The resulting set of accounts are less accurate and consistent than they might otherwise be and present differing results to researchers depending on which account's data are used. Examples of complications include uncertainty in budgeting, in monetary policy, and in business planning or analyses of sources of

3. December 7, 1999, press conference in Washington, DC. Full remarks were reprinted in Landefeld (2000).

growth across industries during the latter half of the 1990s when trend growth using the income approach exceeded that derived using the expenditure approach.[4]

Further variations between BEA and BLS data also reflect differences in the focus of each series. The BEA strives to provide complete and consistent coverage of the entire economy in the NIPAs, whereas the BLS primarily seeks to achieve maximum reliability in its various measures of productivity. These differing goals are not necessarily inconsistent with one another, since both require reliable output and input measures, but they can lead to differences in definition and coverage as well as in methodology. The BEA covers all industries, even those for which output measures are sometimes at best tenuous. The BLS, on the other hand, can focus on those industries for which measures are quite robust.

Part of the differences, especially at detailed industry levels, also reflects different choices for underlying source data and aggregation techniques. For example, the BEA uses a Fisher index-number formula to aggregate components of the NIPA price and quantity indexes consistently, decomposing the nominal change in GDP. The BLS, on the other hand, uses a Tornquist index to aggregate components of its multifactor productivity accounts because it is an exact and superlative index that matches the econometric and statistical properties needed for multifactor productivity analysis. The BEA and BLS use depreciation formulas that can differ for specific industries and types of assets. Until the recent NIPA comprehensive revision, moreover, the BEA and BLS defined the business sector differently to suit their particular needs.

In general, the quantitative importance of the differences caused by dissimilarities in index number formula and depreciation method is small, and the change in the BEA definition of the business sector has removed the sometimes significant differences in growth rates caused by the old definitional difference for that sector. As Diewert and others have shown, all superlative numbers closely approximate each other. Even over long periods, indexes produced by Tornquist and Fisher indexes are identical to the fifth decimal place.[5] Differences in depreciation rates can have an effect on capital services and multifactor productivity, but even the large changes in depreciation for non-residential buildings introduced by the BEA and BLS in 2001 had extremely small effects on capital inputs and multifactor productivity. In addition, the BLS and BEA work together to ensure consistency in depreciation rates.[6]

Most of the significant differences between the BEA and BLS estimates are the result of decisions made over time by individual analysts regarding

4. See, for example, the Council of Economic Advisers (1997), Office of Management and Budget (1997), and Congressional Budget Office (1997).

5. See Diewert (1978).

6. See Bureau of Labor Statistics (2003).

source data, mainly for price deflators rather than any agency views regarding the use of hedonics, or other broad methodological issues. Indeed, most of the differences between BEA and BLS estimates for manufacturing industries were eliminated by a concerted effort in recent years to agree on common deflators for industries where real growth rates differed. However, there are remaining differences in selected manufacturing industries and in a number of nonmanufacturing industries.

These remaining differences between the BEA and BLS estimates have led many researchers to construct their own measures of productivity, particularly for studying the "new economy" of the late 1990s. Results of these studies have sometimes differed significantly, depending partly on data sources and the level of detail provided, leading to differing interpretations of the sources of productivity growth. For example, Nordhaus (2002) found faster labor productivity growth for the nonfarm business sector using the BEA's value-added by industry data rather than the official BLS measure. Baily and Lawrence (2001), also using the BEA's value added by industry data, and Stiroh (2002), using the BEA's gross output by industry data, concluded that the post-1995 productivity acceleration had spread from information technology (IT)–producing industries to IT-using industries. Gordon (2001), however, questioned whether such a spillover actually occurred after finding conflicting evidence from several BEA and BLS output measures. Triplett and Bosworth (2004) have documented how productivity estimates may differ significantly for broad sectors and for individual industries, depending upon whether BEA or BLS data are used. These differences can hinder integrated analysis of the sources of productivity growth. Divergences in the data force researchers to either choose one set of estimates over the other, or to develop their own estimates.[7]

Similar issues arise regarding differences between the BEA's and the FRB's measures of saving and each agency's measure of wealth stocks. The BEA's and the FRB's measures of saving and wealth stocks are developed in concert, and taken as a whole, they both provide consistent and integrated information on trends in saving and wealth. There are, however, important differences between the two series and issues in reconciliation. Similar to the differences between the BEA and BLS, many issues relate to the different purposes for which the data are used. For example, the FRB definition of saving includes saving in the form of purchases of consumer durables. The NIPAs do not, largely because this definition would logically require the treatment of consumer durables as investment and require the estimation of the capital services from these consumer durables, as well as the further step of a full household production account that measures household labor as well as capital services.

7. Jorgenson, Ho, and Stiroh (2005) use a hybrid of BEA and BLS data to construct estimates of productivity.

These and other statistical and methodological differences between the two agencies' data have led economists to generate their own series. In the early 1980s, Ruggles and Ruggles (1982) developed an integrated version of the NIPAs and flow-of-funds accounts. More recently, Gale and Sabelhaus (1999) made adjustments to the BEA and FRB data to create an alternate definition of savings in order to analyze the decline in U.S. saving over the last decade. These adjusted measures showed that saving had fallen less than the official measures and the sectoral composition of the decline was different. Their analysis also underlined the importance of an integrated presentation of saving, capital gains, and other changes in household wealth.

### 1.2.10 Expanding the Boundary of the Accounts

Over the years, researchers interested in issues other than the sources of growth have advocated and developed expanded and better-integrated sets of accounts. Kendrick (1961), Ruggles and Ruggles (1982), and Eisner (1989) extended the NIPAs to better analyze business, household, and governmental decision making. This section discusses the various extensions of the existing accounts required to meet some of the needs raised by these researchers and those raised by the needs of researchers interested in the sources of economic growth.

*Expanded Price and Quantity Measures*

The BEA's accounts are presented in nominal and real terms, but the presentation is incomplete. A complete production account requires price and quantity measures for all stocks and flows. The NIPAs present prices and quantities for output (expenditures, gross output), intermediate inputs, certain assets (residential and nonresidential fixed capital, inventories, consumer durables, and government fixed capital), and selected income aggregates (GDI, GNP, and disposable personal income). What is missing—for a complete production account and other purposes—is price and quantity measures for all factor inputs (all components of labor and capital income and of value added), saving, and financial assets and liabilities.

The problem with developing such price and quantity measures has been the absence of clear conceptual or empirical guidance on the appropriate deflators for these measures. For goods sold in markets, there are observable prices per unit, but what is the appropriate per-unit price for corporate profits, or saving? Alternatively, while one can measure the price of residential houses to deflate the nominal value of the fixed stock of residential structures, what price should be used to deflate the value of corporate equities? One answer has been to use some form of a purchasing power index. The BEA, for example, deflates the value of disposable personal income with the price index for consumer spending. Deflating other incomes, however, is more difficult. Deflating corporate profits, for example, might re-

quire a weighted average of the deflators for consumer spending (dividends), fixed and inventory investment (retained earnings), and government (taxes).

*Consumer Durables, Government, and Nonprofit Capital Services.* Other required components for a complete production account, as well as expanded accounts for the analysis of household and government, are (a) the capitalization of investments in consumer durables and the addition of a service value from these consumer durables and (b) the addition of a complete service value for government and nonprofit fixed assets.

In the existing accounts (SNA 1993 and the NIPAs), investments in consumer durables are treated as current consumption, despite the fact that—like investments by business—they yield a flow of benefits over time. The rise in motor vehicle leasing has further highlighted this inconsistency. If, for example, a vehicle is leased by a household, it is treated as investment in the year it is purchased—by the leasing company—and then yields a flow of capital services (rental payments) that add to GDP over the term of the lease. In contrast, if the car is purchased by the household it is treated as consumption in the year it is purchased, and there is no additional flow of capital services over the life of the car.

The inconsistency related to government capital is similar. While the existing accounts do treat government expenditures on capital goods as investment, they include only a partial value for the services of government capital by counting the value of depreciation on government capital (no value is included for the services of nonprofit capital). In theory, the value of any capital service should be at least equal to the rent that would have to be paid to the owner of an asset: the return that the owner could make if the current market value of the asset were invested elsewhere, or the compensation to the owner for the decline in the value of the asset due to its use in production.[8] The present treatment of government capital implicitly assumes that the net return to government capital is zero, despite a positive opportunity cost. (And the treatment of nonprofits assumes no service value, net return, or depreciation.)

If leasing markets and data were complete then including complete service values for consumer durables and government would not be difficult. The BEA already has estimates of capital stocks and depreciation and could use market rents to estimate the implicit return to apply to the net stocks of capital. However, the absence of such data means that the net return to the capital stock must estimated and added to depreciation to develop a service value. This estimation raises conceptual issues relating to

8. This is a simplified view of the service value for an asset. As noted below, the formula for the service value becomes more complicated when taxes and capital gains and losses are considered.

the appropriate opportunity cost and empirical issues in estimating this cost.

There is a long-standing debate in the economic literature on the opportunity cost of government capital, which includes suggestions to use the household rate of return, the government borrowing rate, the rate of return to business, or some weighted average rate. Also, there are significant empirical difficulties in determining the appropriate values for these alternative rates. What government borrowing rate, for example, should one use—short-term rates, long-term rates, or some weighted average—and over what time period?

As a result of this uncertainty, many researchers have simply picked a rate, applied it to the net stock of capital, and added depreciation to estimate the return. The resulting indirectly estimated service values tend to move in line with movements in the capital stocks and tend to smooth movements in GDP. Such imputations are considered an undesirable characteristic to business, tax, and other analysts interested in movements in the business cycle and the "cash" components of the economy.

An example of how the inclusion of nonmarket transactions influences the national accounts can already be seen in the current calculation of GDP. One of the largest nonmarket activities included in GDP is owner-occupied housing, the rent that owners "pay" themselves to use their property. Although market rents are available, the imputation methodology results in a series that moves roughly in line with the growth in the stock of housing. Owner-occupied housing is a large addition to market-sector GDP (as would be an imputed rent for consumer durables), has ranged in size from 5 to 8 percent of GDP since 1960, and has experienced less volatility in real growth than GDP. During quarters of recessions between 1960:I and 2003:IV (quarters of recession as defined by NBER), GDP declined 1.6 percent on average while implicit housing grew 3.6 percent. Excluding owner-occupied housing, GDP during recessionary quarters would have declined by 1.9 percent, 0.3 percent more decline than stand-alone GDP. During the expansions of the same time frame (1960:I–2003:IV), owner-occupied housing moderated growth. Stand-alone GDP grew 4.2 percent on average. Excluding owner-occupied housing, GDP would have grown 4.3 percent. Volatility also decreases by including owner-occupied housing in GDP. Absolute quarter-to-quarter change in real growth is lower for stand-alone GDP at 3.3 percent versus 3.5 percent if owner-occupied housing is excluded.

Because of this smoothing effect and the uncertainty regarding the appropriate rate of return, the solution for nonbusiness capital services may be the initial introduction of supplemental, or satellite, accounts estimates accompanied by further research and data collection of market rental values. Ultimately, after experimenting with different source data and methods and after vetting by users, hybrid estimates—that utilize a mix of mar-

ket and imputed returns—could be integrated into an expanded set of core accounts.

*Valuing Output in Both Consumers and Producers Prices.* Sales, excise, and other taxes charged against output (output taxes) drive a wedge between the prices paid by consumers and the prices for the same products received by producers. Analysis of production or expenditures suggests that the valuation of output and expenditures should be done using the prices each of these sets of economic actors confronts. SNA 1993 recommends this treatment, with industry and sectoral output value at the prices received by producers (what they call *basic prices,* or market prices less output taxes) and final expenditures at the market prices (including output taxes) confronted by consumers, investors, and government.

While the BEA's input-output accounts decompose sectoral and industry output into producer and purchases prices, the GDP-by-industry accounts value industry and sectoral output at market prices. This treatment is largely motivated by a desire to completely—in one step—decompose GDP, which is valued at market prices. Given the BEA's new procedures (described elsewhere in this volume) of estimating and producing consistent annual I-O and GDP estimates that are available simultaneously, sectoral and industry estimates are now available on both basis. An aggregate production account using the NIPAs, however, requires deducting output taxes from consumption and each of the other components of GDP to transform it from an expenditure to a production account valued at producer prices.

*Decomposition of Proprietor's Income into Labor and Capital Components*

The NIPAs present a single estimate for proprietor's income with no decomposition of the return to the proprietor for his or her labor and the return to the capital invested in the business. A complete production account, however, requires the decomposition of returns from production into labor and capital. The difficulties with developing such a breakdown are twofold. First, proprietors do not break down their income and report the total amount as business income to the tax and statistical authorities. Second, indirect estimates that apply average wages to estimates of hours worked by self-employed persons or capital returns to estimates of capital stocks employed by proprietors result in negative returns to either capital or labor depending upon which imputation is estimated first. The reasons for this are not clear, but may be related to the extent to which proprietors underreport income to tax and statistical authorities, problems in measuring hours worked and capital invested by the self-employed, and the nonpecuniary benefits of self-employment.

Better data on proprietor income will have to await improvements in the reporting of self-employment income and hours, but in the meantime vari-

ous methods can be employed to produce estimates that correctly capture the rough order of magnitude of labor and capital income and changes in these returns. The BLS in their productivity estimates assume that proprietors' labor and capital returns are distributed in the same proportions as in the corporate sector. In the estimates presented below, wages specific to the characteristics of the self-employed are employed, and the resulting residual for capital is lower than average returns to capital, but still positive.

*R&D and Other Intangibles, Human Capital, and Other Expansions*

Other important expansions to the accounts are human capital (Jorgenson and Fraumeni 1996a; Eisner 1989; and Kendrick 1961), research and development (Christensen and Jorgenson 1996, Eisner 1989), and natural resources (Wright 1990). More recent work (Hall and Hall 1993; and Corrado, Haltiwanger, and Sichel 2005) has also pointed to the importance of counting the value of management innovations and other intangibles. While it is clear that all of these assets are important to growth, investments in these assets are normally made by the individuals or the firms that use the capital and the "finished" assets are rarely bought and sold. The result is that although these are all economic assets that are "produced" by markets they are often regarded as nonmarket assets because there are no significant third-party markets and associated market prices for these assets that can be used to value either the assets or the services provided by these assets.

As is the case with consumer durables and government capital, what is needed is the development of an expanded set of satellite accounts that include R&D and other intangibles, human capital, and natural resources accompanied by a research program to improve the valuation basis for these expanded accounts.

## 1.3 Measuring Economic Activity in the Nonmarket Sector

### 1.3.1 Economic versus Welfare Accounts

Since the founding of the U.S. national accounts, there has been an ongoing debate regarding the treatment of natural resources and the environment, as well as the treatment of a whole set of broader welfare-based measures of economic and social progress, including some of the items discussed above. One school, exemplified by Kuznets (1946), favored development of a much broader set of welfare-orientated accounts that would focus on sustainability and address the externalities and social costs associated with economic development. Another, exemplified by Jaszi (1971), insisted that the national accounts must be objective and descriptive and thus based on observable market transactions. Jaszi felt that, conceptually, the accounts should be extended to treat the economic discovery, deple-

tion, and stocks of natural resources symmetrically with plant and equipment and other economic resources. The absence of observable market transactions and the subjectivity associated with such estimates led him to conclude, however, that they should not be included in the accounts. As a result—as described above—analysts such as Jorgenson et al. developed their own extensions to the accounts for production analysis—as opposed to welfare analysis.

In the 1960s and early 1970s another more environmentally focused move to broaden the accounts arose out of concern about environmental degradation and fears that the world was running out of resources and approaching the "limits to growth."[9] Externalities associated with economic growth also prompted renewed interest in broader social accounting. Work by Nordhaus and Tobin (1973), among others, on adjusting traditional economic accounts for changes in leisure time, disamenities of urbanization, exhaustion of natural resources, population growth, and other aspects of welfare produced indicators of economic well-being. However, the seemingly limitless scope, the range of uncertainty, and the degree of subjectivity involved in such measures of nonmarket activities limited the usefulness of and interest in these social indicators. It was felt that inclusion of such measures would sharply diminish the usefulness of traditional economic accounts for analyzing market activities. Attention subsequently focused on more readily identifiable and directly relevant market issues, such as the extent to which expenditures that relate to the protection and restoration of the environment (and other so-called defensive expenditures) are identifiable in the economic accounts.

### 1.3.2 Satellite Accounting

The development of the UN system of environmental and economic accounting (SEEA) and the use of supplemental, or satellite, accounts went a long way toward resolving the long-standing impasse between those who advocated broader sets of accounts and those concerned with maintaining the usefulness of the existing economic accounts (see United Nations 1993). The supplemental accounts allowed conceptual and empirical research to move forward with estimates that can be linked to the existing accounts without diminishing their usefulness. Satellite accounts are also useful in expanding the level of detail of certain sectors or broadening the definition of an industry. For example, transportation appears much smaller in the national accounts than that actual industry since many companies own their own trucking fleet or other delivery system and transportation is often times not a final product.

9. See Meadows et al. (1972), which summarizes the running out of resources. In addition, Nordhaus and Tobin (1973) discuss the broader issue of the measurement of economic growth.

The SEEA is a flexible, expandable satellite system. It draws on the materials balance approach to present the full range of interactions between the economy and the environment. This accounting approach attempts to take inventory of assets or stocks by measuring initial levels and tracking additions to or subtractions from those levels. The SEEA builds on, and is designed to be used with, SNA 1993.

### 1.3.3 Integrated Economic and Environmental Satellite Accounts (IEESA)

In the 1990s, the BEA presented a prototype integrated economic and environmental satellite account (Landefeld et al. 1994).[10] In constructing this account, the BEA built on several key lessons from the social accounting experience of the 1970s and on the framework of the SEEA. First, such accounts should be focused on a specific set of issues. Second, given the kind of uses to which the estimates would be put, the early stage of conceptual development and the statistical uncertainties (even if the estimates are limited to the environment's effects on market activities), such estimates should be developed in a supplemental, or satellite, framework. Third, such accounts should not focus on sustainability or some normative objective but should cover those interactions that can be tied to productive market activities and valued using market values or proxies thereof. Fourth, in keeping with the focus of the existing accounts, the supplemental accounts should be constructed in such a manner as to be consistent with the existing accounts and thus allow analysis of the effects of the interactions between the environment and the economy on production, income, consumption, and wealth. Tables 1.3 and 1.4 show the structure of the BEA's IEESAs.

The existing economic accounts do not provide normative data, and neither did the integrated economic and environmental accounts developed by the BEA. They would describe activities that bear upon the market in the monetary terms of the market, without implying any conclusions about whether the reflected situation is "right." The IEESAs were designed to report either market values or proxies for market values. If a problem with property rights leads to the undervaluation and overexploitation of a resource, a set of integrated economic accounts will not reveal the right price or the correct level of stocks. However, they will provide the data for objective analysis of the problem for items such as the changes in the value of stocks or the share of income to be attributed to a resource. Integrated economic and environmental accounting aims to provide a picture of the

10. In addition to the IEESAs, the BEA has developed satellite accounts in a number of other areas, including household production (Landefeld and Howell 1997), research and development (Fraumeni and Okubo 2005), tourism (Okubo and Planting 1998), transportation (Fang et al. 2000), and ownership-based accounts for international transactions (Landefeld, Whichard, and Lowe 1993).

**Table 1.3 IEESA production account**

| | Row No. | Industries | | | | Final uses (GDP) | | | | | | Total commodity output (4 + 10) (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agriculture, forestry, and fisheries (1) | Mining, utilities, water, and sanitary services (2) | Other industries (3) | Total (4) | Final consumption: Household (5) | Final consumption: Government (6) | Gross domestic capital formation (7) | Exports (8) | Imports (9) | GDP (5 + 6 + 7 + 8 + 9) (10) | |
| | | | | | | *Commodities* | | | | | | |
| Made | 1 | | | | | | | | | | | |
| Assets | 2 | | | | | | | | | | | |
| Fixed assets | 3 | | | | | | | | | | | |
| Environmental management | 4 | | | | | | | | | | | |
| Pollution abatement and control | 5 | | | | | | | | | | | |
| Other | 6 | | | | | | | | | | | |
| Inventories | 7 | | | | | | | | | | | |
| Government | 8 | | | | | | | | | | | |
| Nonfarm | 9 | | | | | | | | | | | |
| Farm | 10 | | | | | | | | | | | |
| Other | 11 | | | | | | | | | | | |
| Environmental cleanup and waste disposal services | 12 | | | | | | | | | | | |
| Other | 13 | | | | | | | | | | | |
| Natural and environmental assets | 14 | | | | | | | | | | | |
| Fixed | 15 | | | | | | | | | | | |
| Cultivated biological resources: Natural growth | 16 | | | | | | | | | | | |
| Proved subsoil assets | 17 | | | | | | | | | | | |
| Developed land | 18 | | | | | | | | | | | |

*(continued)*

**Table 1.3** (continued)

| | Row No. | Industries | | | | Final uses (GDP) | | | | | | Total commodity output (4 + 10) (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agriculture, forestry, and fisheries (1) | Mining, utilities, water, and sanitary services (2) | Other industries (3) | Total (4) | Final consumption: Household (5) | Final consumption: Government (6) | Gross domestic capital formation (7) | Exports (8) | Imports (9) | GDP (5 + 6 + 7 + 8 + 9) (10) | |
| Uncultivated biological resources: Natural growth | 19 | | | | | | | | | | | |
| Unproved subsoil assets | 20 | | | | | | | | | | | |
| Undeveloped land | 21 | | | | | | | | | | | |
| Water | 22 | | | | | | | | | | | |
| Air | 23 | | | | | | | | | | | |
| Work-in-progress inventories (natural growth products) | 24 | | | | | | | | | | | |
| Total intermediate inputs | 25 | | | | | | | | | | | |
| | | | | | *Value added* | | | | | | | |
| Compensation of employees | 26 | | | | | | | | | | | |
| Indirect business taxes, etc. | 27 | | | | | | | | | | | |
| Corporate profits and other property income | 28 | | | | | | | | | | | |
| Depreciation of fixed made assets: | | | | | | | | | | | | |
| Structures and equipment | 29 | | | | | | | | | | | |
| Environmental management | 30 | | | | | | | | | | | |
| Pollution abatement and control | 31 | | | | | | | | | | | |
| Other | 32 | | | | | | | | | | | |

| | |
|---|---|
| Depletion and degradation of fixed natural and environmental assets | 33 |
| Growth products: Fixed | 34 |
| Proved subsoil assets | 35 |
| Developed land | 36 |
| Uncultivated biological resources | 37 |
| Unproved subsoil assets | 38 |
| Undeveloped land | 39 |
| Water | 40 |
| Air | 41 |
| Gross value added (GDP) (rows 25 + 27 + 28 + 29 + 33) | 42 |
| Depreciation, depletion, and degradation (rows 29 + 33) | 43 |
| Net value added (NDP) (rows 42–43) | 44 |
| Total industry output | 45 |

*Source: Survey of Current Business,* April 1994, p. 47.

**Table 1.4 IEESA asset account**

| | Row No. | Opening stocks (1) | Change | | | | Closing stocks (1 + 2) (6) |
|---|---|---|---|---|---|---|---|
| | | | Total, net (3 + 4 + 5) (2) | Depreciation, depletion, degradation (3) | Capital formation (4) | Revaluation and other changes (5) | |
| | | *Produced assets* | | | | | |
| Made assets | 1 | | | | | | |
| Fixed assets | 2 | | | | | | |
| Residential structures and equipment, private and government | 3 | | | | | | |
| Fixed nonresidential structures and equipment, private and government | 4 | | | | | | |
| Natural resource related | 5 | | | | | | |
| Environmental management | 6 | | | | | | |
| Conservation and development | 7 | | | | | | |
| Water supply facilities | 8 | | | | | | |
| Pollution abatement and control | 9 | | | | | | |
| Sanitary services | 10 | | | | | | |
| Air pollution abatement and control | 11 | | | | | | |
| Water pollution abatement and control | 12 | | | | | | |
| Other | 13 | | | | | | |
| Inventories | 14 | | | | | | |
| Government | 15 | | | | | | |
| Nonfarm | 16 | | | | | | |
| Farm (harvested crops, and livestock other than cattle and claves) | 17 | | | | | | |
| Corn | 18 | | | | | | |
| Soybeans | 19 | | | | | | |
| All wheat | 20 | | | | | | |
| Other | 21 | | | | | | |
| Developed natural assets | 22 | | | | | | |
| Cultivated biological resources | 23 | | | | | | |
| Cultivated fixed natural growth assets | 24 | | | | | | |

| | |
|---|---|
| Livestock for breeding, dairy, draught, etc. | 25 |
| Cattle | 26 |
| Fish stock | 27 |
| Vineyards, orchards | 28 |
| Trees on timberland | 29 |
| Work-in-progress on natural growth products | 30 |
| Livestock raised for slaughter | 31 |
| Cattle | 32 |
| Fish stock | 33 |
| Calves | 34 |
| Crops and other produced plants, not yet harvested | 35 |
| Proved subsoil assets | 36 |
| Oil (including natural gas liquids) | 37 |
| Gas (including natural gas liquids) | 38 |
| Coal | 39 |
| Metals | 40 |
| Other minerals | 41 |
| Developed land | 42 |
| Land underlying structures (private) | 43 |
| Agricultural land (excluding vineyards, orchards) | 44 |
| Soil | 45 |
| Recreational land and water (public) | 46 |
| Forest and other wooded land | 47 |
| *Nonproducedlenvironmental assets* | |
| Uncultivated biological resources | 48 |
| Wild fish | 49 |
| Timber and other plants of uncultivated forests | 50 |
| Other uncultivated biological resources | 51 |
| Unproved subsoil assets | 52 |
| Undeveloped land | 53 |
| Water (economic effects of changes in the stock) | 54 |
| Air (economic effects of changes in the stock) | 55 |

*Source: Survey of Current Business,* April 1994, p. 41.

interactions between the economy and the environment, including uses of resources and feedback effects.

In accordance with the first criterion, the BEA limited the IEESAs to those interactions that directly affect the economy and are thus relevant to the objective of economic accounts. From this standpoint, the environment can be thought of as consisting of a range of natural resource and environmental assets that provide an identifiable and significant flow of goods and services to the economy. The economy's uses of these productive natural assets and the goods and services they provide can be grouped into two general classes. When use of the natural asset permanently or temporarily reduces its quantity, this is viewed as involving a flow of a good or service, and the quantitative reduction in the asset is called *depletion.* When use of the natural asset reduces its quality, the qualitative reduction in the asset is called *degradation.* However, the use of natural assets describes only part of the interaction between the economy and the environment. There are also feedback effects, such as the reduction in the future yield of crops, timber, fisheries, and the like from current pollution or overharvesting. Materials balance and energy accounting highlight both the use of the natural assets and the feedback effects from the use; thus, they capture the full interaction between the economy and the environment. In the case of environmental assets, feedback is more complicated, with effects that often fall on other industries and consumers. While this picture has numerous elements and is complex, by definition it does not cover many of the transformations and interactions within the environment itself—for example, the disposal of waste products from wild fish and mammals or the conversion of natural carbon dioxide into oxygen by plant matter on land and in the oceans.

In accord with the second criterion, the IEESAs had two main structural features. First, natural and environmental resources are treated like productive assets and only the economically productive aspects of the resources are considered. These resources, along with structures and equipment, were treated as part of the nation's wealth, and the flow of goods and services from them is identified and their contribution to production measured. Second, the accounts are designed to provide substantial detail on expenditures and assets relevant to understanding and analyzing the production process. Fully implemented IEESAs would permit identification of the economic contribution of natural and environmental resources by industry, by type of income, by product, and ultimately by region.

The BEA's decision to treat natural and environmental resources like productive assets in the IEESAs was based on their similarity to man-made capital for labor and materials in that they are devoted to producing fixed assets and then yield a flow of services over time. Inventories, on the other hand, are stocks held pending further processing, sale, delivery, or intermediate use.

The distinction between fixed assets and inventories is not always clear. Proved mineral reserves may seem to be similar to inventories since they are a set number of units waiting to be used up in production. Yet they also fit the classic characteristics of fixed capital expenditures in that materials and labor are needed to produce ("prove") them, and they yield a stream of product over long periods of time. Further, like a fixed asset such as a machine, the number of units extracted from a new mine or field is uncertain and varies over time and over the service life used up in production. Finally, the treatment of mineral reserves as fixed assets serves equally well as a reminder of the reproducibility of proved reserves.

The valuation basis for the IEESAs is market prices or proxies thereof. While alternative methods such as maintenance cost and contingent valuation have attractive theoretical characteristics, they are not appropriate for the BEA's purpose, and the associated practical difficulties outweigh their pluses. In keeping with the goals and criteria stated above, market pricing was the optimal choice for the IEESAs. First, market pricing maintains objectivity by avoiding the biases that may be inherent in "willingness to pay" surveys. Second, market pricing is consistent with conventional accounts, as well as the SEEA, and facilitates international comparability. Finally, market pricing is consistent with the limits placed on included interactions because it values those interactions from the perspective of the market.

## 1.4 What Is Now Required

### 1.4.1 Building an Integrated and Consistent System of National Accounts

The foregoing review identifies a clear need to update, integrate, and extend the U.S. system of national accounts. Our first and most important objective is to make the NIPAs consistent with the accounts for productivity compiled by the BLS and the flow-of-funds accounts constructed by the FRB. The boundaries of production, income and expenditures, accumulation, and wealth accounts must be identical throughout the system in order to achieve consistency. Development of a fully integrated and consistent system of accounts will require close collaboration among the BEA, BLS, and FRB, as well as coordination with Census, the most important agency for generating primary source data.

This section lays out a blueprint for revamping the U.S. national accounts that builds directly on the new seven-account NIPA framework and the work of Jorgenson et al., as well as the estimates presented in the 2003 benchmark revision of the NIPAs. While this blueprint does not include nonmarket extensions to the accounts, it could be extended to near-market and nonmarket sectors along the lines outlined by Abraham and Mackie (chap. 4 in this volume) and Nordhaus (chap. 3 in this volume). Building on

the lessons of the past, any such extension should be in the form of satellite, or supplementary, accounts. These accounts could then focus on nonmarket goods and services that contribute to production, can be valued in market prices, and are consistent with the economic concepts in the existing accounts.

Our initial goal is to integrate the BLS multifactor productivity measures with the production account of the NIPAs, as proposed by Fraumeni et al. (chap. 9 in this volume). Following the BEA, our measure of output represents the GDP, while our measure of input corresponds to GDI. The GDP is given in current and constant prices, as in the NIPAs, while GDI is given in current and constant prices, as in the BLS productivity accounts. Multifactor productivity is defined as the ratio of GDP to GDI in constant prices. This reformulation of the production account has been advocated, historically, by Denison (1967) and Christensen and Jorgenson (1996). More recently, the proposal has been supported by Hill (1999), Jorgenson (2001), and Moulton (2004).

The major challenge in implementing a consistent and integrated production account is the construction of a measure of GDI in constant prices. SNA 1993 and BLS (1993) have provided appropriate measures of the price and quantity of labor services. These can be combined with the price and quantity of capital services introduced by BLS (1983) to generate price and quantity indexes of GDI, as well as multifactor productivity. The primary obstacle to constructing capital service measures is the lack of market rental data for different types of capital. Although rental markets exist for most types of assets, such as commercial and industrial real estate and equipment, relatively little effort has been made to collect rental prices, except for renter-occupied housing.

An alternative approach for measuring rental prices, employed by the BLS, is to impute these prices from market prices for the assets, utilizing the user cost formula introduced by Jorgenson (1963). This requires estimates of depreciation and the rate of return, as well as asset prices. Measures of asset prices and depreciation, as well as investment and capital stocks, are presented in the BEA's (1999) reproducible wealth accounts. The BLS has generated estimates of the rate of return by combining property income from the NIPAs with capital stocks derived from the BEA's estimates of investment. The BLS employs the imputed rental prices to weight accumulated stocks of assets in generating price and quantity measures of capital services.

Our second goal is to integrate estimates of tangible wealth and the U.S. international position into a wealth account for the U.S. economy. This balance sheet represents an extension and consolidation of the balance sheets for individual sectors given by Teplin et al. (chap. 11 in this volume). Tangible wealth includes equipment, structures, inventories, and land in private business, household, and government sectors. Consolidation of these sec-

tors eliminates claims among the sectors and requires only U.S. claims on the rest of the world (ROW) and ROW claims on the United States in addition to tangible assets. Estimates of these claims are presented in the U.S. International Position, generated by BEA, so that the international accounts for the U.S. economy can be incorporated into our blueprint without alternation.

An important issue, discussed at length by Fraumeni and Okubo (2001) and Moulton (2004), is the appropriate treatment of consumer durables. Moulton (2004) endorses the BEA's current practice of including this investment in the tangible assets accounts but excluding the services of these durables from the GDP. Starting from the premise that the boundaries of production, income and expenditure, accumulation, and wealth accounts should be the same, we treat the services of consumers' durables as an output as well as an input in the production account. These services are also a source of income and a form of expenditures in the income and expenditures account.

Our proposed treatment of consumer durables has the advantage of accounting for owned and rented assets in the same way, following the BEA's treatment of owner-occupied and renter-occupied housing. The principal disadvantage is that the scope of the GDP and the corresponding measure of GDI must be increased. The argument for this change is that the BEA already compiles detailed accounts for investment and stocks of consumer durables as part of its accounts for reproducible assets. The only additional step required to make the accounts for housing and consumer durables fully consistent is to introduce imputed rental prices for consumer durables based on asset prices, like those employed in the BLS productivity accounts.

Similar, but distinct, issues arise for intangible forms of investment such as software and research and development. We follow SNA 1993 and the NIPAs in treating software as a form of investment, but extend this treatment by imputing a flow of services from stocks of software in household, government, and business sectors. This requires an extension of the scope of the GDP and the GDI for the output and input of capital services in the household and government sectors. While we could account for research and development in the same way, we follow Fraumeni and Okubo (2005) and Moulton (2004) in recommending that this be treated as part of a satellite accounting system until more satisfactory data are available on the prices of assets generated by research and development activities.

### 1.4.2 Blueprint for a Complete Accounting System

A schematic representation of our prototype accounting system is given in figure 1.1. The complete accounting system includes a production account, incorporating data on output and input; an income and expenditures account, giving data on income, expenditures, and saving; and an accumulation account, allocating saving to various types of capital forma-

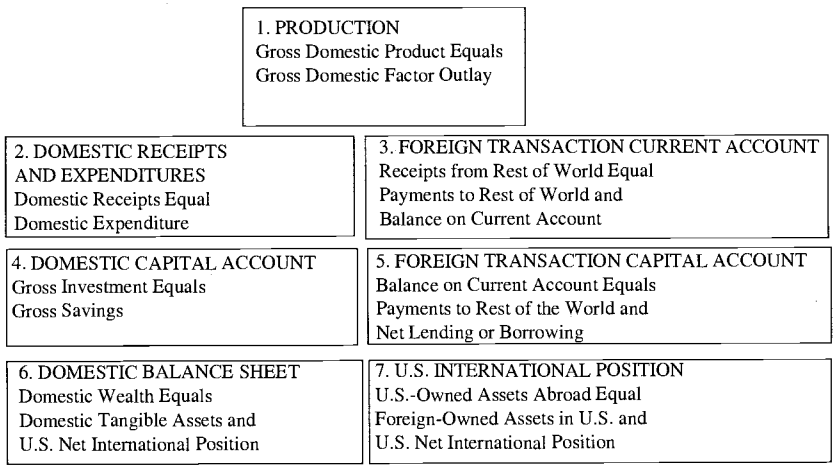


**Fig. 1.1 Blueprint for an expanded and integrated set of accounts for the United States**

tion. A national balance sheet contains data on national wealth. The production, income and expenditures, and accumulation accounts are linked through markets for commodities and factor services. Finally, the accumulation accounts are related to the wealth accounts through the accounting identity between period-to-period changes in wealth and the sum of net saving and the revaluation of assets.

The structure of our prototype system is similar to the NIPAs. The NIPAs currently present current price measures for outputs and inputs, but constant price measures only for outputs. The key innovation in the BLS accounts for multifactor productivity is to present both outputs and inputs in current and constant prices. Constant price measures of inputs and multifactor productivity are essential in accounting for the sources of economic growth. We also provide current and constant price measures of income and expenditures in order to account for the generation of income and its disposition as uses of economic growth. Finally, we present current and constant price measures of saving and capital formation to provide the necessary link between current economic activity and the accumulation of wealth.

Following the NIPAs, we generate a Domestic Income and Product Account for the U.S. economy, featuring GDP and GDI. Both GDP and GDI are presented in current and constant prices. The fundamental accounting identity is that GDP is equal to GDI in current prices. Multifactor productivity, a summary measure of economic performance, is defined as the ratio of GDP to GDI in constant prices. The interpretation of output, input, and productivity requires the concept of a production possibility fron-

tier.[11] In each period the inputs of capital and labor services are transformed into outputs of consumption and investment goods. This transformation depends on the level of productivity.

The most important difference between our prototype system and the NIPAs is the creation of a consolidated Income and Expenditures Account. By consolidating the income and expenditures accounts for household, business, and government sectors presented in the NIPAs, we obtain a single account presenting income and its disposition. This has the advantage of radically simplifying the accounts by excluding all transactions among the sectors. For example, the taxes paid by private business are expenditures by the business sector and sources of income to the government sector. In the consolidated Income and Expenditures Account, these tax payments cancel out.

For the Income and Expenditures Account the fundamental accounting identity is that income is equal to expenditures in current prices. Income includes labor and property income from the Domestic Income and Product Account, evaluated at market prices, income received from the rest of the world, net of income payments to the rest of the world, and net current taxes and transfers to the rest of the world. Expenditures include personal consumption expenditures, government consumption expenditures, and saving, net of depreciation. Income and expenditures are presented in current and constant prices in order to account for the generation of income and its disposition through expenditures and saving and uses of economic growth. The interpretation of these magnitudes in constant prices requires the notion of a social welfare function.[12] Consumption expenditures in constant prices represent the current flow of goods and services for consumption, while net saving in constant prices corresponds to increments in the current period of future flows of consumption.

The Domestic Capital Account allocates saving to various forms of investment. The fundamental accounting identity is that saving is equal to investment in current prices. We take saving and investment in constant prices to be identical as well. Investment in constant prices is an essential link between current economic activity and the accumulation of stocks of capital. As in the Income and Expenditures Account, we radically simplify the Domestic Capital Account by consolidating the capital accounts for household, business, and government sectors. Claims among the sectors cancel out, so that we present only investment in tangible assets and changes in the U.S. International Position.

The Wealth Account completes the domestic side of our prototype system of U.S. national accounts. Our Wealth Account is consistent with the

11. This interpretation is developed by Jorgenson (1996a, 2001) and Jorgenson and Stiroh (2000).

12. This interpretation is developed by Samuelson (1961), Nordhaus and Tobin (1973), and Weitzman (1976, 2003).

balance sheets for financial sectors presented by Teplin et al. (chap. 11 in this volume). We have augmented these balance sheets by including all tangible wealth of business, government, and household sectors, as well as the U.S. International Position. The principal difference between our system of accounts for capital and wealth and SNA 1993 is that we have combined the SNA's capital and revaluation accounts into a single accumulation account. This account also includes period-to-period changes in wealth. Our treatment of consumer durables also differs from the international system (SNA 1993, chap. 9, para. 40, p. 208).

Although it will eventually be desirable to provide a breakdown of our prototype system of U.S. national accounts by industrial sectors, our initial blueprint is limited to aggregates for the U.S. economy as a whole. Disaggregating our production account by industrial sector will require a fully integrated system of input-output accounts and accounts for gross product originating by industry, as described by Lawson et al. (chap. 6 in this volume). This can be combined with measures of capital, labor, and intermediate inputs by industry, like those presented by Jorgenson, Ho, and Stiroh (2005), to generate production accounts by sector.[13] The principles for constructing these production accounts are discussed by Fraumeni et al. (chap. 9 in this volume).

Our Foreign Transactions Current and Capital Accounts are identical to the NIPAs. Similarly, we incorporate the U.S. International Position from the NIPAs without modification. The income and expenditures, capital, and wealth accounts in our prototype system are limited to national aggregates. This has the advantage that transactions among domestic sectors are not required in accounting for income and expenditures and claims among domestic sectors are not required in accounting for capital formation and wealth. The basic similarities between our approach and current accounting practice can be recognized through our reliance on data from the most recent benchmark revision of the NIPAs, published in December 2003.

The first step in implementing an accounting system is to develop accounts in current prices. In section 1.4.3 we present production, income and expenditures, accumulation, and wealth accounts for the U.S. economy for 1948–2002. In section 1.4.4, we introduce accounts in constant prices with a description of index numbers for prices and quantities. Our accounts in constant prices begin with the Domestic Income and Product Account in section 1.4.5. The product side includes consumption and investment goods output in constant prices. The income side includes labor and capital inputs in constant prices. The ratio of real product to real input is multifactor productivity. In section 1.4.6 we give income and expen-

13. A system of production accounts for industrial sectors of the U.S. economy is given by Jorgenson, Gollop, and Fraumeni (1987) and has been updated and revised by Jorgenson, Ho, and Stiroh (2005).

ditures, accumulation, and wealth accounts in constant prices for the U.S. domestic economy and the rest of the world.

### 1.4.3 Income and Wealth

*Introduction*

The measurement of income and wealth requires a system of seven accounts. These must be carefully distinguished for the new system of seven accounts employed in presenting the U.S. NIPAs. Our Domestic Income and Product Account provides data on the outputs of the U.S. economy, as well as inputs of capital and labor services. Incomes and expenditures are divided between two accounts—the Income and Expenditures Account and the Foreign Transactions Current Account. Capital accumulation is recorded in two accounts—the Domestic Capital Account and the Foreign Transactions Capital Account. Finally, assets and liabilities are given in the Wealth Account and the U.S. International Position.

*Production Account*

We implement the Domestic Income and Product Account for the U.S. domestic economy, including business, household, and government sectors.[14] In order to achieve consistency between investment goods production and property compensation we introduce imputations for the services of consumer durables and durables used by nonprofit institutions, as well as the net rent on government durables and government and institutional real estate. The services of these assets are included in the output of services, together with the services of owner-occupied dwellings; both also appear in property compensation. This assures that the accounting identity between the value of output and the value of input is preserved.

Gross Domestic Product is divided among nondurable goods, durable goods, and structures, as well as services, in the NIPAs. The output of durables includes consumer durables and producer durables used by governments and nonprofit institutions, as well as producer durables employed by private businesses. The output of structures includes government structures, private business structures, institutional structures, and new residential housing. The purpose of our imputations for the property compensation of governments, households, and nonprofit institutions is to provide a consistent treatment of investment goods output and property compensation throughout the system.

In the NIPAs the rental value of owner-occupied residential real estate, including structures and land, is imputed from market rental prices of renter-occupied residential real estate. The value of these services is allo-

14. Our estimates are based on those of Jorgenson (2001), updated through 2002 to incorporate data from the 2003 benchmark revision of the U.S. national accounts.

cated among net rent, interest, taxes, and consumption of fixed capital. A similar imputation is made for the services of real estate used by nonprofit institutions, but the imputed value excludes net rent. Finally, depreciation on government capital is included, while net rent on this capital is excluded. No property compensation for the services of consumer durables or producer durables used by nonprofit institutions is included. By imputing the value of these services and the net rent of government capital and real estate used by nonprofit institutions, we align the treatment of property compensation for these assets with that for assets used by private businesses.

We distinguish between taxes charged against revenue, such as excise or sales taxes, and taxes that are part of the outlay on capital services, such as property taxes. We exclude output taxes from the value of output, reflecting prices from the producers' point of view. However, we include taxes on input, since these taxes are included in the outlay of producers. Taxes on output reduce the proceeds of the sector, while subsidies increase these proceeds; accordingly, the value of output includes production subsidies. To be more specific, we exclude excise and sales taxes, business nontax payments, and customs duties from the value of output and include other indirect business taxes plus subsidies. Our valuation of output corresponds to the value of output at basic prices in SNA 1993. The Domestic Income and Product Account for 2002 is presented in table 1.5.

Gross Domestic Income includes income originating in private enterprises and private households and institutions, as well as income originating in government. We add the imputed rental value of consumer durables, producer durables utilized by institutions, and the net rent on government durables and real estate and institutional real estate, together with indirect taxes included in the value of these inputs. The value of capital inputs also includes consumption of fixed capital and the statistical discrepancy; consumption of fixed capital is a component of the rental value of capital services. The value of GDI for 2002 is presented in table 1.5.

Product and income accounts are linked through capital formation and property compensation. To make this link explicit we divide GDP between consumption and investment goods and GDI between labor and property compensation. Investment goods production is equal to the total output of durable goods and structures. Consumption goods production is equal to the output of nondurable goods and services from the NIPAs, together with our imputations for the services of consumer and institutional durables and the net rent on government durables and real estate, as well as institutional real estate.

Property income includes the statistical discrepancy and taxes included in property compensation, such as motor vehicle licenses, property taxes, and other taxes. The imputed value of the services of government, consumer and institutional durables, and the net rent on government and institu-

**Table 1.5 Domestic income and product account, 2002**

| Row No. | Product | Source | Total |
|---|---|---|---|
| 1 | GDP (NIPA) | NIPA 1.1.5 line 1 | 10,487.0 |
| 2 | +Services of consumers' durables | Our imputation | 1,082.2 |
| 3 | +Services of durables held by institutions | Our imputation | 31.8 |
| 4 | +Services of durables, structures, land, and inventories held by government | Our imputation | 340.6 |
| 5 | – General government consumption of fixed capital | NIPA 3.10.5 line 5 | 178.0 |
| 6 | – Government enterprise consumption of fixed capital | NIPA 3.1 line 38–3.10.5 line 5 | 33.2 |
| 7 | – Federal taxes on production and imports | NIPA 3.2 line 4 | 87.3 |
| 8 | – Federal current transfer receipts from business | NIPA 3.2 line 16 | 14.0 |
| 9 | – S&L taxes on production and imports | NIPA 3.3 line 6 | 675.3 |
| 10 | – S&L current transfer receipts fom business | NIPA 3.3 line 18 | 32.8 |
| 11 | +Capital stock tax | — | 0.0 |
| 12 | +MV tax | NIPA 3.5 line 28 | 6.9 |
| 13 | +Property taxes | NIPA 3.3 line 8 | 291.5 |
| 14 | +Severance, special assessments, and other taxes | NIPA 3.5 line 29, 30, 31 | 47.8 |
| 15 | +Subsidies | NIPA 3.1 line 25 | 38.2 |
| 16 | – Current surplus of government enterprises | NIPA 3.1 line 14 | 2.8 |
| 17 | =Gross domestic product | | 11,303.1 |
| | **Income** | **Source** | **Total** |
| 1 | +Consumption of fixed capital | NIPA 5.1 line 13 | 1,303.9 |
| 2 | +Statistical discrepancy | NIPA 5.1 line 26 | –15.3 |
| 3 | +Services of consumers' durables | Our imputation | 1,082.2 |
| 4 | +Services of durables held by institutions | Our imputation | 31.8 |
| 5 | +Services of durables, structures, land, and inventories held by government | Our imputation | 340.6 |
| 6 | – General government consumption of fixed capital | NIPA 3.10.5 line 5 | 178.0 |
| 7 | – Government enterprise consumption of fixed capital | NIPA 3.1 line 38–3.10.5 line 5 | 33.2 |
| 8 | +National income | NIPA 1.7.5 line 16 | 9,225.4 |
| 9 | – ROW income | NIPA 1.7.5 line 2–3 | 27.1 |
| 10 | – Sales tax | Product Account | 463.2 |
| 11 | +Subsidies | NIPA 3.1 line 25 | 38.2 |
| 12 | – Current surplus of government enterprises | NIPA 3.1 line 14 | 2.8 |
| 13 | =Gross domestic income | | 11,303.1 |

tional real estate are also included. Labor income includes the compensation of employees of private enterprises, households, and nonprofit institutions, as well as government. The value of labor input also includes the labor compensation of the self-employed. We estimate this compensation from the incomes received by comparable categories of employees.[15] Gross

15. Details are provided by Jorgenson, Ho, and Stiroh (2005).

Domestic Product, divided between investment and consumption goods output, and GDI, divided between labor and property income, are given for 1948–2002 in table 1.6.

*Income and Expenditures Accounts*

We define Net Income as proceeds from the sale of factor services from the Domestic Income and Product Account, plus income receipts from the result of the world, less income payments, and net current taxes and transfers to the rest of the world, less depreciation. We define Net Expenditures as personal and government consumption expenditures from the Domestic Income and Product Account, evaluated at market prices, plus net saving. These expenditures exclude purchases of durable goods but include the services of accumulated stocks of these durables. The value of Net Income for the year 2002 is presented in table 1.7.

Consumption expenditures include personal and government expenditures on services and nondurable goods, together with our imputation for the services of consumer, institutional, and government durables and the net rent of institutional and government real estate. Purchases of consumer durables, included in personal consumption expenditures in the NIPAs, are excluded from expenditures and included in investment in the Domestic Capital Account described below. The value of personal and government consumption includes taxes and excludes subsidies on output, reflecting prices from the purchasers' point of view. The value of Net Expenditures for the year 2002 is presented in table 1.7.

Income and expenditure accounts are linked through saving and the resulting property income. To make this link explicit we divide Net Income between labor and property income, net of depreciation, and Net Expenditures between net saving and consumption. Net income and expenditures in current prices for 1948–2002 are given in table 1.8. Income is divided between labor and property income, net of depreciation, while expenditures are divided between personal and government consumption and net saving.

The Foreign Transactions Current Account in the NIPAs gives receipts from exports and income receipts from the rest of the world. This is balanced against outlays for imports, income payments, current taxes and transfers to the rest of the world, and the balance on current account. Receipts, outlays, and the balance on current account are presented for the year 2002 in table 1.9. These data are given in current prices for 1948–2002 in table 1.10.

*Accumulation Accounts*

The NIPAs include a Domestic Capital Account that presents investment and saving. We implement this account by consolidating the accounts of business and government sectors with those of households and institutions. Financial claims on the business sector by households and

**Table 1.6 Domestic income and product account, 1948–2002 (billions of current $)**

| Year | Gross domestic product | Investment goods product | Consumption goods product | Labor income | Capital income |
|---|---|---|---|---|---|
| 1948 | 290.8 | 78.7 | 212.1 | 173.2 | 116.9 |
| 1949 | 285.6 | 72.2 | 213.5 | 173.6 | 111.2 |
| 1950 | 319.9 | 92.4 | 227.5 | 187.0 | 132.0 |
| 1951 | 366.3 | 106.3 | 260.0 | 213.6 | 152.1 |
| 1952 | 387.1 | 103.8 | 283.3 | 228.7 | 158.0 |
| 1953 | 409.6 | 110.7 | 298.8 | 244.4 | 165.0 |
| 1954 | 415.5 | 107.2 | 308.3 | 244.5 | 171.2 |
| 1955 | 448.0 | 127.0 | 321.0 | 262.7 | 185.4 |
| 1956 | 475.7 | 132.0 | 343.8 | 283.6 | 192.6 |
| 1957 | 493.5 | 134.8 | 358.6 | 297.5 | 195.3 |
| 1958 | 512.7 | 126.8 | 385.9 | 299.3 | 213.7 |
| 1959 | 542.1 | 145.0 | 397.1 | 323.5 | 218.7 |
| 1960 | 576.9 | 148.5 | 428.5 | 339.5 | 237.2 |
| 1961 | 588.8 | 150.3 | 438.5 | 348.7 | 239.8 |
| 1962 | 626.4 | 165.7 | 460.7 | 371.3 | 255.2 |
| 1963 | 658.4 | 176.1 | 482.4 | 388.9 | 269.3 |
| 1964 | 713.4 | 190.8 | 522.6 | 416.2 | 297.0 |
| 1965 | 779.9 | 212.9 | 567.0 | 446.6 | 333.2 |
| 1966 | 864.4 | 234.7 | 629.6 | 490.3 | 374.1 |
| 1967 | 900.4 | 236.8 | 663.5 | 522.6 | 377.9 |
| 1968 | 980.9 | 257.1 | 723.8 | 575.2 | 405.7 |
| 1969 | 1,063.0 | 276.5 | 786.5 | 632.1 | 431.1 |
| 1970 | 1,096.3 | 272.9 | 823.5 | 673.1 | 422.9 |
| 1971 | 1,197.6 | 303.5 | 894.0 | 719.0 | 478.5 |
| 1972 | 1,350.5 | 343.8 | 1,006.7 | 789.3 | 561.1 |
| 1973 | 1,525.7 | 398.2 | 1,127.5 | 880.9 | 644.9 |
| 1974 | 1,652.2 | 415.5 | 1,236.7 | 966.1 | 686.0 |
| 1975 | 1,789.6 | 427.3 | 1,362.4 | 1,029.5 | 760.0 |
| 1976 | 2,012.7 | 508.6 | 1,504.1 | 1,147.5 | 865.3 |
| 1977 | 2,265.3 | 590.8 | 1,674.5 | 1,279.4 | 986.0 |
| 1978 | 2,558.3 | 687.3 | 1,871.0 | 1,448.6 | 1,109.5 |
| 1979 | 2,803.2 | 774.9 | 2,028.2 | 1,628.4 | 1,174.9 |
| 1980 | 3,000.7 | 784.8 | 2,215.9 | 1,792.6 | 1,207.8 |
| 1981 | 3,338.3 | 884.9 | 2,453.4 | 1,980.5 | 1,358.1 |
| 1982 | 3,489.8 | 837.4 | 2,652.4 | 2,090.2 | 1,399.4 |
| 1983 | 3,845.2 | 904.1 | 2,941.1 | 2,219.2 | 1,626.1 |
| 1984 | 4,308.4 | 1,093.3 | 3,215.0 | 2,447.9 | 1,860.6 |
| 1985 | 4,575.2 | 1,140.4 | 3,434.9 | 2,626.0 | 1,949.2 |
| 1986 | 4,814.6 | 1,177.1 | 3,637.5 | 2,785.0 | 2,030.0 |
| 1987 | 5,105.7 | 1,241.1 | 3,864.6 | 2,978.8 | 2,126.7 |
| 1988 | 5,546.9 | 1,320.5 | 4,226.4 | 3,214.1 | 2,332.7 |
| 1989 | 5,939.4 | 1,413.9 | 4,525.5 | 3,402.5 | 2,537.1 |
| 1990 | 6,245.4 | 1,436.7 | 4,808.7 | 3,610.4 | 2,635.2 |
| 1991 | 6,427.8 | 1,377.5 | 5,050.2 | 3,733.9 | 2,693.6 |
| 1992 | 6,790.5 | 1,454.4 | 5,336.1 | 3,931.5 | 2,858.8 |
| 1993 | 7,087.0 | 1,552.1 | 5,534.8 | 4,118.3 | 2,968.7 |

*(continued)*

**Table 1.6** (continued)

| Year | Gross domestic product | Investment goods product | Consumption goods product | Labor income | Capital income |
|---|---|---|---|---|---|
| 1994 | 7,501.0 | 1,705.2 | 5,795.8 | 4,332.5 | 3,168.3 |
| 1995 | 7,859.4 | 1,782.8 | 6,076.5 | 4,535.5 | 3,323.9 |
| 1996 | 8,340.0 | 1,934.2 | 6,405.8 | 4,749.1 | 3,591.2 |
| 1997 | 8,908.0 | 2,132.6 | 6,775.4 | 5,035.2 | 3,872.7 |
| 1998 | 9,366.3 | 2,266.8 | 7,099.5 | 5,409.0 | 3,956.9 |
| 1999 | 9,943.0 | 2,409.0 | 7,534.0 | 5,763.1 | 4,180.0 |
| 2000 | 10,525.6 | 2,528.8 | 7,996.8 | 6,204.4 | 4,321.6 |
| 2001 | 10,958.6 | 2,476.4 | 8,482.3 | 6,367.8 | 4,590.7 |
| 2002 | 11,303.1 | 2,439.4 | 8,863.7 | 6,493.5 | 4,809.4 |

institutions are liabilities of the business sector; in the consolidated accounts these assets and liabilities cancel out. Similarly, financial claims on the government sector by households and institutions cancel out.

Investment includes gross private domestic investment, government investment, and expenditures on durable goods by households and institutions, all evaluated at market prices, and the balance on current accounts. Net saving includes gross saving, as defined in the NIPAs, less consumption of fixed capital for households, institutions, and governments. Domestic saving and investment are given for 2002 in table 1.11, together with the revaluation of fixed assets and the change in wealth. Domestic investment is presented in current prices for 1948–2002 in table 1.12. Gross saving, depreciation, net saving, revaluation of assets, and the change in wealth are given in table 1.13.

Our estimates of revaluations for net claims on foreigners are based on accounts at market prices included in the U.S. International Position. We estimate revaluations as the difference between the period-to-period changes in these stocks and the deficit of the ROW sector. The NIPAs include a Foreign Transactions Capital Account that links net claims on foreigners to the balance on current account from the NIPAs. Data from the Foreign Transactions Account are given for 2002 in table 1.14 and for the period 1948–2002 in table 1.15.

*Wealth Accounts*

All of the accounts we have considered up to this point contain data on flows. The wealth accounts contain data on stocks. These accounts are presented in balance sheet form with the value of assets equal to the value of liabilities as an accounting identity. The Wealth Account includes the tangible assets of household, business, and government sectors and net claims on the rest of the world. The U.S. International Investment Position includes

**Table 1.7 Income and expenditures account, 2002**

| Row No. | Income | Source | Total |
|---|---|---|---|
| 1 | + Gross income | Product Account | 11,303.1 |
| 2 | + Sales tax | Product Account | 463.2 |
| 3 | – Subsidies | NIPA 3.1 line 25 | 38.2 |
| 4 | + Current surplus of government enterprises | NIPA 3.1 line 14 | 2.8 |
| 5 | = Gross domestic income at market prices | | 11,730.9 |
| 6 | + Income receipts from the rest of the world | NIPA 1.7.5 line 2 | 301.8 |
| 7 | – Income payments to the rest of the world | NIPA 1.7.5 line 3 | 274.7 |
| 8 | – Current taxes and transfers to the rest of the world (net) | NIPA 4.1 line 25 | 59.8 |
| 9 | = Gross income | | 11,698.2 |
| 10 | – Depreciation | Our imputation | 1,934.3 |
| 11 | = Net income | | 9,763.9 |
| | **Expenditures** | **Source** | **Total** |
| 1 | + Personal consumption expenditures | | 7,574.0 |
| 2 | PCE nondurable goods (NIPA) | NIPA 2.3.5 line 6 | 2,080.1 |
| 3 | PCE services | NIPA 2.3.5 line 13 | 4,379.8 |
| 4 | Less space rental value of inst building and nonfarm dwellings | Our imputation | 3,605.9 |
| 5 | Services of consumers' durables | Our imputation | 1,082.2 |
| 6 | Services of structures and land | Our imputation | 773.9 |
| 7 | Services of durables held by institutions | Our imputation | 31.8 |
| 8 | + Government consumption expenditures | | 1,738.7 |
| 9 | Government consumption nondurable goods | NIPA 3.10.5 line 8 | 162.4 |
| 10 | Government intermediate purchases, durable goods | NIPA 3.10.5 line 7 | 47.7 |
| 11 | Government consumption services total | | 226.4 |
| 12 | Government consumption services | NIPA 3.10.5 line 9 | 498.7 |
| 13 | Less sales to other sectors | NIPA 3.10.5 line 11 | 272.3 |
| 14 | Services of durables, structures, land, and inventories held by government | Our imputation | 340.6 |
| 15 | Less government enterprise consumption of fixed capital | NIPA 3.1 line 38–3.10.5 line 5 | 33.2 |
| 16 | Government compensation of employees excluding force account labor | NIPA 3.10.5 line 4–10 | 994.8 |
| 17 | + Gross national saving and statistical discrepancy | Capital Account | 2,385.2 |
| | – Depreciation | Our imputation | 1,934.3 |
| 18 | = Net domestic expenditures | | 9,763.6 |

**Table 1.8 Income and expenditures account, 1948–2002 (billions of current $)**

| Year | Net income | Labor income | Net capital income | Personal consumption expenditures | Government consumption expenditures | Net saving and statistical discrepancy |
|---|---|---|---|---|---|---|
| 1948 | 262.5 | 173.2 | 89.2 | 179.0 | 39.5 | 43.9 |
| 1949 | 252.2 | 173.7 | 78.5 | 176.8 | 43.3 | 32.0 |
| 1950 | 285.6 | 187.1 | 98.5 | 189.6 | 47.3 | 48.6 |
| 1951 | 327.2 | 213.6 | 113.6 | 213.3 | 56.4 | 57.4 |
| 1952 | 347.0 | 228.7 | 118.3 | 227.0 | 68.4 | 51.4 |
| 1953 | 367.1 | 244.4 | 122.7 | 234.4 | 79.5 | 53.1 |
| 1954 | 369.7 | 244.5 | 125.2 | 247.1 | 76.4 | 46.1 |
| 1955 | 400.3 | 262.6 | 137.6 | 262.0 | 74.9 | 63.4 |
| 1956 | 423.1 | 283.5 | 139.6 | 282.7 | 77.2 | 63.1 |
| 1957 | 435.0 | 297.4 | 137.6 | 290.2 | 83.8 | 60.9 |
| 1958 | 452.5 | 299.2 | 153.3 | 308.4 | 96.5 | 47.4 |
| 1959 | 478.0 | 323.4 | 154.6 | 318.1 | 96.8 | 63.2 |
| 1960 | 512.1 | 339.4 | 172.7 | 343.8 | 104.0 | 64.4 |
| 1961 | 521.3 | 348.6 | 172.7 | 355.5 | 102.6 | 63.4 |
| 1962 | 558.4 | 371.2 | 187.2 | 371.4 | 110.3 | 76.9 |
| 1963 | 588.0 | 388.9 | 199.1 | 388.2 | 115.7 | 84.3 |
| 1964 | 640.5 | 416.2 | 224.3 | 417.5 | 127.1 | 96.0 |
| 1965 | 702.9 | 446.7 | 256.2 | 454.6 | 136.0 | 112.5 |
| 1966 | 778.6 | 490.3 | 288.3 | 500.1 | 153.9 | 124.4 |
| 1967 | 805.8 | 522.6 | 283.2 | 519.9 | 170.1 | 115.7 |
| 1968 | 879.4 | 575.2 | 304.1 | 567.5 | 187.2 | 124.8 |
| 1969 | 951.2 | 632.2 | 319.1 | 626.6 | 194.1 | 130.5 |
| 1970 | 970.2 | 673.2 | 297.1 | 664.8 | 193.0 | 112.5 |
| 1971 | 1,061.5 | 719.0 | 342.5 | 723.1 | 208.2 | 130.1 |
| 1972 | 1,198.8 | 789.3 | 409.6 | 799.0 | 248.1 | 151.7 |
| 1973 | 1,368.7 | 880.9 | 487.8 | 886.2 | 281.1 | 201.3 |
| 1974 | 1,470.3 | 966.1 | 504.2 | 969.8 | 321.7 | 178.9 |
| 1975 | 1,569.5 | 1,029.5 | 540.0 | 1,054.9 | 360.6 | 153.9 |
| 1976 | 1,778.7 | 1,147.4 | 631.3 | 1,167.2 | 405.5 | 206.0 |
| 1977 | 2,006.2 | 1,279.4 | 726.8 | 1,319.7 | 439.4 | 247.1 |
| 1978 | 2,264.5 | 1,448.5 | 816.0 | 1,479.0 | 477.8 | 307.8 |
| 1979 | 2,469.1 | 1,628.4 | 840.7 | 1,641.7 | 485.3 | 342.1 |
| 1980 | 2,611.0 | 1,792.5 | 818.5 | 1,815.2 | 513.0 | 283.0 |
| 1981 | 2,903.1 | 1,980.4 | 922.8 | 1,998.5 | 572.9 | 331.8 |
| 1982 | 2,999.8 | 2,090.0 | 909.7 | 2,134.0 | 632.2 | 233.7 |
| 1983 | 3,341.3 | 2,219.1 | 1,122.2 | 2,310.4 | 755.3 | 275.4 |
| 1984 | 3,786.1 | 2,447.7 | 1,338.4 | 2,527.0 | 838.8 | 420.2 |
| 1985 | 4,005.2 | 2,625.8 | 1,379.4 | 2,732.5 | 868.9 | 403.6 |
| 1986 | 4,178.9 | 2,783.2 | 1,395.7 | 2,920.0 | 879.1 | 379.9 |
| 1987 | 4,413.2 | 2,977.4 | 1,435.8 | 3,122.3 | 918.7 | 372.5 |
| 1988 | 4,814.2 | 3,213.2 | 1,601.0 | 3,396.2 | 998.8 | 419.2 |
| 1989 | 5,159.3 | 3,401.2 | 1,758.1 | 3,654.8 | 1,044.4 | 460.3 |
| 1990 | 5,423.5 | 3,608.1 | 1,815.4 | 3,914.2 | 1,086.2 | 423.2 |
| 1991 | 5,609.3 | 3,731.2 | 1,878.2 | 4,072.7 | 1,158.4 | 378.1 |
| 1992 | 5,915.5 | 3,928.5 | 1,987.0 | 4,310.9 | 1,211.3 | 393.2 |
| 1993 | 6,171.5 | 4,115.0 | 2,056.5 | 4,587.3 | 1,146.1 | 438.1 |
| 1994 | 6,548.1 | 4,328.5 | 2,219.5 | 4,816.9 | 1,193.0 | 538.2 |
| 1995 | 6,848.3 | 4,531.4 | 2,316.9 | 5,097.0 | 1,188.1 | 563.3 |
| 1996 | 7,279.1 | 4,745.0 | 2,534.2 | 5,362.9 | 1,274.6 | 641.4 |
| 1997 | 7,796.5 | 5,030.8 | 2,765.7 | 5,695.1 | 1,336.4 | 765.1 |
| 1998 | 8,184.8 | 5,404.4 | 2,780.3 | 6,023.6 | 1,355.5 | 805.9 |
| 1999 | 8,695.5 | 5,757.9 | 2,937.6 | 6,438.3 | 1,422.5 | 834.8 |
| 2000 | 9,174.5 | 6,199.8 | 2,974.8 | 6,907.1 | 1,504.3 | 762.9 |
| 2001 | 9,492.4 | 6,362.6 | 3,129.7 | 7,269.0 | 1,632.2 | 591.3 |
| 2002 | 9,763.5 | 6,488.0 | –3,275.4 | 7,574.0 | 1,738.7 | 450.8 |

**Table 1.9 Foreign transactions current account, 2002**

| Row No. | Receipts from the rest of the world | Source | Total |
|---|---|---|---|
| 1 | + Exports of goods and services | NIPA 4.1 line 2 | 1,005.0 |
| 2 | + Income receipts from the rest of the world | NIPA 4.1 line 7 | 301.8 |
| 3 | Wage and salary receipts | NIPA 4.1 line 8 | 2.9 |
| 4 | Income receipts on assets | NIPA 4.1 line 9 | 298.8 |
| 5 | = Current receipts from the rest of the world | NIPA 4.1 line 1 | 1,306.8 |
| | **Payments to the rest of the world and balance on current account** | **Source** | **Total** |
| 1 | + Imports of goods and services | NIPA 4.1 line 14 | 1,429.9 |
| 2 | + Income payments to the rest of the world | NIPA 4.1 line 19 | 274.7 |
| 3 | Wage and salary payments | NIPA 4.1 line 20 | 8.4 |
| 4 | Income payments on assets | NIPA 4.1 line 21 | 266.3 |
| 5 | + Current taxes and transfer payments to the rest of the world (net) | NIPA 4.1 line 25 | 59.8 |
| 6 | + Balance on current account | NIPA 4.1 line 29 | –457.7 |
| 7 | = Current payments to the rest of the world and balance on current account | | 1,306.7 |

foreign holdings of U.S. domestic assets and U.S. holdings of foreign assets. The Wealth Account for 2002 is presented in table 1.16, and annual data on domestic wealth for the period 1948–2002 are presented in table 1.17. The U.S. International Position for 2002 is given in table 1.18, while the U.S. International Investment Position for this period is given in table 1.19.

### 1.4.4 Price and Quantity Indexes

*Introduction*

We have presented data in current prices for our prototype system of U.S. national accounts in the preceding section. To express any accounting magnitude in constant prices we must separate the value in current prices between components associated with price and quantity indexes. Data in constant prices are associated with the quantity index, while the implicit deflator is associated with the price index. As an illustration, GDP in current prices in the Domestic Income and Product Account is the product of GDP in constant prices and the implicit deflator for GDP. Similarly, GDI in current prices is the product of GDI in constant prices and the implicit deflator for GDI.

As a second illustration, income in current prices from the Income and Expenditures Account can be separated between income in constant prices and the implicit deflator for income. Similarly, the value of expenditures can be separated into price and quantity components. Market prices that

**Table 1.10** **Foreign transactions current account, 1948–2002 (billions of current $)**

| Year | Balance on current account | Current receipts from the ROW | Exports of goods and services | Income receipts from the ROW | Current payments to ROW and balance on current account | Imports of goods and services | Income payments to ROW | Current taxes and transfers to ROW (net) |
|---|---|---|---|---|---|---|---|---|
| 1948 | 2.4 | 17.6 | 15.5 | 2.0 | 17.6 | 10.1 | 0.6 | 4.5 |
| 1949 | 0.9 | 16.4 | 14.5 | 1.9 | 16.5 | 9.2 | 0.7 | 5.6 |
| 1950 | –1.8 | 14.5 | 12.4 | 2.2 | 14.6 | 11.6 | 0.7 | 4.0 |
| 1951 | 0.9 | 19.9 | 17.1 | 2.8 | 19.9 | 14.6 | 0.9 | 3.5 |
| 1952 | 0.6 | 19.3 | 16.5 | 2.9 | 19.3 | 15.3 | 0.9 | 2.5 |
| 1953 | –1.3 | 18.2 | 15.3 | 2.8 | 18.1 | 16.0 | 0.9 | 2.5 |
| 1954 | 0.2 | 18.9 | 15.8 | 3.0 | 18.8 | 15.4 | 0.9 | 2.3 |
| 1955 | 0.4 | 21.2 | 17.7 | 3.5 | 21.1 | 17.2 | 1.1 | 2.5 |
| 1956 | 2.8 | 25.2 | 21.3 | 3.9 | 25.3 | 18.9 | 1.1 | 2.4 |
| 1957 | 4.8 | 28.3 | 24.0 | 4.3 | 28.3 | 19.9 | 1.2 | 2.3 |
| 1958 | 0.9 | 24.4 | 20.6 | 3.9 | 24.4 | 20.0 | 1.2 | 2.3 |
| 1959 | –1.2 | 27.0 | 22.7 | 4.3 | 27.0 | 22.3 | 1.5 | 4.3 |
| 1960 | 3.2 | 31.9 | 27.0 | 4.9 | 31.9 | 22.8 | 1.8 | 4.1 |
| 1961 | 4.3 | 32.9 | 27.6 | 5.3 | 32.9 | 22.7 | 1.8 | 4.2 |
| 1962 | 3.9 | 35.0 | 29.1 | 5.9 | 35.0 | 25.0 | 1.8 | 4.3 |
| 1963 | 5.0 | 37.6 | 31.1 | 6.5 | 37.6 | 26.1 | 2.1 | 4.4 |
| 1964 | 7.5 | 42.3 | 35.0 | 7.2 | 42.2 | 28.1 | 2.3 | 4.3 |
| 1965 | 6.2 | 45.0 | 37.1 | 7.9 | 45.0 | 31.5 | 2.6 | 4.7 |
| 1966 | 3.9 | 49.0 | 40.9 | 8.1 | 49.0 | 37.1 | 3.0 | 5.0 |
| 1967 | 3.6 | 52.1 | 43.5 | 8.7 | 52.2 | 39.9 | 3.3 | 5.4 |
| 1968 | 1.7 | 58.0 | 47.9 | 10.1 | 58.0 | 46.6 | 4.0 | 5.7 |
| 1969 | 1.8 | 63.7 | 51.9 | 11.8 | 63.7 | 50.5 | 5.7 | 5.8 |
| 1970 | 4.0 | 72.5 | 59.7 | 12.8 | 72.5 | 55.8 | 6.4 | 6.3 |
| 1971 | 0.6 | 77.0 | 63.0 | 14.0 | 77.0 | 62.3 | 6.4 | 7.6 |
| 1972 | –3.6 | 87.1 | 70.8 | 16.3 | 87.1 | 74.2 | 7.7 | 8.8 |
| 1973 | 9.3 | 118.8 | 95.3 | 23.5 | 118.8 | 91.2 | 10.9 | 7.4 |
| 1974 | 6.6 | 156.5 | 126.7 | 29.8 | 156.4 | 127.5 | 14.3 | 8.1 |
| 1975 | 21.4 | 166.7 | 138.7 | 28.0 | 166.8 | 122.7 | 15.0 | 7.6 |
| 1976 | 8.9 | 181.9 | 149.5 | 32.4 | 181.9 | 151.1 | 15.5 | 6.3 |
| 1977 | –9.0 | 196.6 | 159.4 | 37.2 | 196.6 | 182.4 | 16.9 | 6.2 |
| 1978 | –10.4 | 233.1 | 186.9 | 46.3 | 233.2 | 212.3 | 24.7 | 6.7 |
| 1979 | 1.4 | 298.5 | 230.1 | 68.3 | 298.4 | 252.7 | 36.4 | 8.0 |
| 1980 | 11.4 | 359.9 | 280.8 | 79.1 | 359.9 | 293.8 | 44.9 | 9.8 |
| 1981 | 6.3 | 397.3 | 305.2 | 92.0 | 397.2 | 317.8 | 59.1 | 14.1 |
| 1982 | –0.2 | 384.2 | 283.2 | 101.0 | 384.2 | 303.2 | 64.5 | 16.7 |
| 1983 | –32.1 | 378.9 | 277.0 | 101.9 | 378.8 | 328.6 | 64.8 | 17.5 |
| 1984 | –86.9 | 424.2 | 302.4 | 121.9 | 424.3 | 405.1 | 85.6 | 20.5 |
| 1985 | –110.8 | 414.5 | 302.0 | 112.4 | 414.5 | 417.2 | 85.9 | 22.2 |
| 1986 | –139.2 | 431.9 | 320.5 | 111.4 | 432.0 | 453.3 | 93.6 | 24.3 |
| 1987 | –150.8 | 487.1 | 363.9 | 123.2 | 487.1 | 509.1 | 105.3 | 23.5 |
| 1988 | –112.2 | 596.2 | 444.1 | 152.1 | 596.2 | 554.5 | 128.5 | 25.5 |
| 1989 | –88.3 | 681.0 | 503.3 | 177.7 | 681.0 | 591.5 | 151.5 | 26.4 |
| 1990 | –70.1 | 741.5 | 552.4 | 189.1 | 741.4 | 630.3 | 154.3 | 26.9 |
| 1991 | 13.5 | 765.7 | 596.8 | 168.9 | 765.8 | 624.3 | 138.5 | –10.6 |
| 1992 | –36.9 | 788.0 | 635.3 | 152.7 | 788.0 | 668.6 | 123.0 | 33.4 |
| 1993 | –70.4 | 812.1 | 655.8 | 156.2 | 812.1 | 720.9 | 124.3 | 37.3 |
| 1994 | –105.2 | 907.3 | 720.9 | 186.4 | 907.3 | 814.5 | 160.2 | 37.8 |
| 1995 | –91.0 | 1,046.1 | 812.2 | 233.9 | 1,046.1 | 903.6 | 198.1 | 35.4 |

**Table 1.10** (continued)

| Year | Balance on current account | Current receipts from the ROW | Exports of goods and services | Income receipts from the ROW | Current payments to ROW and balance on current account | Imports of goods and services | Income payments to ROW | Current taxes and transfers to ROW (net) |
|---|---|---|---|---|---|---|---|---|
| 1996 | –100.3 | 1,117.3 | 868.6 | 248.7 | 1,117.3 | 964.8 | 213.7 | 39.1 |
| 1997 | –110.2 | 1,242.0 | 955.3 | 286.7 | 1,242.0 | 1,056.9 | 253.7 | 41.6 |
| 1998 | –187.4 | 1,243.1 | 955.9 | 287.1 | 1,242.1 | 1,115.9 | 265.8 | 48.8 |
| 1999 | –273.9 | 1,312.1 | 991.2 | 320.8 | 1,312.0 | 1,251.7 | 287.0 | 47.2 |
| 2000 | –396.6 | 1,478.9 | 1,096.3 | 382.7 | 1,479.0 | 1,475.8 | 343.7 | 56.1 |
| 2001 | –370.4 | 1,355.2 | 1,032.8 | 322.4 | 1,355.2 | 1,399.8 | 278.8 | 47.0 |
| 2002 | –457.7 | 1,306.8 | 1,005.0 | 301.8 | 1,306.7 | 1,429.9 | 274.7 | 59.8 |

*Note:* ROW = rest of world.

**Table 1.11** **Domestic capital account, 2002**

| Row No. | Investment | Source | Total |
|---|---|---|---|
| 1 | + Private fixed investment, nonresidential structures | NIPA 5.4.5 line 2 | 271.6 |
| 2 | + Private fixed investment, equipment and software | NIPA 5.5.5 line 1 | 799.9 |
| 3 | + Change in private inventories, nonfarm | NIPA 5.6.5 line 19 | 12.7 |
| 4 | + Change in private inventories, farm | NIPA 5.6.5 line 2 | –1.5 |
| 5 | + Private fixed investment, residential structures | NIPA 5.4.5 line 35 | 496.6 |
| 6 | + Personal consumption expenditures, durable goods | NIPA 1.1.5 line 3 | 916.2 |
| 7 | = Gross private domestic investment | | 2,495.5 |
| 8 | + Government investment, structures | NIPA 5.8.5 line 6 | 222.6 |
| 9 | + Government investment, equipment and software | NIPA 5.8.5 line 46 | 124.9 |
| 10 | = Gross domestic investment | | 2,843.0 |
| 11 | + Net lending or borrowing on rest of world account | NIPA 4.1 line 30 | –458.9 |
| 12 | + Capital accounts transaction (net) | NIPA 4.1 line 32 | 1.3 |
| 13 | = Gross investment | | 2,385.4 |
| | **Saving** | **Source** | **Total** |
| 1 | + Net saving (NIPA) | NIPA 5.1 line 26 | 180.4 |
| 2 | Personal saving | NIPA 2.1 line 33 | 159.2 |
| 3 | Undistributed corporate profits with IVA and capital consumption adjustments | NIPA 5.1 line 5 | 300.7 |
| 4 | Wage accruals less disbursements (private) | NIPA 5.1 line 9 | 0.0 |
| 5 | Net government saving | NIPA 5.1 line 27 | –279.5 |
| 6 | + Consumption of fixed capital | NIPA 1.7.5 line 5 | 1,303.9 |
| 7 | = Gross saving (NIPA) | NIPA 5.1 line 1 | 1,484.3 |
| 8 | + Personal consumption expenditures, durable goods | NIPA 1.1.5 line 3 | 916.2 |
| 9 | = Gross saving | | 2,400.5 |
| 10 | + Statistical discrepancy | NIPA 5.1 line 26 | –15.3 |
| 11 | = Gross saving and statistical discrepancy | | 2,385.2 |
| 12 | – Depreciation | Our imputation | 1,934.3 |
| 13 | = Net saving | | 450.9 |
| 14 | + Revaluation | Our imputation | 2,123.2 |
| 15 | = Change in wealth | | 2,574.0 |

**Table 1.12 Domestic capital account, investment, 1948–2002 (billions of current $)**

| Year | Gross investment | Private investment | Government investment | Balance on current account |
|---|---|---|---|---|
| 1948 | 81.2 | 71.7 | 7.1 | 2.4 |
| 1949 | 73.4 | 62.7 | 9.8 | 0.9 |
| 1950 | 93.8 | 85.7 | 9.9 | –1.8 |
| 1951 | 109.2 | 90.8 | 17.5 | 0.9 |
| 1952 | 106.8 | 83.9 | 22.3 | 0.6 |
| 1953 | 112.4 | 89.7 | 24.0 | –1.3 |
| 1954 | 108.5 | 85.8 | 22.5 | 0.2 |
| 1955 | 129.1 | 107.7 | 21.0 | 0.4 |
| 1956 | 135.5 | 109.7 | 23.0 | 2.8 |
| 1957 | 140.2 | 111.0 | 24.4 | 4.8 |
| 1958 | 128.9 | 101.5 | 26.5 | 0.9 |
| 1959 | 149.2 | 121.1 | 29.3 | –1.2 |
| 1960 | 153.7 | 122.3 | 28.2 | 3.2 |
| 1961 | 155.8 | 120.0 | 31.5 | 4.3 |
| 1962 | 172.1 | 135.0 | 33.2 | 3.9 |
| 1963 | 183.9 | 145.3 | 33.6 | 5.0 |
| 1964 | 200.8 | 158.7 | 34.6 | 7.5 |
| 1965 | 223.1 | 181.4 | 35.5 | 6.2 |
| 1966 | 243.2 | 199.5 | 39.8 | 3.9 |
| 1967 | 245.5 | 199.0 | 42.9 | 3.6 |
| 1968 | 267.3 | 222.1 | 43.5 | 1.7 |
| 1969 | 287.5 | 242.4 | 43.3 | 1.8 |
| 1970 | 285.0 | 237.3 | 43.7 | 4.0 |
| 1971 | 317.5 | 275.1 | 41.8 | 0.6 |
| 1972 | 357.0 | 318.0 | 42.6 | –3.6 |
| 1973 | 424.1 | 368.0 | 46.8 | 9.3 |
| 1974 | 434.6 | 371.7 | 56.3 | 6.6 |
| 1975 | 448.3 | 363.8 | 63.1 | 21.4 |
| 1976 | 526.3 | 451.0 | 66.4 | 8.9 |
| 1977 | 601.1 | 542.5 | 67.6 | –9.0 |
| 1978 | 706.3 | 639.7 | 77.0 | –10.4 |
| 1979 | 797.2 | 707.3 | 88.5 | 1.4 |
| 1980 | 805.4 | 693.7 | 100.3 | 11.4 |
| 1981 | 916.7 | 803.6 | 106.8 | 6.3 |
| 1982 | 869.7 | 757.5 | 112.4 | –0.2 |
| 1983 | 935.8 | 845.0 | 122.8 | –32.0 |
| 1984 | 1,114.6 | 1,062.2 | 139.3 | –86.9 |
| 1985 | 1,147.7 | 1,099.7 | 158.8 | –110.8 |
| 1986 | 1,183.4 | 1,149.4 | 173.2 | –139.2 |
| 1987 | 1,240.2 | 1,206.7 | 184.3 | –150.8 |
| 1988 | 1,349.1 | 1,275.2 | 186.1 | –112.2 |
| 1989 | 1,456.2 | 1,346.8 | 197.7 | –88.3 |
| 1990 | 1,480.9 | 1,335.2 | 215.7 | –70.0 |
| 1991 | 1,490.7 | 1,256.8 | 220.4 | 13.5 |
| 1992 | 1,534.5 | 1,348.4 | 223.0 | –36.9 |
| 1993 | 1,628.7 | 1,480.1 | 219.0 | –70.4 |
| 1994 | 1,795.5 | 1,679.4 | 221.3 | –105.2 |
| 1995 | 1,897.3 | 1,755.6 | 232.7 | –91.0 |
| 1996 | 2,037.4 | 1,892.8 | 244.9 | –100.3 |
| 1997 | 2,224.2 | 2,082.4 | 252.1 | –110.3 |
| 1998 | 2,334.4 | 2,259.4 | 262.4 | –187.4 |
| 1999 | 2,456.2 | 2,443.2 | 286.9 | –273.9 |
| 2000 | 2,506.5 | 2,598.7 | 304.4 | –396.6 |
| 2001 | 2,451.7 | 2,498.1 | 324.0 | –370.4 |
| 2002 | 2,385.3 | 2,495.5 | 347.4 | –457.6 |

**Table 1.13** **Domestic capital account, change in wealth, 1948–2002 (billions of current $)**

| Year | Gross saving | Depreciation | Net saving | Revaluation | Change in wealth |
|---|---|---|---|---|---|
| 1948 | 81.2 | 36.5 | 44.7 | | |
| 1949 | 73.4 | 40.5 | 32.9 | 4.5 | 37.4 |
| 1950 | 93.8 | 44.1 | 49.7 | 25.4 | 75.1 |
| 1951 | 109.2 | 51.1 | 58.1 | 71.7 | 129.8 |
| 1952 | 106.8 | 54.9 | 52.0 | 13.6 | 65.6 |
| 1953 | 112.4 | 58.8 | 53.6 | 42.8 | 96.4 |
| 1954 | 108.5 | 62.4 | 46.1 | 8.8 | 54.8 |
| 1955 | 129.1 | 65.9 | 63.2 | 31.5 | 94.7 |
| 1956 | 135.5 | 72.7 | 62.8 | 101.1 | 164.0 |
| 1957 | 140.2 | 78.7 | 61.5 | 79.0 | 140.6 |
| 1958 | 128.9 | 81.8 | 47.1 | 32.1 | 79.2 |
| 1959 | 149.2 | 86.2 | 63.0 | 45.0 | 108.0 |
| 1960 | 153.7 | 89.4 | 64.3 | 54.9 | 119.3 |
| 1961 | 155.8 | 92.1 | 63.7 | 59.8 | 123.5 |
| 1962 | 172.1 | 95.4 | 76.7 | 68.3 | 145.0 |
| 1963 | 183.9 | 99.7 | 84.2 | 34.6 | 118.8 |
| 1964 | 200.8 | 104.9 | 95.9 | –9.4 | 86.5 |
| 1965 | 223.1 | 110.9 | 112.2 | 38.7 | 150.9 |
| 1966 | 243.2 | 118.9 | 124.3 | 78.4 | 202.8 |
| 1967 | 245.5 | 129.8 | 115.7 | 60.4 | 176.1 |
| 1968 | 267.3 | 142.6 | 124.7 | 191.2 | 315.9 |
| 1969 | 287.5 | 156.9 | 130.6 | 239.4 | 370.0 |
| 1970 | 285.0 | 172.5 | 112.5 | 158.1 | 270.5 |
| 1971 | 317.5 | 187.3 | 130.2 | 196.1 | 326.3 |
| 1972 | 357.0 | 205.3 | 151.7 | 259.8 | 411.4 |
| 1973 | 424.1 | 222.8 | 201.3 | 361.6 | 562.8 |
| 1974 | 434.6 | 255.8 | 178.8 | 606.4 | 785.3 |
| 1975 | 448.3 | 294.2 | 154.1 | 546.6 | 700.7 |
| 1976 | 526.3 | 320.2 | 206.1 | 326.5 | 532.5 |
| 1977 | 601.1 | 353.9 | 247.2 | 624.1 | 871.3 |
| 1978 | 706.3 | 398.5 | 307.8 | 860.5 | 1,168.3 |
| 1979 | 797.2 | 455.0 | 342.2 | 1,073.8 | 1,416.0 |
| 1980 | 805.4 | 522.1 | 283.3 | 1,069.9 | 1,353.2 |
| 1981 | 916.7 | 585.1 | 331.6 | 842.5 | 1,174.0 |
| 1982 | 869.7 | 635.9 | 233.8 | 527.6 | 761.4 |
| 1983 | 935.8 | 660.5 | 275.3 | 361.8 | 637.1 |
| 1984 | 1,114.6 | 694.4 | 420.2 | 333.9 | 754.2 |
| 1985 | 1,147.7 | 744.0 | 403.8 | 568.6 | 972.3 |
| 1986 | 1,183.4 | 803.6 | 379.8 | 917.9 | 1,297.7 |
| 1987 | 1,240.2 | 867.7 | 372.5 | 1,102.7 | 1,475.2 |
| 1988 | 1,349.1 | 929.9 | 419.2 | 1,193.6 | 1,612.9 |
| 1989 | 1,456.2 | 995.9 | 460.3 | 1,056.1 | 1,516.4 |
| 1990 | 1,480.9 | 1,057.7 | 423.2 | 744.5 | 1,167.7 |
| 1991 | 1,490.7 | 1,112.4 | 378.3 | 352.2 | 730.5 |
| 1992 | 1,534.5 | 1,141.3 | 393.2 | 311.6 | 704.8 |
| 1993 | 1,628.7 | 1,190.5 | 438.2 | 990.0 | 1,428.2 |
| 1994 | 1,795.5 | 1,257.3 | 538.2 | 793.8 | 1,332.1 |
| 1995 | 1,897.3 | 1,334.1 | 563.2 | 781.1 | 1,344.3 |
| 1996 | 2,037.4 | 1,396.0 | 641.4 | 801.9 | 1,443.3 |
| 1997 | 2,224.2 | 1,459.3 | 764.9 | 468.6 | 1,233.5 |
| 1998 | 2,334.4 | 1,528.5 | 805.9 | 626.0 | 1,431.9 |
| 1999 | 2,456.2 | 1,621.4 | 834.8 | 1,320.6 | 2,155.4 |
| 2000 | 2,506.5 | 1,743.7 | 762.8 | 1,654.1 | 2,416.9 |
| 2001 | 2,451.7 | 1,860.4 | 591.3 | 1,560.4 | 2,151.7 |
| 2002 | 2,385.3 | 1,934.3 | 451.0 | 2,123.2 | 2,574.1 |

**Table 1.14 Foreign transactions capital account, 2002**

| Row No. | Balance on current account | Source | Total |
|---|---|---|---|
| 1 | Balance on current account | NIPA 4.1 line 29 | –457.7 |
| | Capital account transactions and net lending | Source | Total |
| 1 | Capital account transactions (net) | NIPA 4.1 line 32 | 1.3 |
| 2 | Net lending or borrowing | NIPA 4.1 line 30 | –458.9 |
| 3 | = Current account transactions and net lending | | –457.6 |

include production and sales taxes are used in evaluating private and government consumption expenditures, reflecting the purchasers' perspective. We extend the price and quantity decomposition to saving and investment in order to link investment in constant prices to the change in wealth.

*Index Number Systems*

To illustrate the construction of price and quantity index numbers we consider the value of output in the Domestic Income and Product Account. Suppose that $m$ components of output are distinguished in the accounts; the value of output, say $qY$, can be written:

$$qY = q_1Y_1 + q_2Y_2 + \ldots + q_mY_m.$$

Our system of index numbers consists of a price index for output $q$ and a quantity index for output $Y$, defined in terms of the prices ($q_i$) and quantities ($Y_i$) of the $m$ components. We choose the base for all price indexes as 1.000 in 2000, following the December 2003 benchmark revision of the NIPAs. The base for the quantity indexes is the corresponding value in 2000.

Gross Domestic Product is presented in current and constant prices in the NIPAs. The index number system is based on the Fisher ideal index, a geometric average of Laspeyres and Paasche index numbers. The Laspeyres index of quantity of output, say $Y^L$, is defined by

$$Y_1^L = \frac{\sum q_{i0}Y_{i1}}{\sum q_{i0}Y_{i0}}.$$

The Paasche index uses current prices, rather than base-period prices, as weights:

$$Y_1^P = \frac{\sum q_{i1}Y_{i1}}{\sum q_{i1}Y_{i0}}.$$

The corresponding price index is obtained by dividing GDP in current prices by the Fisher ideal quantity index.

**Table 1.15 Foreign transactions capital account, 1948–2002 (billions of current $)**

| Year | Balance on current account | Capital account transactions (net) | Net lending or borrowing |
|---|---|---|---|
| 1948 | 2.4 | | 2.4 |
| 1949 | 0.9 | | 0.0 |
| 1950 | –1.8 | | –1.8 |
| 1951 | 0.9 | | 0.9 |
| 1952 | 0.6 | | 0.6 |
| 1953 | –1.3 | | –1.3 |
| 1954 | 0.2 | | 0.2 |
| 1955 | 0.4 | | 0.4 |
| 1956 | 2.8 | | 2.8 |
| 1957 | 4.8 | | 4.8 |
| 1958 | 0.9 | | 0.9 |
| 1959 | –1.2 | | –1.2 |
| 1960 | 3.2 | | 3.2 |
| 1961 | 4.3 | | 4.3 |
| 1962 | 3.9 | | 3.9 |
| 1963 | 5.0 | | 5.0 |
| 1964 | 7.5 | | 7.5 |
| 1965 | 6.2 | | 6.2 |
| 1966 | 3.9 | | 3.9 |
| 1967 | 3.6 | | 3.6 |
| 1968 | 1.7 | | 1.7 |
| 1969 | 1.8 | | 1.8 |
| 1970 | 4.0 | | 4.0 |
| 1971 | 0.6 | | 0.6 |
| 1972 | –3.6 | | –3.6 |
| 1973 | 9.3 | | 9.3 |
| 1974 | 6.6 | | 6.6 |
| 1975 | 21.4 | | 21.4 |
| 1976 | 8.9 | | 8.9 |
| 1977 | –9.0 | | –9.0 |
| 1978 | –10.4 | | –10.4 |
| 1979 | 1.4 | | 1.4 |
| 1980 | 11.4 | | 11.4 |
| 1981 | 6.3 | | 6.3 |
| 1982 | –0.2 | –0.2 | 0.0 |
| 1983 | –32.1 | –0.2 | –31.8 |
| 1984 | –86.9 | –0.2 | –86.7 |
| 1985 | –110.8 | –0.3 | –110.5 |
| 1986 | –139.2 | –0.3 | –138.9 |
| 1987 | –150.8 | –0.4 | –150.4 |
| 1988 | –112.2 | –0.5 | –111.7 |
| 1989 | –88.3 | –0.3 | –88.0 |
| 1990 | –70.1 | 6.6 | –76.6 |
| 1991 | 13.5 | 4.5 | 9.0 |
| 1992 | –36.9 | 0.6 | –37.5 |
| 1993 | –70.4 | 1.3 | –71.7 |
| 1994 | –105.2 | 1.7 | –106.9 |
| 1995 | –91.0 | 0.9 | –91.9 |
| 1996 | –100.3 | 0.7 | –101.0 |
| 1997 | –110.2 | 1.0 | –111.3 |
| 1998 | –187.4 | 0.7 | –188.1 |
| 1999 | –273.9 | 4.8 | –278.7 |
| 2000 | –396.6 | 0.8 | –397.4 |
| 2001 | –370.4 | 1.1 | –371.5 |
| 2002 | –457.7 | –1.3 | –458.9 |

**Table 1.16** **Wealth account, 2002**

| Row No. | Wealth | Source | Total |
|---|---|---|---|
| 1 | + Private domestic tangible assets | Our imputation | 38,111.6 |
| 2 | + Government tangible assets | Our imputation | 9,331.4 |
| 3 | = Domestic tangible assets | | 47,443.0 |
| 4 | + Net international investment position of the United States | | –2,553.4 |
| 5 | = Wealth | | 44,889.6 |

Landefeld and Parker (1997) provide a detailed exposition of the chained Fisher ideal price and quantity indexes employed in the NIPAs, and Moulton (2001) discusses the implications of this index number system. Erwin Diewert (1976) has defined a superlative index number as an index that exactly replicates a flexible representation of the underlying technology (or preferences). A flexible representation provides a second-order approximation to an arbitrary technology (or preference system). Konus and Byushgens (1926) first showed that the Fisher ideal index employed in the NIPAs is superlative in this sense. Laspeyres and Paasche indexes are not superlative and fail to capture substitutions among products in response to price changes.

The BLS multifactor productivity program employs a superlative quantity index for measuring real input that replicates a translog representation of technology:

$$\log Y_t - \log Y_{t-1} = \overline{w}_{it}(\log Y_{it} - \log Y_{i,t-1}).$$

The relative share of the $i$th output in the value of total output, say $w_i$, is

$$w_i = \frac{q_i Y_i}{\sum q_i Y_i}.$$

The weights ($\overline{w}_{it}$) are arithmetic averages of the relative shares in the two periods,

$$\overline{w}_{it} = \frac{1}{2} w_{it} + \frac{1}{2} w_{i,t-1}.$$

The corresponding price index is obtained by dividing the value of output by the translog quantity index.[16]

In SNA 1993, superlative systems of index numbers like those employed in the U.S. national accounts are recommended for the output side of the production account. As the base period is changed from time to time, chain-linking of the resulting price and quantity indexes is recommended.

16. Translog index numbers were originally discussed by Fisher (1922).

**Table 1.17 Wealth account, 1948–2002 (billions of current $)**

| Year | Wealth | Private domestic tangible assets | Government tangible assets | Net international investment position of the United States |
|---|---|---|---|---|
| 1948 | 770.6 | 492.0 | 265.7 | 12.9 |
| 1949 | 799.8 | 526.9 | 259.1 | 13.8 |
| 1950 | 875.6 | 605.5 | 257.0 | 13.1 |
| 1951 | 1,008.0 | 698.5 | 295.5 | 14.0 |
| 1952 | 1,079.6 | 747.3 | 318.0 | 14.2 |
| 1953 | 1,175.6 | 816.3 | 343.9 | 15.4 |
| 1954 | 1,234.5 | 859.9 | 359.8 | 14.8 |
| 1955 | 1,328.3 | 934.5 | 379.1 | 14.7 |
| 1956 | 1,483.1 | 1,043.2 | 422.6 | 17.3 |
| 1957 | 1,619.5 | 1,141.1 | 456.4 | 22.0 |
| 1958 | 1,697.6 | 1,199.0 | 475.2 | 23.3 |
| 1959 | 1,799.3 | 1,280.2 | 496.4 | 22.7 |
| 1960 | 1,902.0 | 1,365.4 | 509.9 | 26.7 |
| 1961 | 2,008.6 | 1,446.6 | 533.8 | 28.1 |
| 1962 | 2,144.7 | 1,547.5 | 563.2 | 34.1 |
| 1963 | 2,266.2 | 1,632.2 | 597.2 | 36.8 |
| 1964 | 2,363.7 | 1,694.8 | 626.6 | 42.2 |
| 1965 | 2,512.4 | 1,807.2 | 657.8 | 47.4 |
| 1966 | 2,714.1 | 1,961.2 | 701.5 | 51.4 |
| 1967 | 2,900.6 | 2,098.9 | 751.5 | 50.2 |
| 1968 | 3,194.2 | 2,340.4 | 806.0 | 47.8 |
| 1969 | 3,547.4 | 2,614.4 | 885.4 | 47.7 |
| 1970 | 3,836.9 | 2,826.6 | 980.9 | 39.3 |
| 1971 | 4,152.6 | 3,062.1 | 1,064.5 | 26.0 |
| 1972 | 4,687.3 | 3,477.1 | 1,188.8 | 21.4 |
| 1973 | 5,299.0 | 3,944.9 | 1,304.7 | 49.3 |
| 1974 | 5,784.9 | 4,168.6 | 1,542.5 | 73.7 |
| 1975 | 6,626.8 | 4,816.6 | 1,721.0 | 89.2 |
| 1976 | 7,202.4 | 5,295.1 | 1,829.0 | 78.2 |
| 1977 | 8,138.9 | 5,999.0 | 1,986.0 | 153.8 |
| 1978 | 9,356.8 | 6,965.8 | 2,179.0 | 212.0 |
| 1979 | 10,898.7 | 8,110.1 | 2,455.3 | 333.3 |
| 1980 | 12,428.1 | 9,220.9 | 2,828.6 | 378.6 |
| 1981 | 14,106.3 | 10,582.0 | 3,224.2 | 300.1 |
| 1982 | 15,009.3 | 11,349.4 | 3,424.0 | 235.9 |
| 1983 | 15,628.4 | 11,841.8 | 3,529.2 | 257.4 |
| 1984 | 17,081.0 | 13,278.8 | 3,668.2 | 134.1 |
| 1985 | 18,650.4 | 14,799.9 | 3,753.6 | 96.9 |
| 1986 | 19,987.4 | 15,884.1 | 4,002.5 | 100.8 |
| 1987 | 21,339.8 | 17,007.2 | 4,282.1 | 50.5 |
| 1988 | 23,005.1 | 18,427.1 | 4,567.6 | 10.5 |
| 1989 | 24,721.6 | 19,883.7 | 4,884.9 | –47.0 |
| 1990 | 25,194.5 | 20,351.1 | 5,007.9 | –164.5 |
| 1991 | 25,919.0 | 20,993.3 | 5,186.5 | –260.8 |
| 1992 | 26,170.7 | 21,336.5 | 5,286.5 | –452.3 |
| 1993 | 27,067.8 | 21,811.2 | 5,400.8 | –144.3 |
| 1994 | 27,581.6 | 22,210.7 | 5,506.2 | –135.3 |
| 1995 | 29,373.4 | 23,803.1 | 5,876.1 | –305.8 |
| 1996 | 30,426.3 | 24,677.9 | 6,108.5 | –360.0 |
| 1997 | 31,726.5 | 26,110.0 | 6,439.3 | –822.7 |
| 1998 | 33,951.7 | 28,159.2 | 6,867.8 | –1,075.4 |
| 1999 | 36,550.3 | 30,224.8 | 7,372.2 | –1,046.7 |
| 2000 | 39,504.6 | 33,046.6 | 8,046.6 | –1,588.6 |
| 2001 | 41,629.9 | 35,371.8 | 8,566.2 | –2,308.2 |
| 2002 | 44,889.6 | 38,111.6 | 9,331.4 | –2,553.4 |

**Table 1.18 U.S. international position, 2002**

| Row No. | Wealth | Source | Total |
|---|---|---|---|
| 1 | +U.S. owned assets abroad | | 6,613.3 |
| 2 | –Foreign-owned assets in the United States | | 9,166.7 |
| 3 | =Net international investment position of the United States | | –2,553.4 |

Our index numbers are chain-linked Fisher ideal indexes of components from the NIPAs.

*Taxes*

At a number of points we present data net and gross of taxes, reflecting differences between sellers and buyers that result from tax wedges. As one illustration, consumer expenditures on goods and services in the Income and Expenditures Account include sales and excise taxes, reflecting the purchasers' point of view. Sales of the same goods and services in the Domestic Income and Product Account exclude these taxes, reflecting the perspective of producers. The prices net of taxes are denoted basic prices in SNA 1993. We treat sales and excise taxes as part of the price paid by consumers, so that we can separate the value of transactions into three components—price, quantity, and tax rate.

To illustrate the construction of price, quantity, and tax indexes we consider the value of consumer expenditure as it enters the Income and Expenditures Account. Suppose that $m$ components of consumer expenditure are distinguished in the account; the value of output, gross of tax, say $q^+Y$, may be written:

$$q^+Y = q_1^+Y_1 + q_2^+Y_2 + \ldots + q_m^+Y_m.$$

The prices ($q_i^+$) include sales and excise taxes; the quantities ($Y_i$) are measured in the same way as in the Domestic Income and Product Account. Price and quantity indexes based on these prices and quantities are defined as before.

To introduce taxes into the system of index numbers we let the market price of output $q^+$ be equal to the price received by the producer, say $q$, multiplied by unity plus the effective tax rate, $t$; the value of output at market prices is

$$(1 + t)qY = \sum(1 + t_i)q_iY_i,$$

where the prices paid by the consumers ($q_i^+$) are expressed in terms of prices received by producers ($q_i$) and tax rates ($t_i$). Accordingly, we construct an index of taxes $1 + t$ by dividing the value of transactions at purchasers' prices by the value of transactions at producers' prices. The price and quantity indexes at market prices differ from the corresponding indexes at

**Table 1.19 U.S. international position, 1948–2002 (billions of current $)**

| Year | U.S. owned assets abroad | Foreign-owned assets in the United States | Net international investment position of the United States |
|---|---|---|---|
| 1948 | 29.4 | 16.5 | 12.9 |
| 1949 | 30.7 | 16.9 | 13.8 |
| 1950 | 32.8 | 19.7 | 13.1 |
| 1951 | 34.8 | 20.9 | 14.0 |
| 1952 | 37.2 | 23.0 | 14.2 |
| 1953 | 39.5 | 24.1 | 15.4 |
| 1954 | 42.2 | 27.4 | 14.8 |
| 1955 | 45.0 | 30.4 | 14.7 |
| 1956 | 49.8 | 32.5 | 17.3 |
| 1957 | 54.3 | 32.4 | 22.0 |
| 1958 | 59.4 | 36.1 | 23.3 |
| 1959 | 64.8 | 42.1 | 22.7 |
| 1960 | 71.4 | 44.7 | 26.7 |
| 1961 | 75.0 | 46.9 | 28.1 |
| 1962 | 80.3 | 46.3 | 34.1 |
| 1963 | 88.3 | 51.5 | 36.8 |
| 1964 | 99.1 | 56.9 | 42.2 |
| 1965 | 106.2 | 58.7 | 47.4 |
| 1966 | 111.8 | 60.4 | 51.4 |
| 1967 | 119.9 | 69.7 | 50.2 |
| 1968 | 131.1 | 83.2 | 47.8 |
| 1969 | 138.5 | 90.8 | 47.7 |
| 1970 | 136.7 | 97.4 | 39.3 |
| 1971 | 151.9 | 125.9 | 26.0 |
| 1972 | 181.0 | 159.6 | 21.4 |
| 1973 | 232.0 | 182.7 | 49.3 |
| 1974 | 276.9 | 203.2 | 73.7 |
| 1975 | 321.3 | 232.1 | 89.2 |
| 1976 | 343.4 | 265.2 | 78.2 |
| 1977 | 488.4 | 334.6 | 153.8 |
| 1978 | 645.9 | 434.0 | 212.0 |
| 1979 | 844.8 | 511.5 | 333.3 |
| 1980 | 1,003.8 | 625.2 | 378.6 |
| 1981 | 944.7 | 644.6 | 300.1 |
| 1982 | 961.0 | 725.1 | 235.9 |
| 1983 | 1,129.7 | 872.3 | 257.4 |
| 1984 | 1,127.1 | 993.0 | 134.1 |
| 1985 | 1,302.7 | 1,205.8 | 96.9 |
| 1986 | 1,594.7 | 1,493.9 | 100.8 |
| 1987 | 1,758.7 | 1,708.2 | 50.5 |
| 1988 | 2,008.4 | 1,997.9 | 10.5 |
| 1989 | 2,350.2 | 2,397.2 | –47.0 |
| 1990 | 2,294.1 | 2,458.6 | –164.5 |
| 1991 | 2,470.6 | 2,731.4 | –260.8 |
| 1992 | 2,466.5 | 2,918.8 | –452.3 |
| 1993 | 3,091.4 | 3,235.7 | –144.3 |
| 1994 | 3,315.1 | 3,450.4 | –135.3 |
| 1995 | 3,964.6 | 4,270.4 | –305.8 |
| 1996 | 4,650.8 | 5,010.9 | –360.0 |
| 1997 | 5,379.1 | 6,201.9 | –822.7 |
| 1998 | 6,174.5 | 7,249.9 | –1,075.4 |
| 1999 | 7,390.4 | 8,437.1 | –1,046.7 |
| 2000 | 7,393.6 | 8,982.2 | –1,588.6 |
| 2001 | 6,898.7 | 9,206.9 | –2,308.2 |
| 2002 | 6,613.3 | 9,166.7 | –2,553.4 |

producer prices since taxes enter the weights ($w_i$) employed in constructing the indexes.

### 1.4.5 Domestic Income and Product Account in Constant Prices

*Introduction*

Our principal innovation in presenting the Domestic Income and Product Account in constant prices is to introduce a user cost formula for imputing the rental price of capital services. Systems of national accounts have traditionally relied on market rental prices for making these imputations, but data on market rentals are too limited in scope to cover the capital services required for an integrated and consistent system of U.S. national accounts. In this section we present the Domestic Income and Product Account in constant prices.

*Output and Labor Income*

To construct a quantity index for GDP we first allocate the value of output between consumption and investment goods. Investment goods include durable goods and structures. Consumption goods include nondurable goods and services. Data for prices and quantities of consumption and investment goods are presented in the NIPAs. We construct price and quantity index numbers for the services of consumer, institutional, and government durables, as well as institutional and government real estate, as part of our imputation for the value of the capital services.

The value of output from the point of view of the producing sector excludes sales and excise taxes and includes subsidies. We have allocated these taxes and subsidies in proportion to the consumption and investment goods output in current prices. The price index for each type of output is implicit in the value and quantity of output included in the GDP. We construct price and quantity indexes of GDP by applying chained Fisher ideal index numbers to price and quantity data for consumption and investment goods product. The results are given in table 1.20.

Construction of a quantity index of labor income begins with data on hours worked and labor compensation per hour. We obtain hours worked and labor compensation by sex, age, educational attainment, and employment class from the Census of Population and the Current Population Survey. These data are based on household surveys. Control totals for hours worked and labor compensation are taken from the NIPAs. These totals are based on establishment surveys and reflect payroll records.[17]

Denoting the labor income quantity index by $L$ and the corresponding price index by $p_L$, we represent the value of labor input as the sum over all categories of labor input:

17. Details are given by Jorgenson, Ho, and Stiroh (2005).

**Table 1.20** **Domestic income and product account, product, 1948–2002 (constant prices of 2000)**

| | Gross domestic product | | Investment goods product | | Consumption goods product | |
|---|---|---|---|---|---|---|
| Year | Price | Quantity | Price | Quantity | Price | Quantity |
| 1948 | 0.178 | 1,634.2 | 0.256 | 307.4 | 0.159 | 1,332.9 |
| 1949 | 0.171 | 1,674.2 | 0.254 | 284.6 | 0.151 | 1,415.3 |
| 1950 | 0.175 | 1,825.2 | 0.255 | 362.1 | 0.156 | 1,456.8 |
| 1951 | 0.185 | 1,980.1 | 0.282 | 376.5 | 0.162 | 1,608.1 |
| 1952 | 0.186 | 2,080.0 | 0.284 | 365.1 | 0.163 | 1,742.5 |
| 1953 | 0.188 | 2,181.3 | 0.283 | 390.8 | 0.165 | 1,813.6 |
| 1954 | 0.191 | 2,176.0 | 0.284 | 377.8 | 0.168 | 1,829.7 |
| 1955 | 0.193 | 2,319.8 | 0.287 | 441.7 | 0.170 | 1,884.8 |
| 1956 | 0.201 | 2,372.3 | 0.304 | 433.6 | 0.176 | 1,958.5 |
| 1957 | 0.203 | 2,427.1 | 0.314 | 428.8 | 0.177 | 2,029.9 |
| 1958 | 0.212 | 2,421.9 | 0.319 | 397.5 | 0.186 | 2,078.6 |
| 1959 | 0.211 | 2,572.0 | 0.318 | 456.5 | 0.185 | 2,148.3 |
| 1960 | 0.219 | 2,633.0 | 0.321 | 462.4 | 0.194 | 2,207.6 |
| 1961 | 0.218 | 2,700.9 | 0.322 | 466.4 | 0.193 | 2,277.6 |
| 1962 | 0.220 | 2,847.7 | 0.323 | 513.4 | 0.195 | 2,365.4 |
| 1963 | 0.223 | 2,956.9 | 0.324 | 543.3 | 0.198 | 2,439.4 |
| 1964 | 0.229 | 3,121.1 | 0.326 | 584.7 | 0.204 | 2,556.5 |
| 1965 | 0.236 | 3,303.1 | 0.331 | 643.7 | 0.213 | 2,666.5 |
| 1966 | 0.245 | 3,530.3 | 0.336 | 699.2 | 0.222 | 2,832.7 |
| 1967 | 0.248 | 3,626.7 | 0.342 | 691.6 | 0.225 | 2,950.5 |
| 1968 | 0.259 | 3,791.1 | 0.356 | 721.5 | 0.235 | 3,086.4 |
| 1969 | 0.272 | 3,909.9 | 0.372 | 744.1 | 0.247 | 3,183.2 |
| 1970 | 0.279 | 3,927.2 | 0.389 | 701.8 | 0.252 | 3,266.7 |
| 1971 | 0.295 | 4,057.0 | 0.405 | 749.1 | 0.268 | 3,337.8 |
| 1972 | 0.316 | 4,268.4 | 0.419 | 820.3 | 0.291 | 3,464.2 |
| 1973 | 0.338 | 4,511.6 | 0.436 | 912.8 | 0.313 | 3,596.9 |
| 1974 | 0.367 | 4,496.2 | 0.477 | 871.7 | 0.340 | 3,637.7 |
| 1975 | 0.398 | 4,495.4 | 0.537 | 795.8 | 0.364 | 3,745.9 |
| 1976 | 0.425 | 4,740.1 | 0.563 | 903.6 | 0.390 | 3,855.7 |
| 1977 | 0.455 | 4,974.6 | 0.594 | 994.2 | 0.421 | 3,981.0 |
| 1978 | 0.488 | 5,242.4 | 0.633 | 1,086.2 | 0.452 | 4,141.1 |
| 1979 | 0.519 | 5,401.8 | 0.691 | 1,120.9 | 0.476 | 4,264.6 |
| 1980 | 0.557 | 5,382.5 | 0.756 | 1,038.6 | 0.508 | 4,364.5 |
| 1981 | 0.607 | 5,500.1 | 0.825 | 1,073.0 | 0.552 | 4,442.4 |
| 1982 | 0.644 | 5,416.4 | 0.870 | 962.2 | 0.587 | 4,515.6 |
| 1983 | 0.681 | 5,649.0 | 0.869 | 1,040.9 | 0.632 | 4,656.2 |
| 1984 | 0.711 | 6,057.5 | 0.878 | 1,245.1 | 0.667 | 4,819.3 |
| 1985 | 0.722 | 6,337.2 | 0.888 | 1,284.3 | 0.678 | 5,065.8 |
| 1986 | 0.729 | 6,600.0 | 0.888 | 1,324.8 | 0.687 | 5,292.5 |
| 1987 | 0.746 | 6,845.6 | 0.901 | 1,378.2 | 0.705 | 5,484.2 |
| 1988 | 0.780 | 7,115.3 | 0.916 | 1,442.4 | 0.743 | 5,687.8 |
| 1989 | 0.806 | 7,365.1 | 0.940 | 1,504.3 | 0.770 | 5,873.7 |
| 1990 | 0.831 | 7,518.0 | 0.958 | 1,500.0 | 0.796 | 6,038.7 |
| 1991 | 0.857 | 7,502.9 | 0.972 | 1,417.4 | 0.825 | 6,121.4 |
| 1992 | 0.878 | 7,736.1 | 0.971 | 1,498.5 | 0.851 | 6,268.8 |
| 1993 | 0.892 | 7,943.7 | 0.982 | 1,581.3 | 0.866 | 6,543.5 |
| 1994 | 0.910 | 8,245.4 | 0.992 | 1,719.2 | 0.886 | 6,543.5 |
| 1995 | 0.928 | 8,471.2 | 1.001 | 1,780.3 | 0.906 | 6,707.0 |
| 1996 | 0.947 | 8,806.8 | 1.005 | 1,923.7 | 0.929 | 6,893.1 |
| 1997 | 0.966 | 9,220.6 | 1.004 | 2,124.6 | 0.954 | 7,099.0 |
| 1998 | 0.971 | 9,645.6 | 0.995 | 2,277.8 | 0.963 | 7,368.7 |
| 1999 | 0.983 | 10,111.7 | 0.993 | 2,425.4 | 0.980 | 7,686.4 |
| 2000 | 1.000 | 10,525.6 | 1.000 | 2,528.8 | 1.000 | 7,996.8 |
| 2001 | 1.027 | 10,670.5 | 1.010 | 2,452.7 | 1.032 | 8,216.7 |
| 2002 | 1.034 | 10,927.1 | 1.006 | 2,423.8 | 1.043 | 8,499.6 |

$$p_L L = \sum p_{L,j} L_j,$$

where $p_{L,j}$ is the price of the $j$th type of labor input and $L_j$ is the number of hours worked by workers of this type. Price and quantity indexes of labor income are constructed from chained Fisher ideal quantity indexes, as recommended by SNA 1993.

Price and quantity indexes of labor income for 1948–2002 are given in table 1.21, along with employment, weekly hours, hourly compensation, and hours worked. Labor quality in table 1.21 is defined as the ratio of the quantity index of labor income to hours worked. Labor quality captures changes in the composition of the work force by the characteristics of individual workers, as suggested by BLS (1993). A more detailed description of our estimates is provided by Jorgenson, Ho, and Stiroh (2005).

*Capital Income*

Estimates of capital income, property compensation, depreciation, and capital assets in constant prices require data on both prices and quantities of capital goods. We next describe the construction of these data.[18] The starting point for a quantity index of capital income is a perpetual inventory of capital stocks. Under the assumption that efficiency of capital assets declines geometrically with age, the rate of depreciation, say $\delta$, is a constant. Capital stock at the end of every period can be estimated from investment and capital stock at the beginning of the period:

$$K_t = A_t + (1 - \delta)K_{t-1},$$

where $K_t$ is end of period capital stock, $A_t$ the quantity of investment, and $K_{t-1}$ the capital stock at the beginning of the period. To transform capital stocks into flows of capital services, we introduce an assumption about the time required for new investment to begin to contribute to production, namely that the capital service from each asset is proportional to the arithmetic average of current and lagged capital stocks.[19]

Our perpetual inventory estimates of capital stocks are based on the BEA's reproducible wealth accounts, described by Herman (2000). These data include investment by asset class for sixty-one types of nonresidential assets from 1901 to 2000, forty-eight types of residential assets for the same period, and thirteen types of consumers' durables from 1925 to 2000. As described by Fraumeni (1997), the reproducible wealth accounts use efficiency functions for most assets that decline geometrically with age. To simplify the accounts for tangible wealth, we approximate age-efficiency profiles that are not geometric by best geometric average (BGA) profiles

18. Further details are given by Jorgenson, Ho, and Stiroh (2005).

19. This assumption is employed by Jorgenson and Stiroh (2000), Jorgenson (2001), Jorgenson, Ho, and Stiroh (2005), and Oliner and Sichel (2000). Jorgenson, Gollop, and Fraumeni (1987) had assumed that capital services were proportional to lagged capital stocks.

**Table 1.21** **Domestic income and product account, labor income, 1948–2002 (constant prices of 2000)**

| Year | Labor income | | | | Employment | Weekly hours | Hourly compensation | Hours worked |
|---|---|---|---|---|---|---|---|---|
| | Price | Quantity | Value | Quality | | | | |
| 1948 | 0.077 | 2,246.1 | 173.2 | 0.734 | 61,536 | 38.9 | 1.4 | 124,616 |
| 1949 | 0.079 | 2,184.5 | 173.6 | 0.734 | 60,437 | 38.6 | 1.4 | 121,201 |
| 1950 | 0.082 | 2,277.2 | 187.0 | 0.746 | 62,424 | 38.3 | 1.5 | 124,336 |
| 1951 | 0.087 | 2,462.7 | 213.6 | 0.761 | 66,169 | 38.3 | 1.6 | 131,846 |
| 1952 | 0.090 | 2,534.9 | 228.7 | 0.775 | 67,407 | 38.0 | 1.7 | 133,284 |
| 1953 | 0.094 | 2,597.5 | 244.4 | 0.788 | 68,471 | 37.7 | 1.8 | 134,352 |
| 1954 | 0.096 | 2,536.8 | 244.5 | 0.794 | 66,843 | 37.4 | 1.9 | 130,070 |
| 1955 | 0.100 | 2,613.8 | 262.7 | 0.797 | 68,367 | 37.6 | 2.0 | 133,520 |
| 1956 | 0.106 | 2,677.8 | 283.6 | 0.803 | 69,968 | 37.3 | 2.1 | 135,779 |
| 1957 | 0.111 | 2,684.3 | 297.5 | 0.811 | 70,262 | 36.9 | 2.2 | 134,783 |
| 1958 | 0.114 | 2,618.6 | 299.3 | 0.817 | 68,578 | 36.6 | 2.3 | 130,526 |
| 1959 | 0.119 | 2,709.3 | 323.5 | 0.822 | 70,149 | 36.8 | 2.4 | 134,240 |
| 1960 | 0.124 | 2,748.1 | 339.5 | 0.827 | 71,128 | 36.6 | 2.5 | 135,346 |
| 1961 | 0.125 | 2,788.2 | 348.7 | 0.842 | 71,183 | 36.4 | 2.6 | 134,905 |
| 1962 | 0.128 | 2,893.7 | 371.3 | 0.855 | 72,673 | 36.5 | 2.7 | 137,903 |
| 1963 | 0.133 | 2,930.9 | 388.9 | 0.859 | 73,413 | 36.4 | 2.8 | 139,032 |
| 1964 | 0.138 | 3,008.3 | 416.2 | 0.865 | 74,990 | 36.3 | 2.9 | 141,729 |
| 1965 | 0.144 | 3,105.4 | 446.6 | 0.865 | 77,239 | 36.4 | 3.1 | 146,304 |
| 1966 | 0.151 | 3,239.6 | 490.3 | 0.869 | 80,802 | 36.2 | 3.2 | 151,932 |
| 1967 | 0.159 | 3,290.3 | 522.6 | 0.875 | 82,645 | 35.7 | 3.4 | 153,260 |
| 1968 | 0.170 | 3,375.8 | 575.2 | 0.880 | 84,733 | 35.4 | 3.7 | 156,187 |
| 1969 | 0.183 | 3,463.6 | 632.1 | 0.881 | 87,071 | 35.4 | 3.9 | 160,067 |
| 1970 | 0.198 | 3,407.3 | 673.1 | 0.883 | 86,867 | 34.8 | 4.3 | 157,112 |
| 1971 | 0.211 | 3,408.2 | 719.0 | 0.887 | 86,715 | 34.7 | 4.6 | 156,454 |
| 1972 | 0.226 | 3,499.8 | 789.3 | 0.888 | 88,838 | 34.7 | 4.9 | 160,480 |
| 1973 | 0.242 | 3,640.8 | 880.9 | 0.889 | 92,542 | 34.7 | 5.3 | 166,760 |
| 1974 | 0.265 | 3,643.4 | 966.1 | 0.889 | 94,121 | 34.1 | 5.8 | 166,881 |

*(continued)*

**Table 1.21** (continued)

| Year | Labor income | | | | Employment | Weekly hours | Hourly compensation | Hours worked |
|---|---|---|---|---|---|---|---|---|
| | Price | Quantity | Value | Quality | | | | |
| 1975 | 0.287 | 3,586.8 | 1,029.5 | 0.899 | 92,575 | 33.8 | 6.3 | 162,482 |
| 1976 | 0.311 | 3,689.2 | 1,147.5 | 0.901 | 94,922 | 33.8 | 6.9 | 166,754 |
| 1977 | 0.335 | 3,814.1 | 1,279.4 | 0.901 | 98,202 | 33.8 | 7.4 | 172,399 |
| 1978 | 0.363 | 3,985.8 | 1,448.6 | 0.900 | 102,931 | 33.7 | 8.0 | 180,360 |
| 1979 | 0.395 | 4,120.2 | 1,628.4 | 0.901 | 106,463 | 33.6 | 8.7 | 186,235 |
| 1980 | 0.437 | 4,104.6 | 1,792.6 | 0.904 | 107,061 | 33.2 | 9.7 | 184,922 |
| 1981 | 0.478 | 4,145.3 | 1,980.5 | 0.910 | 108,050 | 33.0 | 10.7 | 185,539 |
| 1982 | 0.509 | 4,105.2 | 2,090.2 | 0.918 | 106,749 | 32.8 | 11.5 | 182,161 |
| 1983 | 0.532 | 4,168.7 | 2,219.2 | 0.919 | 107,810 | 33.0 | 12.0 | 184,781 |
| 1984 | 0.555 | 4,413.4 | 2,447.9 | 0.928 | 112,604 | 33.1 | 12.6 | 193,754 |
| 1985 | 0.580 | 4,531.0 | 2,626.0 | 0.32 | 115,201 | 33.1 | 13.3 | 198,072 |
| 1986 | 0.608 | 4,578.9 | 2,785.0 | 0.932 | 117,158 | 32.9 | 13.9 | 200,164 |
| 1987 | 0.628 | 4,743.4 | 2,978.8 | 0.938 | 120,456 | 32.9 | 14.5 | 206,046 |
| 1988 | 0.657 | 4,889.3 | 3,214.1 | 0.942 | 123,916 | 32.8 | 15.2 | 211,493 |
| 1989 | 0.674 | 5,047.1 | 3,402.5 | 0.947 | 126,743 | 33.0 | 15.7 | 217,179 |
| 1990 | 0.705 | 5,121.8 | 3,610.4 | 0.956 | 128,290 | 32.7 | 16.5 | 218,341 |
| 1991 | 0.737 | 5,069.2 | 3,733.9 | 0.964 | 127,022 | 32.4 | 17.4 | 214,106 |
| 1992 | 0.774 | 5,076.2 | 3,931.5 | 0.965 | 127,100 | 32.4 | 18.4 | 214,183 |
| 1993 | 0.787 | 5,236.2 | 4,118.3 | 0.974 | 129,556 | 32.5 | 18.8 | 218,916 |
| 1994 | 0.803 | 5,393.0 | 4,332.5 | 0.977 | 132,459 | 32.6 | 19.3 | 224,790 |
| 1995 | 0.819 | 5,539.7 | 4,535.5 | 0.982 | 135,297 | 32.7 | 19.7 | 229,741 |
| 1996 | 0.841 | 5,644.8 | 4,749.1 | 0.988 | 137,571 | 32.5 | 20.4 | 232,695 |
| 1997 | 0.867 | 5,804.6 | 5,035.2 | 0.989 | 140,432 | 32.7 | 21.1 | 239,043 |
| 1998 | 0.907 | 5,964.9 | 5,409.0 | 0.993 | 143,557 | 32.8 | 22.1 | 244,667 |
| 1999 | 0.944 | 6,105.2 | 5,763.1 | 0.996 | 146,468 | 32.8 | 23.1 | 249,676 |
| 2000 | 1.000 | 6,204.4 | 6,204.4 | 1.000 | 149,364 | 32.5 | 24.5 | 252,730 |
| 2001 | 1.032 | 6,168.4 | 6,367.8 | 1.005 | 149,166 | 32.2 | 25.5 | 250,029 |
| 2002 | 1.065 | 6,098.7 | 6,493.5 | 1.005 | 147,885 | 32.1 | 26.3 | 247,080 |

**Table 1.22 Benchmarks, depreciation rates, and deflators**

| Row No. | Asset class | 2002 benchmark (billions of 2000 dollars) | Depreciation rate | Deflator |
|---|---|---|---|---|
| 1 | Consumer Durables | 3,846.0 | 0.201 | NIPA |
| 2 | Nonresidential Structures | 11,482.5 | 0.024 | NIPA |
| 3 | Residential Structures | 10,639.4 | 0.016 | NIPA |
| 4 | Equipment and Software | 5,561.2 | 0.144 | NIPA |
| 5 | Nonfarm inventories | 1,573.3 | | NIPA |
| 6 | Farm inventories | 124.7 | | NIPA |
| 7 | Land | 10,193.5 | | Implicit price of household land, flow of funds |

that are geometric, following Hulten and Wykoff (1982). Benchmark estimates of capital stocks in 2002, expressed in constant prices of 2000, rates of depreciation, and the sources of price indexes for each type of capital are presented in table 1.22.

The official price indexes for computers provide the paradigm for economic measurement. These indexes capture the steady decline in information technology prices and the recent acceleration in this decline. The official price indexes for central office switching equipment and prepackaged software also hold performance constant. Our price indexes for reproducible assets are taken from the NIPAs. An important assumption is that these prices are measured in "efficiency" units, holding the quality of assets constant over time. For example, we hold the performance of computers and peripheral equipment constant, using the constant quality price indexes constructed by a BEA-IBM team and introduced into the NIPAs in 1985. Triplett's (1986) discussion of the economic interpretation of these indexes brought the rapid decline of computer prices to the attention of a very broad audience.

Dulberger (1989) presented a more detailed report on her research on the prices of computer processors for the BEA-IBM project. Speed of processing and main memory played central roles in her model. Triplett (1989, 2005) has provided exhaustive surveys of research on hedonic price indexes for computers. Gordon (1989, 1990) gave an alternative model of computer prices and identified computers and communications equipment, along with commercial aircraft, as assets with the highest rates of price decline.

Communications technology is crucial for the rapid development and diffusion of the Internet, perhaps the most striking manifestation of information technology in the American economy. Flamm (1989) was the first to compare the behavior of computer prices and the prices of communications equipment. He concluded that the communications equipment prices

fell only a little more slowly than computer prices. Gordon (1990) compared Flamm's results with the official price indexes, revealing substantial bias in the official indexes. Unfortunately, constant quality price indexes cover only a portion of communications equipment. Switching and terminal equipment rely heavily on semiconductor technology, so that product development reflects improvements in semiconductors. Grimm's (1997) constant quality price index for digital telephone switching equipment was incorporated into the national accounts in 1996. The output of communications equipment in the NIPAs also incorporates a constant quality price index for cellular phones.

Much communications investment takes the form of the transmission gear, connecting data, voice, and video terminals to switching equipment. Technologies such as fiber optics, microwave broadcasting, and communications satellites have progressed at rates that outrun even the dramatic pace of semiconductor development. Mark Doms (2005) has provided comprehensive price indexes for terminals, switching gear, and transmission equipment. These have been incorporated into the Federal Reserve's Index of Industrial Production, as described by Corrado (2003), but are not yet included in the NIPAs.

Both software and hardware are essential for information technology, and this is reflected in the large volume of software expenditures. The eleventh comprehensive revision of the national accounts, released by the BEA on October 27, 1999, reclassified computer software as investment.[20] Before this important advance, business expenditures on software were treated as current outlays, while personal and government expenditures were treated as purchases of nondurable goods. Software investment is growing rapidly and is now much more important than investment in computer hardware.

Parker and Grimm (2000) describe the new estimates of investment in software. The BEA distinguishes among three types of software—prepackaged, custom, and own-account software. Prepackaged software is sold or licensed in standardized form and is delivered in packages or electronic files downloaded from the Internet. Custom software is tailored to the specific application of the user and is delivered along with analysis, design, and programming services required for customization. Own-account software consists of software created for a specific application. However, only price indexes for prepackaged software hold performance constant.

Parker and Grimm (2000) present a constant quality price index for prepackaged software. This combines a hedonic model of prices for business applications software and a matched model index for spreadsheet and word processing programs developed by Oliner and Sichel (1994). Pre-

20. Moulton (2000) describes the eleventh comprehensive revision of NIPA and the 1999 update.

packaged software prices decline at more than 10 percent per year over the period 1962–1998. Since 1998 the BEA has relied on a matched model price index for all prepackaged software from the Producers' Price Index (PPI) program of the BLS. The BEA's prices for own-account and custom software incorporate data on programmer wage rates. Custom and own-account software prices are a weighted average of prepackaged software prices and programmer wage rates with arbitrary weights of 75 percent for programmer wage rates and 25 percent for prepackaged software.

Given market rental prices by class of asset, the implicit rental values paid by owners for the use of their property can be imputed by applying these rental rates. This method of imputation is used to estimate the rental value of owner-occupied dwellings in the U.S. national accounts. The total rental value is divided among taxes, consumption of fixed capital, interest payments, and net rent. A similar method of imputation is used for the space rental value of institutional buildings, but net rent is omitted from the imputation. The main obstacle to broader application of this method is the lack of data on market rental prices. A substantial proportion of the capital goods employed in the U.S. economy has an active rental market; most classes of structures can be rented and a rental market exists for many types of equipment, especially aircraft, trucks, construction equipment, computers, and so on. Unfortunately, very little effort has been devoted to compiling data on rental rates for either structures or equipment.

We extend the perpetual inventory method to rental prices of capital services in order to provide an alternative approach for imputation of the rental values.[21] For each type of capital we prepare perpetual inventory estimates of acquisition prices, service prices, depreciation, and revaluation. Under our assumption of geometrically declining relative efficiency of capital goods, the acquisition prices decline geometrically with vintage. The formula for the value of capital stock,

$$q_{A,t}K_t = \sum q_{A,t}(1 - \delta)^{\tau} A_{t-\tau},$$

is the sum of past investments weighted by relative efficiencies and evaluated at the price for acquisition of new capital goods $q_{A,t}$. Second, depreciation $q_{D,t}$ is proportional to the value of beginning-of-period capital stock:

$$q_{D,t}K_{t-1} = \delta q_{A,t}K_{t-1}.$$

Finally, revaluation $(q_{A,t} - q_{A,t-1})K_{t-1}$ is equal to the change in the acquisition price of new capital goods multiplied by beginning-of-period capital stock.

Households and institutions and government are not subject to direct taxes. Noncorporate business is subject to personal income taxes, while corporate business is subject to both corporate and personal income taxes.

21. A detailed presentation of this extension of the perpetual inventory method is given by Christensen and Jorgenson (1996).

**Table 1.23** **Relative proportions of capital stock by asset class and sector, 2002**

| Row No. | Asset class | Sector | | | | Total |
|---|---|---|---|---|---|---|
| | | Corporate | Noncorporate | Households | Government | |
| 1 | Consumer durables | | | 0.078 | | 0.078 |
| 2 | Nonresidential structures | 0.102 | 0.027 | 0.017 | 0.112 | 0.258 |
| 3 | Equipment and software | 0.085 | 0.012 | 0.003 | 0.016 | 0.115 |
| 4 | Residential structures | 0.002 | 0.041 | 0.193 | 0.005 | 0.241 |
| 5 | Nonfarm inventories | 0.027 | 0.002 | | 0.005 | 0.033 |
| 6 | Farm inventories | | 0.003 | | | 0.003 |
| 7 | Land | 0.050 | 0.071 | 0.090 | 0.060 | 0.272 |
| | Total | 0.266 | 0.155 | 0.382 | 0.197 | 1.000 |

Businesses and households are subject to indirect taxes on the value of property. In order to take these differences in taxation into account we first allocate each class of assets among the five sectors of the U.S. domestic economy—corporations, noncorporate business, households, and institutions and government. The relative proportions of capital stock by asset class for each sector for 2002 are given in table 1.23.

For a sector not subject to either direct or indirect taxes, we can utilize the capital service price $q_{K,t}$,

$$q_{K,t} = q_{A,t-1}[r_t - \pi_t + (1 + \pi_t)\delta],$$

where $r_t$ is the nominal rate of return and $\pi_t$ is the rate of inflation in the acquisition price of new capital goods. This formula can be applied to government and nonprofit institutions by choosing an appropriate rate of return, as described below.[22]

Given the rate of return for government and nonprofit institutions, we can construct estimates of capital service prices for each class of assets held by these sectors—land held by government and institutions, residential and nonresidential structures, producer and consumer durables. Price and quantity measures of capital input by class of asset can be combined into price and quantity index numbers of capital input by government and institutions, using the chained Fisher ideal index numbers employed in the NIPAs.

Households hold consumer durables and owner-occupied dwellings that are taxed indirectly through property taxes. To incorporate property taxes into our estimates of the price and quantity of capital services we add taxes to the cost of capital, depreciation, and revaluation, obtaining the capital service price:

22. Alternative methods for imputing the rate of return to capital are reviewed by Moulton (2004). A detailed derivation of prices of capital services is given by Jorgenson and Yun (2001).

$$q_{K,t} = q_{A,t-1}[r_t - \pi_t + (1 + \pi_t)\delta + (1 - t_e)\tau_t],$$

where $\tau_t$ is the rate of property taxation and $t_e$ is the average marginal tax rate on income from which property taxes are deductible.

The household rate of return,

$$r_t - \pi = \beta[(1 - t_e)i_t - \pi_t] + (1 - \beta)[\rho_t - \pi_t],$$

is a weighted average of the rate of interest $i_t$ and the nominal rate of return on equity in household assets $\rho_t$ with weights that depend on the ratio of debt to the value of household capital stock $\beta$ and the average marginal individual tax rate on income from household property $t_e$. We set the nominal rate of return on equity equal to the corresponding rate of return for owner-occupied housing after all taxes.

Given the rate of return for households, we can construct estimates of capital service prices for each class of assets held by households—land, residential structures, and consumer durables. We employ separate effective tax rates for owner-occupied residential property, both land and structures, and for consumer durables. Price and quantity measures of capital income by class of asset are combined into price and quantity index numbers of capital income by households, using chained Fisher ideal index numbers.

Our measure of the GDP differs from the NIPAs in the treatment of durables and real estate held by households and institutions and government. We assign personal and government consumption expenditures on durables to investment rather than consumption. This leaves GDP unchanged. We add the service flow from household, institutional, and government durables to the value of output and the value of capital input. We also add the net rent component of the services of institutional and government real estate to values of both output and input.

We next consider the measurement of price and quantity of capital services for noncorporate business. The main challenge is to separate the income of unincorporated enterprises between labor and property compensation. We estimate labor compensation of the self-employed from the incomes received by comparable categories of employees.[23] Property compensation is the sum of income originating in business, other than corporate business and government enterprises and the net rent of owner-occupied dwellings, less the imputed labor compensation of proprietors and unpaid family workers, plus noncorporate consumption of fixed capital, less allowances for owner-occupied dwellings and institutional structures, and plus indirect business taxes allocated to the noncorporate sector. We also allocate the statistical discrepancy to noncorporate property compensation.

To obtain an estimate of the noncorporate rate of return we must take

23. Estimation of the labor compensation of the self-employed is discussed by Jorgenson, Ho, and Stiroh (2005).

into account the personal income tax. The capital service price, modified to incorporate income tax and indirect business taxes, becomes

$$q_{K,t} = \left(\frac{1 - t_e z_t - k_t + y_t}{1 - t_e}\right) q_{A,t-1}[r_t - \pi_t + (1 + \pi_t)\delta] + q_{A,t-1}\tau_t,$$

where indirect business taxes $q_{A,t-1}\tau_t$ are deducted from noncorporate property compensation before taxes as an expense, $t_e$ is the average marginal tax rate on noncorporate property compensation, $z_t$ is the present value of depreciation allowances on one dollar's worth of investment, $k_t$ the investment tax credit, and $y_t = k_t u_t z_t$. The variable $y_t$ is set equal to zero for all years but 1962 and 1963; it is used in accounting for the fact that the investment tax credit was deducted from the value of an asset for depreciation in those years. The tax credit and depreciation allowances are different from zero only for durables and structures.

The noncorporate rate of return,

$$r_t - \pi = \beta[(1 - t_e)i_t - \pi_t] + (1 - \beta)[\rho_t - \pi_t(1 - t_g)],$$

is a weighted average of the rate of interest $i_t$ and the nominal rate of return on noncorporate assets $\rho_t$ with weights that depend on the ratio of debt to the value of noncorporate capital stock $\beta$, the average marginal individual tax rate on income from noncorporate property $t_e$, and the marginal tax rate on capital gains on noncorporate assets $t_g$.

We multiply the capital service price by the quantity of capital services for each asset held by noncorporate business, sum over assets, and solve for the rate of return. Given data on prices of acquisition, stocks, tax rates, and replacement rates, we can estimate capital service prices for each class of assets held by the noncorporate sector. Price and quantity measures of capital input by class of asset are combined into price and quantity index numbers of capital input, using chained Fisher ideal index numbers, as before.

Finally, we consider the measurement of prices and quantities of capital services for corporate business. We measure corporate property compensation as income originating in corporate business, less compensation of employees, plus corporate consumption of fixed capital, plus business transfer payments, plus the indirect business taxes allocated to the corporate sector. To obtain an estimate of the corporate rate of return we must take into account the corporate income tax. The capital service price becomes

$$q_{K,t} = \left(\frac{1 - uz_t - k_t + y_t}{1 - u}\right) q_{A,t-1}[r_t - \pi_t + (1 + \pi_t)\delta] + q_{A,t-1}\tau_t,$$

where indirect business taxes $q_{A,t-1}\tau_t$ are deducted from corporate property compensation before taxes as an expense, $u$ is the corporate tax rate, $z_t$ is the present value of depreciation allowances, $k_t$ the investment tax credit, and $y_t = k_t u_t z_t$.

The corporate rate of return,

$$r_t - \pi = \beta[(1 - u)i_t - \pi_t] + (1 - \beta)\left[\frac{\rho_t - \pi_t(1 - t_g)}{(1 - t_e)\alpha + (1 - t_g)(1 - \alpha)}\right],$$

is a weighted average of the rate of interest $i_t$ and the nominal rate of return on corporate assets $\rho_t$ with weights that depend on the ratio of debt to the value of corporate capital stock $\beta$, the average marginal individual tax rate on income from corporate property $t_e$, the marginal tax rate on capital gains on corporate equities $t_g$, and the dividend payout ratio $\alpha$ from corporate income after corporate taxes.

Our method for estimating the corporate rate of return is the same as for the noncorporate rate of return. Property compensation in the corporate sector is the sum of the value of services from residential and nonresidential structures, producer durable equipment, inventories, and land held by the sector. To estimate the rate of return in the corporate sector we require estimates of the variables that enter the value of capital services except, of course, for the rate of return. We then solve for the rate of return in terms of these variables and total property compensation. Price and quantity indexes of capital input by class of asset are combined into price and quantity indexes of capital input for the corporate sector.

We assume that the nominal rate of return is the same for all assets within a given sector. For the corporate and noncorporate sectors this rate of return is inferred from the value of property compensation, acquisition prices and stocks of capital goods, rates of replacement, and variables describing the tax structure. For households the rate of return is inferred from income from owner-occupied housing. For government, the imputed rate of return is set equal to the average of corporate, noncorporate, and household rates of return after both corporate and personal taxes. To obtain price and quantity indexes of capital income for the domestic sector we apply chained Fisher ideal index numbers to price and quantity indexes for each of the five subsectors—corporations, noncorporate business, households, institutions, and government. Price and quantity indexes of capital income for corporations, noncorporate business, households, institutions, and government, as well as the U.S. domestic economy are given for 1948–2002 in table 1.24.

We construct price and quantity index numbers for the GDI by combining indexes of labor and capital income. The weights for labor and capital are the relative shares of labor and capital income in the GDI. Price and quantity indexes of GDI for the U.S. domestic economy are given for 1948–2002 in table 1.25. Multifactor productivity, also given in table 1.25, is defined as the ratio of GDP in constant prices to GDI in constant prices.[24] Growth in multifactor productivity can be interpreted as an increase in

24. For further discussion of this index of multifactor productivity, see Jorgenson (2001).

**Table 1.24** **Domestic income and product account, capital income, 1948–2002 (constant prices of 2000)**

| | Capital income | | Corporate income | | Noncorporate income | | Household income | | Government income | | Capital income: Relative share |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Price | Quantity | Price | Quantity | Price | Quantity | Price | Quantity | Price | Quantity | |
| 1948 | 0.268 | 436.8 | 0.333 | 131.6 | 0.171 | 124.5 | 0.325 | 110.9 | 0.175 | 89.7 | 0.402 |
| 1949 | 0.235 | 472.8 | 0.309 | 139.8 | 0.147 | 131.7 | 0.256 | 131.4 | 0.175 | 86.3 | 0.389 |
| 1950 | 0.260 | 506.7 | 0.345 | 147.7 | 0.166 | 139.1 | 0.262 | 151.2 | 0.219 | 83.8 | 0.413 |
| 1951 | 0.278 | 547.3 | 0.364 | 159.2 | 0.215 | 146.8 | 0.279 | 171.3 | 0.175 | 83.5 | 0.415 |
| 1952 | 0.272 | 581.8 | 0.337 | 169.6 | 0.211 | 152.2 | 0.279 | 186.6 | 0.195 | 85.9 | 0.408 |
| 1953 | 0.270 | 611.6 | 0.333 | 177.6 | 0.200 | 156.6 | 0.256 | 200.0 | 0.262 | 89.7 | 0.403 |
| 1954 | 0.268 | 639.2 | 0.321 | 184.7 | 0.188 | 160.5 | 0.272 | 212.9 | 0.258 | 93.3 | 0.412 |
| 1955 | 0.277 | 670.0 | 0.368 | 193.2 | 0.185 | 164.7 | 0.275 | 227.7 | 0.221 | 95.9 | 0.414 |
| 1956 | 0.274 | 704.1 | 0.357 | 203.4 | 0.161 | 168.6 | 0.292 | 243.9 | 0.221 | 97.8 | 0.405 |
| 1957 | 0.266 | 733.7 | 0.352 | 212.9 | 0.180 | 171.7 | 0.262 | 257.5 | 0.223 | 99.3 | 0.396 |
| 1958 | 0.282 | 756.9 | 0.327 | 219.2 | 0.201 | 175.7 | 0.283 | 268.5 | 0.306 | 101.1 | 0.417 |
| 1959 | 0.280 | 781.0 | 0.371 | 225.4 | 0.184 | 179.9 | 0.256 | 279.3 | 0.293 | 104.1 | 0.403 |
| 1960 | 0.293 | 809.4 | 0.357 | 233.7 | 0.173 | 184.1 | 0.296 | 291.3 | 0.331 | 107.4 | 0.411 |
| 1961 | 0.287 | 834.5 | 0.358 | 241.4 | 0.188 | 187.8 | 0.293 | 300.9 | 0.270 | 110.9 | 0.407 |
| 1962 | 0.296 | 863.2 | 0.383 | 250.7 | 0.200 | 192.8 | 0.292 | 310.8 | 0.260 | 114.9 | 0.407 |
| 1963 | 0.299 | 899.7 | 0.394 | 262.7 | 0.202 | 199.8 | 0.293 | 323.9 | 0.256 | 118.5 | 0.409 |
| 1964 | 0.316 | 939.5 | 0.410 | 276.0 | 0.216 | 206.5 | 0.303 | 339.5 | 0.299 | 121.7 | 0.416 |
| 1965 | 0.338 | 985.4 | 0.436 | 292.3 | 0.234 | 213.2 | 0.326 | 357.8 | 0.313 | 124.4 | 0.427 |
| 1966 | 0.359 | 1,043.2 | 0.440 | 314.0 | 0.275 | 222.1 | 0.350 | 379.7 | 0.330 | 127.5 | 0.433 |
| 1967 | 0.343 | 1,102.1 | 0.423 | 335.2 | 0.272 | 232.8 | 0.327 | 401.0 | 0.319 | 131.8 | 0.420 |
| 1968 | 0.350 | 1,158.2 | 0.432 | 354.3 | 0.274 | 242.5 | 0.335 | 423.0 | 0.327 | 136.0 | 0.414 |
| 1969 | 0.354 | 1,216.6 | 0.425 | 375.3 | 0.270 | 251.4 | 0.365 | 446.7 | 0.293 | 138.7 | 0.406 |
| 1970 | 0.334 | 1,267.6 | 0.396 | 394.3 | 0.291 | 260.5 | 0.347 | 465.7 | 0.210 | 140.4 | 0.386 |
| 1971 | 0.364 | 1,315.7 | 0.427 | 411.3 | 0.321 | 270.2 | 0.381 | 484.4 | 0.226 | 140.6 | 0.400 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1972 | 0.404 | 1,389.3 | 0.448 | 436.0 | 0.339 | 288.6 | 0.411 | 513.0 | 0.404 | 140.5 | 0.415 |
| 1973 | 0.436 | 1,480.2 | 0.457 | 468.5 | 0.377 | 311.5 | 0.429 | 548.9 | 0.552 | 140.9 | 0.423 |
| 1974 | 0.456 | 1,505.6 | 0.469 | 478.3 | 0.392 | 308.2 | 0.432 | 566.9 | 0.679 | 141.2 | 0.415 |
| 1975 | 0.500 | 1,520.4 | 0.552 | 485.4 | 0.454 | 302.5 | 0.431 | 577.2 | 0.739 | 143.2 | 0.425 |
| 1976 | 0.545 | 1,586.5 | 0.588 | 512.0 | 0.498 | 313.7 | 0.460 | 602.1 | 0.894 | 146.9 | 0.430 |
| 1977 | 0.595 | 1,656.4 | 0.643 | 539.8 | 0.517 | 322.1 | 0.527 | 634.5 | 0.925 | 149.7 | 0.435 |
| 1978 | 0.636 | 1,743.1 | 0.682 | 576.1 | 0.560 | 335.5 | 0.563 | 670.5 | 0.989 | 152.4 | 0.434 |
| 1979 | 0.639 | 1,839.9 | 0.681 | 617.8 | 0.623 | 355.5 | 0.576 | 703.6 | 0.822 | 155.2 | 0.419 |
| 1980 | 0.627 | 1,925.6 | 0.676 | 659.1 | 0.582 | 372.4 | 0.601 | 726.5 | 0.686 | 158.6 | 0.403 |
| 1981 | 0.671 | 2,025.0 | 0.749 | 708.2 | 0.576 | 397.8 | 0.638 | 745.7 | 0.753 | 162.5 | 0.407 |
| 1982 | 0.662 | 2,112.7 | 0.734 | 752.0 | 0.480 | 419.6 | 0.662 | 763.3 | 0.847 | 166.4 | 0.401 |
| 1983 | 0.748 | 2,174.7 | 0.787 | 780.7 | 0.606 | 426.7 | 0.672 | 783.5 | 1.328 | 170.5 | 0.423 |
| 1984 | 0.812 | 2,292.5 | 0.856 | 827.9 | 0.636 | 452.3 | 0.721 | 826.8 | 1.529 | 175.5 | 0.432 |
| 1985 | 0.792 | 2,461.6 | 0.837 | 891.0 | 0.644 | 496.6 | 0.723 | 887.9 | 1.325 | 182.2 | 0.426 |
| 1986 | 0.780 | 2,602.4 | 0.806 | 937.2 | 0.694 | 523.5 | 0.748 | 947.2 | 1.057 | 191.6 | 0.422 |
| 1987 | 0.786 | 2,705.5 | 0.839 | 968.1 | 0.666 | 531.6 | 0.751 | 998.4 | 1.038 | 202.4 | 0.417 |
| 1988 | 0.831 | 2,806.5 | 0.893 | 999.2 | 0.647 | 541.5 | 0.792 | 1,047.6 | 1.230 | 211.5 | 0.421 |
| 1989 | 0.870 | 2,915.6 | 0.904 | 1,037.5 | 0.803 | 555.7 | 0.810 | 1,096.1 | 1.210 | 219.1 | 0.427 |
| 1990 | 0.881 | 2,992.3 | 0.902 | 1,067.4 | 0.867 | 558.2 | 0.827 | 1,131.2 | 1.113 | 227.1 | 0.422 |
| 1991 | 0.885 | 3,043.4 | 0.906 | 1,089.9 | 0.850 | 555.3 | 0.825 | 1,153.0 | 1.206 | 235.1 | 0.419 |
| 1992 | 0.922 | 3,099.5 | 0.917 | 1,116.2 | 0.977 | 554.2 | 0.838 | 1,175.5 | 1.272 | 242.3 | 0.421 |
| 1993 | 0.942 | 3,151.5 | 0.939 | 1,148.1 | 1.071 | 544.2 | 0.900 | 1,201.3 | 0.908 | 248.5 | 0.419 |
| 1994 | 0.990 | 3,200.4 | 1.002 | 1,184.7 | 1.148 | 527.8 | 0.917 | 1,229.3 | 0.977 | 253.3 | 0.422 |
| 1995 | 1.007 | 3,301.8 | 1.041 | 1,241.0 | 1.114 | 526.5 | 0.965 | 1,273.3 | 0.841 | 257.4 | 0.423 |
| 1996 | 1.044 | 3,441.4 | 1.077 | 1,312.8 | 1.174 | 533.5 | 0.961 | 1,330.2 | 1.042 | 261.9 | 0.431 |
| 1997 | 1.076 | 3,597.7 | 1.110 | 1,394.9 | 1.192 | 538.9 | 0.994 | 1,396.6 | 1.104 | 266.1 | 0.435 |
| 1998 | 1.036 | 3,817.9 | 1.062 | 1,502.5 | 1.091 | 560.1 | 0.991 | 1,484.0 | 1.029 | 270.7 | 0.422 |
| 1999 | 1.028 | 4,067.9 | 1.034 | 1,620.1 | 1.089 | 584.1 | 1.004 | 1,586.3 | 0.994 | 277.2 | 0.420 |
| 2000 | 1.000 | 4,321.6 | 1.000 | 1,738.7 | 1.000 | 606.3 | 1.000 | 1,692.5 | 1.000 | 284.2 | 0.411 |
| 2001 | 1.012 | 4,537.1 | 0.946 | 1,836.6 | 1.132 | 620.9 | 1.013 | 1,790.4 | 1.157 | 291.0 | 0.419 |
| 2002 | 1.021 | 4,709.2 | 0.965 | 1,894.1 | 1.211 | 632.6 | 0.994 | 1,887.7 | 1.141 | 298.5 | 0.425 |

**Table 1.25** **Domestic income and product account, productivity, 1948–2002 (constant prices of 2000)**

| Year | Gross domestic product | | Gross domestic income | | Multifactor productivity |
|---|---|---|---|---|---|
| | Price | Quantity | Price | Quantity | |
| 1948 | 0.178 | 1,634.2 | 0.129 | 2,258.7 | 0.725 |
| 1949 | 0.171 | 1,674.2 | 0.125 | 2,292.6 | 0.732 |
| 1950 | 0.175 | 1,825.2 | 0.132 | 2,416.6 | 0.757 |
| 1951 | 0.185 | 1,980.1 | 0.140 | 2,609.2 | 0.760 |
| 1952 | 0.186 | 2,080.0 | 0.142 | 2,719.7 | 0.766 |
| 1953 | 0.188 | 2,181.3 | 0.146 | 2,814.3 | 0.775 |
| 1954 | 0.191 | 2,176.0 | 0.147 | 2,822.6 | 0.770 |
| 1955 | 0.193 | 2,319.8 | 0.153 | 2,930.1 | 0.792 |
| 1956 | 0.201 | 2,372.3 | 0.157 | 3,030.8 | 0.782 |
| 1957 | 0.203 | 2,427.1 | 0.160 | 3,093.0 | 0.786 |
| 1958 | 0.212 | 2,421.9 | 0.166 | 3,080.9 | 0.786 |
| 1959 | 0.211 | 2,572.0 | 0.170 | 3,185.9 | 0.807 |
| 1960 | 0.219 | 2,633.0 | 0.177 | 3,261.0 | 0.808 |
| 1961 | 0.218 | 2,700.9 | 0.177 | 3,330.9 | 0.811 |
| 1962 | 0.220 | 2,847.7 | 0.182 | 3,450.0 | 0.825 |
| 1963 | 0.223 | 2,956.9 | 0.186 | 3,537.3 | 0.836 |
| 1964 | 0.229 | 3,121.1 | 0.195 | 3,656.0 | 0.854 |
| 1965 | 0.236 | 3,303.1 | 0.205 | 3,799.1 | 0.870 |
| 1966 | 0.245 | 3,530.3 | 0.217 | 3,988.1 | 0.885 |
| 1967 | 0.248 | 3,626.7 | 0.219 | 4,118.5 | 0.881 |
| 1968 | 0.259 | 3,791.1 | 0.230 | 4,268.6 | 0.888 |
| 1969 | 0.272 | 3,909.9 | 0.240 | 4,421.1 | 0.884 |
| 1970 | 0.279 | 3,927.2 | 0.246 | 4,451.3 | 0.883 |
| 1971 | 0.295 | 4,057.0 | 0.265 | 4,516.8 | 0.898 |
| 1972 | 0.316 | 4,268.4 | 0.288 | 4,691.2 | 0.910 |
| 1973 | 0.338 | 4,511.6 | 0.310 | 4,928.6 | 0.915 |
| 1974 | 0.367 | 4,496.2 | 0.333 | 4,966.5 | 0.905 |
| 1975 | 0.398 | 4,495.4 | 0.362 | 4,941.8 | 0.910 |
| 1976 | 0.425 | 4,740.1 | 0.394 | 5,114.1 | 0.927 |
| 1977 | 0.455 | 4,974.6 | 0.427 | 5,309.2 | 0.937 |
| 1978 | 0.488 | 5,242.4 | 0.460 | 5,566.0 | 0.942 |
| 1979 | 0.519 | 5,401.8 | 0.483 | 5,804.3 | 0.931 |
| 1980 | 0.557 | 5,382.5 | 0.508 | 5,901.6 | 0.912 |
| 1981 | 0.607 | 5,500.1 | 0.551 | 6,057.4 | 0.908 |
| 1982 | 0.644 | 5,416.4 | 0.570 | 6,127.4 | 0.884 |
| 1983 | 0.681 | 5,649.0 | 0.615 | 6,256.5 | 0.903 |
| 1984 | 0.711 | 6,057.5 | 0.652 | 6,611.8 | 0.916 |
| 1985 | 0.722 | 6,337.2 | 0.661 | 6,920.1 | 0.916 |
| 1986 | 0.729 | 6,600.0 | 0.676 | 7,127.4 | 0.926 |
| 1987 | 0.746 | 6,845.6 | 0.690 | 7,395.5 | 0.926 |
| 1988 | 0.780 | 7,115.3 | 0.726 | 7,643.1 | 0.931 |
| 1989 | 0.806 | 7,365.1 | 0.751 | 7,910.7 | 0.931 |
| 1990 | 0.831 | 7,518.0 | 0.774 | 8,066.3 | 0.932 |
| 1991 | 0.857 | 7,502.9 | 0.796 | 8,076.2 | 0.929 |
| 1992 | 0.878 | 7,736.1 | 0.834 | 8,144.7 | 0.950 |
| 1993 | 0.892 | 7,943.7 | 0.849 | 8,350.5 | 0.951 |
| 1994 | 0.910 | 8,245.4 | 0.877 | 8,550.0 | 0.964 |
| 1995 | 0.928 | 8,471.2 | 0.893 | 8,798.4 | 0.963 |
| 1996 | 0.947 | 8,806.8 | 0.921 | 9,052.0 | 0.973 |
| 1997 | 0.966 | 9,220.6 | 0.950 | 9,375.2 | 0.984 |
| 1998 | 0.971 | 9,645.6 | 0.959 | 9,768.3 | 0.988 |
| 1999 | 0.983 | 10,111.7 | 0.978 | 10,168.3 | 0.994 |
| 2000 | 1.000 | 10,525.6 | 1.000 | 10,525.6 | 1.000 |
| 2001 | 1.027 | 10,670.5 | 1.024 | 10,704.1 | 0.997 |
| 2002 | 1.034 | 10,927.1 | 1.046 | 10,802.6 | 1.012 |

efficiency of the use of input to produce output or as a decline in the cost of input required to produce a given value of output.

### 1.4.6 Income and Expenditure, Domestic Capital, and Wealth Accounts

*Introduction*

In the previous section we have presented the Domestic Income and Product Account for the U.S. economy in constant prices. In this section we present Income and Expenditure, Domestic Capital, and Wealth Accounts in constant prices. We describe the accounts for the domestic economy in detail. The accounts for the rest of the world are identical to those generated by the BEA.

*Income and Expenditures*

We begin with estimates of gross saving and household and government consumption outlays in constant prices for the U.S. domestic economy. To construct price and quantity indexes of household and government expenditures, we obtain data for consumption expenditures on nondurable goods and services, excluding the services of institutional real estate, from the Domestic Income and Production Account. We evaluate consumption expenditures on market prices and combine these data with imputed values of the services of household, institutional, and government durables and the services of institutional and government real estate.

The value of consumption expenditures at market prices includes customs duties and excise and sales taxes, and excludes subsidies. We construct price and quantity indexes of consumption expenditures from the price and quantity indexes of nondurables, services, and our estimates of capital services by using chained Fisher ideal index numbers. Gross and net saving in constant prices are taken from the Domestic Capital Account, described below. Price, quantity, and tax indexes for personal and government consumption expenditures are presented in table 1.26.

The starting point for estimating price and quantity components of Domestic Capital Income is the price and quantity of capital income in the Domestic Income and Product Account. To construct price and quantity indexes of capital income our procedure is analogous to the methods we have used for the Domestic Income and Product Account. The most important innovation is in the use of a rental price formula to impute the price of capital services. Price and quantity indexes of capital income are presented in table 1.27. Similarly, prices and quantities of the different categories of labor services are combined into price and quantity indexes of labor income using chained Fisher idea index numbers. Price and quantity indexes of labor, capital, and gross income are presented in table 1.28.

The quantity index of Net Expenditures is a measure of social welfare; it consists of the quantity of current consumption and the quantity of net

**Table 1.26** **Income and expenditures account, expenditure, 1948–2002 (constant prices of 2000)**

| | Net expenditures | | Personal consumption expenditures | | Government consumption expenditures | | Net saving | | Effective tax rate on consumption expenditures |
|---|---|---|---|---|---|---|---|---|---|
| Year | Price | Quantity | Price | Quantity | Price | Quantity | Price | Quantity | |
| 1948 | 0.161 | 1,634.4 | 0.176 | 1,014.7 | 0.098 | 401.8 | 0.268 | 166.5 | 0.046 |
| 1949 | 0.155 | 1,631.9 | 0.166 | 1,062.6 | 0.101 | 431.0 | 0.266 | 123.7 | 0.048 |
| 1950 | 0.159 | 1,806.8 | 0.169 | 1,123.7 | 0.110 | 429.5 | 0.263 | 189.1 | 0.046 |
| 1951 | 0.168 | 1,953.8 | 0.180 | 1,182.3 | 0.106 | 534.8 | 0.294 | 197.7 | 0.043 |
| 1952 | 0.171 | 2,033.3 | 0.183 | 1,239.4 | 0.109 | 624.3 | 0.296 | 175.6 | 0.046 |
| 1953 | 0.173 | 2,129.7 | 0.182 | 1,290.5 | 0.122 | 652.9 | 0.283 | 189.1 | 0.047 |
| 1954 | 0.177 | 2,087.8 | 0.186 | 1,329.4 | 0.124 | 615.3 | 0.297 | 155.2 | 0.045 |
| 1955 | 0.178 | 2,248.3 | 0.187 | 1,399.8 | 0.123 | 609.3 | 0.303 | 208.8 | 0.045 |
| 1956 | 0.184 | 2,294.3 | 0.193 | 1,465.0 | 0.126 | 612.5 | 0.323 | 194.5 | 0.044 |
| 1957 | 0.186 | 2,342.6 | 0.192 | 1,510.0 | 0.130 | 643.3 | 0.336 | 183.3 | 0.044 |
| 1958 | 0.196 | 2,308.2 | 0.199 | 1,545.8 | 0.149 | 647.5 | 0.333 | 141.3 | 0.046 |
| 1959 | 0.191 | 2,502.5 | 0.197 | 1,612.6 | 0.146 | 661.2 | 0.297 | 212.3 | 0.049 |
| 1960 | 0.203 | 2,520.1 | 0.207 | 1,658.6 | 0.155 | 668.9 | 0.338 | 190.2 | 0.051 |
| 1961 | 0.202 | 2,580.2 | 0.209 | 1,704.5 | 0.148 | 691.0 | 0.339 | 188.1 | 0.049 |
| 1962 | 0.204 | 2,737.3 | 0.210 | 1,766.1 | 0.150 | 734.9 | 0.341 | 224.7 | 0.050 |
| 1963 | 0.206 | 2,850.9 | 0.213 | 1,825.2 | 0.152 | 758.9 | 0.343 | 245.6 | 0.050 |
| 1964 | 0.212 | 3,017.2 | 0.217 | 1,924.1 | 0.164 | 774.6 | 0.345 | 277.8 | 0.050 |
| 1965 | 0.220 | 3,201.4 | 0.224 | 2,026.3 | 0.170 | 797.5 | 0.355 | 316.0 | 0.048 |
| 1966 | 0.229 | 3,406.5 | 0.234 | 2,137.5 | 0.179 | 858.8 | 0.362 | 343.1 | 0.043 |
| 1967 | 0.231 | 3,486.0 | 0.235 | 2,216.8 | 0.184 | 923.1 | 0.372 | 310.6 | 0.045 |
| 1968 | 0.240 | 3,661.2 | 0.243 | 2,331.1 | 0.194 | 964.0 | 0.381 | 327.1 | 0.048 |
| 1969 | 0.253 | 3,767.2 | 0.258 | 2,426.9 | 0.198 | 978.3 | 0.402 | 325.3 | 0.048 |
| 1970 | 0.260 | 3,737.3 | 0.265 | 2,510.5 | 0.199 | 967.4 | 0.433 | 259.7 | 0.050 |
| 1971 | 0.274 | 3,880.5 | 0.280 | 2,584.7 | 0.216 | 965.7 | 0.431 | 302.3 | 0.050 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1972 | 0.290 | 4,139.1 | 0.294 | 2,722.2 | 0.257 | 965.6 | 0.396 | 383.3 | 0.047 |
| 1973 | 0.319 | 4,292.0 | 0.311 | 2,853.2 | 0.295 | 952.5 | 0.494 | 407.0 | 0.048 |
| 1974 | 0.348 | 4,219.4 | 0.338 | 2,869.7 | 0.333 | 967.0 | 0.525 | 340.4 | 0.049 |
| 1975 | 0.376 | 4,177.3 | 0.359 | 2,938.5 | 0.365 | 988.0 | 0.598 | 257.6 | 0.049 |
| 1976 | 0.401 | 4,437.3 | 0.379 | 3,076.2 | 0.407 | 996.6 | 0.616 | 334.5 | 0.047 |
| 1977 | 0.433 | 4,631.5 | 0.412 | 3,203.8 | 0.432 | 1,016.4 | 0.670 | 369.0 | 0.044 |
| 1978 | 0.464 | 4,885.7 | 0.442 | 3,349.6 | 0.461 | 1,036.4 | 0.714 | 430.9 | 0.043 |
| 1979 | 0.490 | 5,039.4 | 0.475 | 3,458.6 | 0.463 | 1,048.7 | 0.752 | 455.0 | 0.042 |
| 1980 | 0.527 | 4,959.7 | 0.520 | 3,493.8 | 0.480 | 1,068.1 | 0.771 | 367.4 | 0.044 |
| 1981 | 0.575 | 5,044.5 | 0.563 | 3,548.3 | 0.527 | 1,086.5 | 0.879 | 377.0 | 0.048 |
| 1982 | 0.610 | 4,917.7 | 0.591 | 3,609.0 | 0.569 | 1,110.8 | 0.958 | 243.9 | 0.044 |
| 1983 | 0.641 | 5,212.0 | 0.614 | 3,765.6 | 0.665 | 1,136.5 | 0.844 | 326.3 | 0.044 |
| 1984 | 0.679 | 5,573.9 | 0.643 | 3,931.9 | 0.727 | 1,153.1 | 0.901 | 466.3 | 0.044 |
| 1985 | 0.692 | 5,787.0 | 0.660 | 4,143.1 | 0.718 | 1,210.3 | 0.937 | 430.8 | 0.044 |
| 1986 | 0.699 | 5,981.8 | 0.676 | 4,317.0 | 0.689 | 1,275.2 | 0.943 | 402.8 | 0.042 |
| 1987 | 0.714 | 6,178.2 | 0.695 | 4,494.0 | 0.708 | 1,297.7 | 0.921 | 404.5 | 0.041 |
| 1988 | 0.749 | 6,427.4 | 0.727 | 4,673.9 | 0.760 | 1,313.8 | 0.930 | 450.6 | 0.042 |
| 1989 | 0.777 | 6,644.1 | 0.757 | 4,826.9 | 0.781 | 1,337.0 | 0.946 | 486.8 | 0.042 |
| 1990 | 0.801 | 6,767.7 | 0.791 | 4,949.6 | 0.795 | 1,366.3 | 0.911 | 464.6 | 0.043 |
| 1991 | 0.823 | 6,815.5 | 0.815 | 4,999.7 | 0.838 | 1,381.7 | 0.843 | 448.7 | 0.046 |
| 1992 | 0.828 | 7,145.9 | 0.838 | 5,146.1 | 0.873 | 1,386.8 | 0.598 | 657.7 | 0.046 |
| 1993 | 0.868 | 7,107.4 | 0.868 | 5,286.6 | 0.828 | 1,384.3 | 0.957 | 458.0 | 0.045 |
| 1994 | 0.890 | 7,353.6 | 0.885 | 5,442.7 | 0.861 | 1,386.4 | 1.002 | 537.4 | 0.048 |
| 1995 | 0.908 | 7,539.8 | 0.911 | 5,593.8 | 0.855 | 1,390.0 | 0.995 | 566.1 | 0.046 |
| 1996 | 0.932 | 7,814.2 | 0.928 | 5,780.3 | 0.915 | 1,393.7 | 0.996 | 644.2 | 0.045 |
| 1997 | 0.956 | 8,153.6 | 0.951 | 5,990.9 | 0.943 | 1,417.3 | 1.029 | 743.5 | 0.044 |
| 1998 | 0.966 | 8,469.2 | 0.959 | 6,282.2 | 0.943 | 1,438.1 | 1.076 | 748.9 | 0.045 |
| 1999 | 0.981 | 8,864.5 | 0.978 | 6,582.3 | 0.961 | 1,479.6 | 1.043 | 800.5 | 0.043 |
| 2000 | 1.000 | 9,174.2 | 1.000 | 6,907.1 | 1.000 | 1,504.3 | 1.000 | 762.8 | 0.044 |
| 2001 | 1.031 | 9,206.5 | 1.022 | 7,109.7 | 1.055 | 1,547.4 | 1.066 | 554.6 | 0.042 |
| 2002 | 1.045 | 9,347.3 | 1.031 | 7,346.4 | 1.083 | 1,604.8 | 1.101 | 409.6 | 0.043 |

**Table 1.27** **Income and expenditures account, property income, 1948–2002 (constant prices of 2000)**

| | Property income | | ROW property income | | Domestic property income | |
|---|---|---|---|---|---|---|
| Year | Price | Quantity | Price | Quantity | Price | Quantity |
| 1948 | 0.243 | 497.3 | 0.139 | 63.6 | 0.268 | 436.8 |
| 1949 | 0.223 | 532.6 | 0.132 | 58.7 | 0.235 | 472.8 |
| 1950 | 0.248 | 575.9 | 0.149 | 71.5 | 0.260 | 506.7 |
| 1951 | 0.263 | 625.6 | 0.151 | 83.5 | 0.278 | 547.3 |
| 1952 | 0.258 | 671.4 | 0.153 | 99.5 | 0.272 | 581.8 |
| 1953 | 0.257 | 707.1 | 0.154 | 106.9 | 0.270 | 611.6 |
| 1954 | 0.255 | 734.5 | 0.157 | 104.4 | 0.268 | 639.2 |
| 1955 | 0.264 | 772.5 | 0.160 | 113.6 | 0.277 | 670.0 |
| 1956 | 0.262 | 810.6 | 0.168 | 117.4 | 0.274 | 704.1 |
| 1957 | 0.257 | 843.0 | 0.175 | 119.8 | 0.266 | 733.7 |
| 1958 | 0.272 | 865.9 | 0.181 | 117.9 | 0.282 | 756.9 |
| 1959 | 0.270 | 892.6 | 0.184 | 120.4 | 0.280 | 781.0 |
| 1960 | 0.281 | 932.2 | 0.183 | 135.5 | 0.293 | 809.4 |
| 1961 | 0.277 | 957.6 | 0.186 | 134.5 | 0.287 | 834.5 |
| 1962 | 0.285 | 992.7 | 0.192 | 142.3 | 0.296 | 863.2 |
| 1963 | 0.288 | 1,038.4 | 0.192 | 153.9 | 0.299 | 899.7 |
| 1964 | 0.303 | 1,085.7 | 0.198 | 162.7 | 0.316 | 939.5 |
| 1965 | 0.323 | 1,135.5 | 0.205 | 165.5 | 0.338 | 985.4 |
| 1966 | 0.342 | 1,190.1 | 0.212 | 156.3 | 0.359 | 1,043.2 |
| 1967 | 0.329 | 1,255.1 | 0.217 | 161.7 | 0.343 | 1,102.1 |
| 1968 | 0.337 | 1,326.1 | 0.228 | 180.5 | 0.350 | 1,158.2 |
| 1969 | 0.341 | 1,394.1 | 0.235 | 191.3 | 0.354 | 1,216.6 |
| 1970 | 0.325 | 1,444.0 | 0.249 | 187.4 | 0.334 | 1,267.6 |
| 1971 | 0.354 | 1,497.6 | 0.266 | 193.0 | 0.364 | 1,315.7 |
| 1972 | 0.391 | 1,573.2 | 0.279 | 192.7 | 0.404 | 1,389.3 |
| 1973 | 0.421 | 1,687.3 | 0.298 | 220.9 | 0.436 | 1,480.2 |
| 1974 | 0.441 | 1,721.7 | 0.318 | 232.6 | 0.456 | 1,505.6 |
| 1975 | 0.485 | 1,721.4 | 0.351 | 211.0 | 0.500 | 1,520.4 |
| 1976 | 0.528 | 1,801.7 | 0.379 | 227.6 | 0.545 | 1,586.5 |
| 1977 | 0.575 | 1,878.9 | 0.404 | 234.6 | 0.595 | 1,656.4 |
| 1978 | 0.615 | 1,973.9 | 0.434 | 242.1 | 0.636 | 1,743.1 |
| 1979 | 0.621 | 2,085.3 | 0.468 | 258.0 | 0.639 | 1,839.9 |
| 1980 | 0.616 | 2,176.1 | 0.507 | 261.9 | 0.627 | 1,925.6 |
| 1981 | 0.660 | 2,283.9 | 0.555 | 270.1 | 0.671 | 2,025.0 |
| 1982 | 0.657 | 2,351.7 | 0.594 | 246.1 | 0.662 | 2,112.7 |
| 1983 | 0.737 | 2,418.0 | 0.626 | 250.3 | 0.748 | 2,174.7 |
| 1984 | 0.797 | 2,551.0 | 0.647 | 266.1 | 0.812 | 2,292.5 |
| 1985 | 0.782 | 2,716.2 | 0.674 | 258.4 | 0.792 | 2,461.6 |
| 1986 | 0.769 | 2,859.1 | 0.654 | 258.7 | 0.780 | 2,602.4 |
| 1987 | 0.778 | 2,960.1 | 0.694 | 254.8 | 0.786 | 2,705.5 |
| 1988 | 0.822 | 3,079.0 | 0.724 | 273.7 | 0.831 | 2,806.5 |
| 1989 | 0.861 | 3,196.9 | 0.768 | 282.4 | 0.870 | 2,915.6 |
| 1990 | 0.875 | 3,285.4 | 0.807 | 294.6 | 0.881 | 2,992.3 |
| 1991 | 0.881 | 3,395.8 | 0.831 | 357.6 | 0.885 | 3,043.4 |
| 1992 | 0.914 | 3,420.9 | 0.832 | 323.9 | 0.922 | 3,099.5 |
| 1993 | 0.937 | 3,466.6 | 0.879 | 316.7 | 0.942 | 3,151.5 |
| 1994 | 0.982 | 3,540.0 | 0.900 | 342.7 | 0.990 | 3,200.4 |
| 1995 | 1.000 | 3,649.6 | 0.932 | 350.8 | 1.007 | 3,301.8 |
| 1996 | 1.036 | 3,793.4 | 0.956 | 354.4 | 1.044 | 3,441.4 |
| 1997 | 1.068 | 3,957.8 | 0.973 | 361.8 | 1.076 | 3,597.7 |
| 1998 | 1.031 | 4,179.6 | 0.973 | 361.9 | 1.036 | 3,817.9 |
| 1999 | 1.023 | 4,454.5 | 0.980 | 386.9 | 1.028 | 4,067.9 |
| 2000 | 1.000 | 4,718.4 | 1.000 | 396.8 | 1.000 | 4,321.6 |
| 2001 | 1.012 | 4,930.1 | 1.016 | 393.0 | 1.012 | 4,537.1 |
| 2002 | 1.021 | 5,105.1 | 1.011 | 395.9 | 1.021 | 4,709.2 |

*Note:* ROW = rest of world.

**Table 1.28** **Income and expenditures account, income, 1948–2002 (constant prices of 2000)**

| | Net income | | Labor income | | Net property income | |
|---|---|---|---|---|---|---|
| Year | Price | Quantity | Price | Quantity | Price | Quantity |
| 1948 | 0.116 | 2,272.4 | 0.077 | 2,246.1 | 0.258 | 345.9 |
| 1949 | 0.111 | 2,275.6 | 0.080 | 2,184.4 | 0.213 | 368.0 |
| 1950 | 0.119 | 2,404.0 | 0.082 | 2,277.2 | 0.246 | 399.6 |
| 1951 | 0.126 | 2,604.3 | 0.087 | 2,462.3 | 0.261 | 434.4 |
| 1952 | 0.127 | 2,723.4 | 0.090 | 2,534.3 | 0.253 | 468.2 |
| 1953 | 0.130 | 2,817.8 | 0.094 | 2,596.9 | 0.249 | 493.7 |
| 1954 | 0.132 | 2,800.8 | 0.096 | 2,535.8 | 0.246 | 508.3 |
| 1955 | 0.137 | 2,913.1 | 0.101 | 2,612.7 | 0.256 | 538.3 |
| 1956 | 0.141 | 3,004.8 | 0.106 | 2,676.6 | 0.248 | 562.8 |
| 1957 | 0.143 | 3,049.0 | 0.111 | 2,683.2 | 0.235 | 585.8 |
| 1958 | 0.150 | 3,019.2 | 0.114 | 2,617.5 | 0.256 | 598.2 |
| 1959 | 0.153 | 3,128.9 | 0.119 | 2,708.2 | 0.249 | 622.0 |
| 1960 | 0.159 | 3,210.7 | 0.124 | 2,746.9 | 0.264 | 653.4 |
| 1961 | 0.159 | 3,270.4 | 0.125 | 2,787.1 | 0.258 | 670.7 |
| 1962 | 0.164 | 3,401.4 | 0.128 | 2,892.9 | 0.267 | 700.4 |
| 1963 | 0.169 | 3,488.0 | 0.133 | 2,930.2 | 0.271 | 735.9 |
| 1964 | 0.178 | 3,604.2 | 0.138 | 3,007.8 | 0.291 | 770.1 |
| 1965 | 0.188 | 3,735.4 | 0.144 | 3,105.3 | 0.319 | 803.7 |
| 1966 | 0.200 | 3,894.6 | 0.151 | 3,239.5 | 0.344 | 837.1 |
| 1967 | 0.201 | 4,000.5 | 0.159 | 3,290.1 | 0.323 | 877.3 |
| 1968 | 0.212 | 4,147.1 | 0.170 | 3,375.7 | 0.328 | 927.1 |
| 1969 | 0.222 | 4,284.0 | 0.183 | 3,463.4 | 0.329 | 970.5 |
| 1970 | 0.227 | 4,269.9 | 0.198 | 3,407.1 | 0.299 | 994.5 |
| 1971 | 0.246 | 4,320.7 | 0.211 | 3,408.0 | 0.332 | 1,032.0 |
| 1972 | 0.268 | 4,477.9 | 0.226 | 3,499.6 | 0.376 | 1,089.6 |
| 1973 | 0.290 | 4,723.9 | 0.242 | 3,640.6 | 0.413 | 1,179.8 |
| 1974 | 0.311 | 4,728.9 | 0.265 | 3,643.2 | 0.427 | 1,181.7 |
| 1975 | 0.338 | 4,646.5 | 0.287 | 3,586.6 | 0.467 | 1,156.9 |
| 1976 | 0.369 | 4,823.6 | 0.311 | 3,689.0 | 0.517 | 1,221.9 |
| 1977 | 0.401 | 5,001.7 | 0.335 | 3,813.9 | 0.571 | 1,273.8 |
| 1978 | 0.433 | 5,233.9 | 0.363 | 3,985.6 | 0.611 | 1,336.0 |
| 1979 | 0.453 | 5,448.9 | 0.395 | 4,120.0 | 0.597 | 1,409.3 |
| 1980 | 0.474 | 5,503.0 | 0.437 | 4,104.4 | 0.559 | 1,463.9 |
| 1981 | 0.514 | 5,645.2 | 0.478 | 4,144.7 | 0.594 | 1,553.9 |
| 1982 | 0.531 | 5,654.4 | 0.509 | 4,104.6 | 0.570 | 1,596.2 |
| 1983 | 0.579 | 5,768.8 | 0.532 | 4,168.0 | 0.682 | 1,644.8 |
| 1984 | 0.619 | 6,116.8 | 0.555 | 4,412.7 | 0.765 | 1,749.1 |
| 1985 | 0.629 | 6,365.0 | 0.580 | 4,530.3 | 0.739 | 1,866.4 |
| 1986 | 0.642 | 6,509.7 | 0.608 | 4,578.2 | 0.714 | 1,953.8 |
| 1987 | 0.658 | 6,712.0 | 0.628 | 4,742.8 | 0.720 | 1,995.4 |
| 1988 | 0.695 | 6,929.8 | 0.657 | 4,888.6 | 0.775 | 2,067.1 |
| 1989 | 0.721 | 7,154.8 | 0.674 | 5,046.3 | 0.823 | 2,135.0 |
| 1990 | 0.746 | 7,268.3 | 0.705 | 5,121.0 | 0.835 | 2,173.0 |
| 1991 | 0.769 | 7,296.2 | 0.736 | 5,068.4 | 0.837 | 2,243.9 |
| 1992 | 0.810 | 7,300.6 | 0.774 | 5,075.4 | 0.886 | 2,241.8 |
| 1993 | 0.827 | 7,461.5 | 0.787 | 5,232.0 | 0.913 | 2,252.4 |
| 1994 | 0.857 | 7,639.7 | 0.803 | 5,388.3 | 0.974 | 2,279.8 |
| 1995 | 0.874 | 7,837.5 | 0.819 | 5,534.9 | 0.993 | 2,332.9 |
| 1996 | 0.906 | 8,032.8 | 0.841 | 5,640.4 | 1.048 | 2,417.5 |
| 1997 | 0.940 | 8,291.5 | 0.867 | 5,799.8 | 1.101 | 2,513.0 |
| 1998 | 0.952 | 8,599.5 | 0.907 | 5,960.1 | 1.048 | 2,651.8 |
| 1999 | 0.974 | 8,924.2 | 0.944 | 6,100.0 | 1.039 | 2,827.5 |
| 2000 | 1.000 | 9,174.5 | 1.000 | 6,199.8 | 1.000 | 2,974.8 |
| 2001 | 1.028 | 9,231.4 | 1.033 | 6,162.0 | 1.019 | 3,069.9 |
| 2002 | 1.056 | 9,244.4 | 1.065 | 6,091.9 | 1.038 | 3,154.4 |

increments to future consumption in the current time period, as suggested by Weitzman (1976, 2003). Similarly, the quantity index of Net Income is a measure of the labor and property incomes generated by the U.S. economy. The ratio of expenditures in constant prices to income in constant prices is the Level of Living, a quantity index of welfare generated from current and future consumption in proportion to the effort required in the form of supply of labor and capital services. This must be carefully distinguished from multifactor productivity, the ratio of GDP to GDI, a measure of productive efficiency. Price and quantity indexes of Net Expenditures, Net Income and the Level of Living index are presented in table 1.29.[25]

*Domestic Capital Account*

The fundamental accounting identity for the Domestic Capital Account is that gross saving from the Income and Expenditures Account is equal to investment. Investment and saving are equal in current and constant prices. Investment is a chained Fisher ideal quantity index of private and government investment, evaluated at market prices. The quantities are taken from the Domestic Income and Product Account, while the prices include sales and excise taxes paid by purchasers of investment goods. Price, quantity, and tax indexes of Gross Investment are given for 1948–2002 in table 1.30.

To complete the saving side of the Domestic Capital Account in constant prices we require depreciation and the revaluation of assets in constant prices. If the decline in efficiency of capital goods is geometric, the change in wealth from period to period for a single capital good may be written

$$\begin{aligned} W_t - W_{t-1} &= q_{A,t}K_t - q_{A,t-1}K_{t-1} \\ &= q_{A,t}(K_t - K_{t-1}) + (q_{A,t} - q_{A,t-1})K_{t-1} \\ &= q_{A,t}A_t - q_{A,t}\delta K_{t-1} + (q_{A,t} - q_{A,t-1})K_{t-1}. \end{aligned}$$

Gross saving is represented by $q_{A,t}A_t$, which is equal to gross investment and has the same price and quantity components.

Depreciation is represented by $q_{A,t}\delta K_{t-1}$. We construct the price and quantity indexes of depreciation from the lagged stocks, $K_{t-1}$, with depreciation prices $q_{D,t}$ as weights. Revaluation is represented by $(q_{At} - q_{A,t-1})K_{t-1}$. We construct price and quantity indexes of revaluation from lagged capital stocks with revaluation prices $(q_{A,t} - q_{A,t-1})$ as weights. Chained Fisher ideal price and quantity index numbers of private national saving, depreciation, and revaluation for the period 1948–2002 are presented in table 1.31.

25. For further discussion, see Hulten (1992).

**Table 1.29** **Income and expenditures account, level of living, 1948–2002 (constant prices of 2000)**

| | Net expenditures | | Net income | | |
|---|---|---|---|---|---|
| Year | Price | Quantity | Price | Quantity | Level of living |
| 1948 | 0.161 | 1,634.4 | 0.116 | 2,272.4 | 0.719 |
| 1949 | 0.155 | 1,631.9 | 0.111 | 2,275.6 | 0.717 |
| 1950 | 0.159 | 1,806.8 | 0.119 | 2,404.0 | 0.752 |
| 1951 | 0.168 | 1,953.8 | 0.126 | 2,604.3 | 0.750 |
| 1952 | 0.171 | 2,033.3 | 0.127 | 2,723.4 | 0.747 |
| 1953 | 0.173 | 2,129.7 | 0.130 | 2,817.8 | 0.756 |
| 1954 | 0.177 | 2,087.8 | 0.132 | 2,800.8 | 0.745 |
| 1955 | 0.178 | 2,248.3 | 0.137 | 2,913.1 | 0.772 |
| 1956 | 0.184 | 2,294.3 | 0.141 | 3,004.8 | 0.764 |
| 1957 | 0.186 | 2,342.6 | 0.143 | 3,049.0 | 0.768 |
| 1958 | 0.196 | 2,308.2 | 0.150 | 3,019.2 | 0.764 |
| 1959 | 0.191 | 2,502.5 | 0.153 | 3,128.9 | 0.800 |
| 1960 | 0.203 | 2,520.1 | 0.159 | 3,210.7 | 0.785 |
| 1961 | 0.202 | 2,580.2 | 0.159 | 3,270.4 | 0.789 |
| 1962 | 0.204 | 2,737.3 | 0.164 | 3,401.4 | 0.805 |
| 1963 | 0.206 | 2,850.9 | 0.169 | 3,488.0 | 0.817 |
| 1964 | 0.212 | 3,017.2 | 0.178 | 3,604.2 | 0.837 |
| 1965 | 0.220 | 3,201.4 | 0.188 | 3,735.4 | 0.857 |
| 1966 | 0.229 | 3,406.5 | 0.200 | 3,894.6 | 0.875 |
| 1967 | 0.231 | 3,486.0 | 0.201 | 4,000.5 | 0.871 |
| 1968 | 0.240 | 3,661.2 | 0.212 | 4,147.1 | 0.883 |
| 1969 | 0.253 | 3,767.2 | 0.222 | 4,284.0 | 0.879 |
| 1970 | 0.260 | 3,737.3 | 0.227 | 4,269.9 | 0.875 |
| 1971 | 0.274 | 3,880.5 | 0.246 | 4,320.7 | 0.898 |
| 1972 | 0.290 | 4,139.1 | 0.268 | 4,477.9 | 0.924 |
| 1973 | 0.319 | 4,292.0 | 0.290 | 4,723.9 | 0.909 |
| 1974 | 0.348 | 4,219.4 | 0.311 | 4,728.9 | 0.892 |
| 1975 | 0.376 | 4,177.3 | 0.338 | 4,646.5 | 0.899 |
| 1976 | 0.401 | 4,437.3 | 0.369 | 4,823.6 | 0.920 |
| 1977 | 0.433 | 4,631.5 | 0.401 | 5,001.7 | 0.926 |
| 1978 | 0.464 | 4,885.7 | 0.433 | 5,233.9 | 0.933 |
| 1979 | 0.490 | 5,039.4 | 0.453 | 5,448.9 | 0.925 |
| 1980 | 0.527 | 4,959.7 | 0.474 | 5,503.0 | 0.901 |
| 1981 | 0.575 | 5,044.5 | 0.514 | 5,645.2 | 0.894 |
| 1982 | 0.610 | 4,917.7 | 0.531 | 5,654.4 | 0.870 |
| 1983 | 0.641 | 5,212.0 | 0.579 | 5,768.8 | 0.903 |
| 1984 | 0.679 | 5,573.9 | 0.619 | 6,116.8 | 0.911 |
| 1985 | 0.692 | 5,787.0 | 0.629 | 6,365.0 | 0.909 |
| 1986 | 0.699 | 5,981.8 | 0.642 | 6,509.7 | 0.919 |
| 1987 | 0.714 | 6,178.2 | 0.658 | 6,712.0 | 0.920 |
| 1988 | 0.749 | 6,427.4 | 0.695 | 6,929.8 | 0.927 |
| 1989 | 0.777 | 6,644.1 | 0.721 | 7,154.8 | 0.929 |
| 1990 | 0.801 | 6,767.7 | 0.746 | 7,268.3 | 0.931 |
| 1991 | 0.823 | 6,815.5 | 0.769 | 7,296.2 | 0.934 |
| 1992 | 0.828 | 7,145.9 | 0.810 | 7,300.6 | 0.979 |
| 1993 | 0.868 | 7,107.4 | 0.827 | 7,461.5 | 0.953 |
| 1994 | 0.890 | 7,353.6 | 0.857 | 7,639.7 | 0.963 |
| 1995 | 0.908 | 7,539.8 | 0.874 | 7,837.5 | 0.962 |
| 1996 | 0.932 | 7,814.2 | 0.906 | 8,032.8 | 0.973 |
| 1997 | 0.956 | 8,153.6 | 0.940 | 8,291.5 | 0.983 |
| 1998 | 0.966 | 8,469.2 | 0.952 | 8,599.5 | 0.985 |
| 1999 | 0.981 | 8,864.5 | 0.974 | 8,924.2 | 0.993 |
| 2000 | 1.000 | 9,174.2 | 1.000 | 9,174.5 | 1.000 |
| 2001 | 1.031 | 9,206.5 | 1.028 | 9,231.4 | 0.997 |
| 2002 | 1.045 | 9,347.3 | 1.056 | 9,244.4 | 1.011 |

**Table 1.30 Domestic capital account, investment, 1948–2002 (constant prices of 2000)**

| Year | Gross investment | | Private investment | | Government investment | | Effective sales tax rate on investment expenditures |
|---|---|---|---|---|---|---|---|
| | Price | Quantity | Price | Quantity | Price | Quantity | |
| 1948 | 0.243 | 334.4 | 0.252 | 284.3 | 0.174 | 40.7 | 0.046 |
| 1949 | 0.244 | 300.5 | 0.256 | 245.0 | 0.175 | 56.1 | 0.048 |
| 1950 | 0.245 | 383.3 | 0.262 | 327.5 | 0.171 | 57.9 | 0.046 |
| 1951 | 0.268 | 407.7 | 0.282 | 322.2 | 0.191 | 91.6 | 0.043 |
| 1952 | 0.270 | 395.4 | 0.283 | 296.6 | 0.195 | 114.2 | 0.046 |
| 1953 | 0.267 | 420.5 | 0.289 | 310.6 | 0.193 | 124.5 | 0.047 |
| 1954 | 0.273 | 396.8 | 0.289 | 296.8 | 0.192 | 117.4 | 0.045 |
| 1955 | 0.279 | 463.2 | 0.294 | 366.1 | 0.195 | 107.5 | 0.045 |
| 1956 | 0.294 | 461.1 | 0.305 | 359.1 | 0.213 | 108.0 | 0.044 |
| 1957 | 0.306 | 458.3 | 0.316 | 351.4 | 0.223 | 109.6 | 0.044 |
| 1958 | 0.305 | 422.1 | 0.317 | 320.1 | 0.222 | 119.6 | 0.046 |
| 1959 | 0.298 | 499.8 | 0.326 | 371.3 | 0.224 | 130.8 | 0.049 |
| 1960 | 0.316 | 486.3 | 0.327 | 373.7 | 0.222 | 126.8 | 0.051 |
| 1961 | 0.316 | 492.2 | 0.327 | 367.4 | 0.224 | 140.5 | 0.049 |
| 1962 | 0.320 | 537.7 | 0.330 | 409.6 | 0.228 | 145.9 | 0.050 |
| 1963 | 0.322 | 571.1 | 0.330 | 439.7 | 0.235 | 143.3 | 0.050 |
| 1964 | 0.325 | 618.9 | 0.333 | 476.3 | 0.237 | 146.1 | 0.050 |
| 1965 | 0.330 | 676.1 | 0.337 | 538.6 | 0.244 | 145.7 | 0.048 |
| 1966 | 0.335 | 726.8 | 0.340 | 586.3 | 0.251 | 158.6 | 0.043 |
| 1967 | 0.343 | 716.3 | 0.348 | 572.5 | 0.258 | 166.3 | 0.045 |
| 1968 | 0.354 | 755.4 | 0.362 | 613.7 | 0.268 | 162.1 | 0.048 |
| 1969 | 0.370 | 777.8 | 0.376 | 644.6 | 0.285 | 151.8 | 0.048 |
| 1970 | 0.391 | 729.8 | 0.390 | 608.1 | 0.309 | 141.6 | 0.050 |
| 1971 | 0.401 | 792.3 | 0.408 | 673.8 | 0.331 | 126.2 | 0.050 |
| 1972 | 0.399 | 895.3 | 0.423 | 751.2 | 0.364 | 116.9 | 0.047 |
| 1973 | 0.449 | 945.6 | 0.442 | 832.2 | 0.389 | 120.3 | 0.048 |
| 1974 | 0.481 | 902.6 | 0.483 | 770.0 | 0.444 | 126.8 | 0.049 |
| 1975 | 0.538 | 832.9 | 0.535 | 679.6 | 0.478 | 131.9 | 0.049 |
| 1976 | 0.564 | 933.4 | 0.565 | 797.7 | 0.495 | 134.0 | 0.047 |
| 1977 | 0.604 | 996.0 | 0.601 | 902.6 | 0.519 | 130.2 | 0.044 |
| 1978 | 0.644 | 1,096.4 | 0.646 | 990.6 | 0.553 | 139.3 | 0.043 |
| 1979 | 0.687 | 1,160.0 | 0.701 | 1,009.3 | 0.599 | 147.8 | 0.042 |
| 1980 | 0.732 | 1,100.3 | 0.764 | 908.5 | 0.660 | 152.1 | 0.044 |
| 1981 | 0.809 | 1,132.6 | 0.832 | 966.2 | 0.725 | 147.3 | 0.048 |
| 1982 | 0.861 | 1,099.8 | 0.873 | 867.6 | 0.770 | 146.0 | 0.044 |
| 1983 | 0.839 | 1,115.4 | 0.877 | 963.5 | 0.783 | 156.8 | 0.044 |
| 1984 | 0.864 | 1,290.5 | 0.883 | 1,203.3 | 0.791 | 176.0 | 0.044 |
| 1985 | 0.882 | 1,301.4 | 0.892 | 1,232.9 | 0.795 | 199.9 | 0.044 |
| 1986 | 0.893 | 1,325.0 | 0.906 | 1,269.0 | 0.796 | 217.5 | 0.042 |
| 1987 | 0.898 | 1,380.7 | 0.927 | 1,302.0 | 0.802 | 229.8 | 0.041 |
| 1988 | 0.915 | 1,473.6 | 0.947 | 1,346.1 | 0.814 | 228.5 | 0.042 |
| 1989 | 0.934 | 1,559.0 | 0.968 | 1,390.9 | 0.832 | 237.8 | 0.042 |
| 1990 | 0.934 | 1,585.2 | 0.983 | 1,358.8 | 0.852 | 253.1 | 0.043 |
| 1991 | 0.925 | 1,610.8 | 0.995 | 1,263.2 | 0.865 | 254.7 | 0.046 |
| 1992 | 0.850 | 1,804.6 | 0.996 | 1,353.9 | 0.869 | 256.5 | 0.046 |
| 1993 | 0.972 | 1,675.4 | 1.008 | 1,468.0 | 0.888 | 246.6 | 0.045 |
| 1994 | 0.998 | 1,799.6 | 1.025 | 1,638.1 | 0.911 | 243.0 | 0.048 |
| 1995 | 1.007 | 1,884.5 | 1.038 | 1,692.1 | 0.936 | 248.6 | 0.046 |
| 1996 | 1.008 | 2,021.4 | 1.031 | 1,835.6 | 0.947 | 258.5 | 0.045 |
| 1997 | 1.016 | 2,190.1 | 1.021 | 2,040.3 | 0.953 | 264.5 | 0.044 |
| 1998 | 1.025 | 2,277.6 | 1.004 | 2,249.8 | 0.959 | 273.7 | 0.045 |
| 1999 | 1.011 | 2,428.5 | 0.997 | 2,450.7 | 0.976 | 294.1 | 0.043 |
| 2000 | 1.00 | 2,506.5 | 1.000 | 2,598.7 | 1.000 | 304.4 | 0.044 |
| 2001 | 1.018 | 2,408.7 | 1.000 | 2,497.1 | 1.014 | 319.4 | 0.042 |
| 2002 | 1.018 | 2,343.2 | 0.992 | 2,516.3 | 1.026 | 338.6 | 0.043 |

**Table 1.31** **Domestic capital account, change in wealth, 1948–2002 (constant prices of 2000)**

| | Gross saving | | Depreciation | | Net saving | | Revaluation | | Change in wealth | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Price | Quantity | Price | Quantity | Price | Quantity | Price | Quantity | Price | Quantity |
| 1948 | 0.243 | 334.4 | 0.239 | 152.8 | 0.268 | 166.5 | | | | |
| 1949 | 0.244 | 300.5 | 0.244 | 166.0 | 0.266 | 123.7 | 0.005 | 911.4 | 0.092 | 404.0 |
| 1950 | 0.245 | 383.3 | 0.248 | 178.0 | 0.263 | 189.1 | 0.027 | 951.4 | 0.133 | 565.9 |
| 1951 | 0.268 | 407.7 | 0.265 | 193.1 | 0.294 | 197.7 | 0.071 | 1,016.5 | 0.217 | 597.4 |
| 1952 | 0.270 | 395.4 | 0.267 | 205.2 | 0.296 | 175.6 | 0.013 | 1,069.7 | 0.116 | 565.9 |
| 1953 | 0.267 | 420.5 | 0.273 | 215.6 | 0.283 | 189.1 | 0.042 | 1,026.6 | 0.164 | 587.1 |
| 1954 | 0.273 | 396.8 | 0.273 | 228.1 | 0.297 | 155.2 | 0.009 | 930.8 | 0.110 | 496.5 |
| 1955 | 0.279 | 463.2 | 0.279 | 236.4 | 0.303 | 208.8 | 0.035 | 891.8 | 0.154 | 614.2 |
| 1956 | 0.294 | 461.1 | 0.291 | 250.0 | 0.323 | 194.5 | 0.110 | 916.1 | 0.274 | 599.5 |
| 1957 | 0.306 | 458.3 | 0.303 | 259.6 | 0.336 | 183.3 | 0.086 | 922.5 | 0.239 | 587.5 |
| 1958 | 0.305 | 422.1 | 0.304 | 269.4 | 0.333 | 141.3 | 0.035 | 911.8 | 0.155 | 510.7 |
| 1959 | 0.298 | 499.8 | 0.315 | 273.4 | 0.297 | 212.3 | 0.050 | 901.8 | 0.167 | 646.0 |
| 1960 | 0.316 | 486.3 | 0.317 | 282.3 | 0.338 | 190.2 | 0.063 | 878.5 | 0.199 | 600.5 |
| 1961 | 0.316 | 492.2 | 0.317 | 290.5 | 0.339 | 188.1 | 0.068 | 881.8 | 0.207 | 598.0 |
| 1962 | 0.320 | 537.7 | 0.321 | 297.0 | 0.341 | 224.7 | 0.084 | 815.1 | 0.229 | 632.0 |
| 1963 | 0.322 | 571.1 | 0.324 | 308.0 | 0.343 | 245.6 | 0.041 | 844.8 | 0.175 | 677.0 |
| 1964 | 0.325 | 618.9 | 0.326 | 321.4 | 0.345 | 277.8 | –0.012 | 779.1 | 0.115 | 751.6 |
| 1965 | 0.330 | 676.1 | 0.329 | 337.7 | 0.355 | 316.0 | 0.047 | 816.1 | 0.178 | 849.9 |
| 1966 | 0.335 | 726.8 | 0.331 | 359.3 | 0.362 | 343.1 | 0.093 | 844.1 | 0.223 | 908.4 |
| 1967 | 0.343 | 716.3 | 0.338 | 384.4 | 0.372 | 310.6 | 0.066 | 916.5 | 0.200 | 878.8 |
| 1968 | 0.354 | 755.4 | 0.351 | 405.9 | 0.381 | 327.1 | 0.201 | 952.6 | 0.343 | 919.7 |
| 1969 | 0.370 | 777.8 | 0.364 | 430.6 | 0.402 | 325.3 | 0.261 | 915.8 | 0.413 | 895.4 |
| 1970 | 0.391 | 729.8 | 0.379 | 455.0 | 0.433 | 259.7 | 0.143 | 1,106.6 | 0.293 | 922.7 |
| 1971 | 0.401 | 792.3 | 0.397 | 471.4 | 0.431 | 302.3 | 0.190 | 1,030.5 | 0.347 | 940.9 |
| 1972 | 0.399 | 895.3 | 0.419 | 490.5 | 0.396 | 383.3 | 0.267 | 971.3 | 0.414 | 993.8 |
| 1973 | 0.449 | 945.6 | 0.432 | 515.7 | 0.494 | 407.0 | 0.421 | 858.0 | 0.600 | 938.6 |
| 1974 | 0.481 | 902.6 | 0.468 | 546.9 | 0.525 | 340.4 | 0.634 | 956.6 | 0.816 | 961.9 |
| 1975 | 0.538 | 832.9 | 0.517 | 569.1 | 0.598 | 257.6 | 0.485 | 1,126.4 | 0.683 | 1,026.0 |

*(continued)*

**Table 1.31** (continued)

| | Gross saving | | Depreciation | | Net saving | | Revaluation | | Change in wealth | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Price | Quantity | Price | Quantity | Price | Quantity | Price | Quantity | Price | Quantity |
| 1976 | 0.564 | 933.4 | 0.547 | 585.4 | 0.616 | 334.5 | 0.237 | 1,379.5 | 0.416 | 1,279.1 |
| 1977 | 0.604 | 996.0 | 0.579 | 611.0 | 0.670 | 369.0 | 0.837 | 745.2 | 0.992 | 877.9 |
| 1978 | 0.644 | 1,096.4 | 0.619 | 644.0 | 0.712 | 430.9 | 0.860 | 1,000.3 | 1.030 | 1,134.3 |
| 1979 | 0.687 | 1,160.0 | 0.667 | 682.4 | 0.752 | 455.0 | 1.047 | 1,025.9 | 1.208 | 1,172.0 |
| 1980 | 0.732 | 1,100.3 | 0.727 | 717.6 | 0.771 | 367.4 | 0.849 | 1,260.3 | 1.033 | 1,309.7 |
| 1981 | 0.809 | 1,132.6 | 0.791 | 740.0 | 0.879 | 377.0 | 0.511 | 1,647.9 | 0.728 | 1,613.4 |
| 1982 | 0.861 | 1,009.8 | 0.832 | 764.7 | 0.958 | 243.9 | 0.288 | 1,831.9 | 0.498 | 1,529.1 |
| 1983 | 0.839 | 1,115.4 | 0.843 | 783.6 | 0.844 | 326.3 | 0.289 | 1,251.6 | 0.476 | 1,339.3 |
| 1984 | 0.864 | 1,290.5 | 0.852 | 814.8 | 0.901 | 466.3 | 0.203 | 1,647.4 | 0.411 | 1,835.9 |
| 1985 | 0.882 | 1,301.4 | 0.861 | 864.1 | 0.937 | 430.8 | 0.417 | 1,364.0 | 0.606 | 1,603.3 |
| 1986 | 0.893 | 1,325.0 | 0.875 | 918.6 | 0.943 | 402.8 | 0.605 | 1,517.8 | 0.774 | 1,677.4 |
| 1987 | 0.898 | 1,380.7 | 0.891 | 973.3 | 0.921 | 404.5 | 0.675 | 1,634.0 | 0.833 | 1,771.9 |
| 1988 | 0.915 | 1,473.6 | 0.912 | 1,019.4 | 0.930 | 450.6 | 0.705 | 1,692.0 | 0.863 | 1,869.5 |
| 1989 | 0.934 | 1,559.0 | 0.932 | 1,068.2 | 0.946 | 486.8 | 0.605 | 1,745.6 | 0.776 | 1,953.9 |
| 1990 | 0.934 | 1,585.2 | 0.948 | 1,116.1 | 0.911 | 464.6 | 0.418 | 1,780.3 | 0.599 | 1,949.3 |
| 1991 | 0.925 | 1,610.8 | 0.963 | 1,155.7 | 0.843 | 448.7 | 0.204 | 1,725.2 | 0.387 | 1,886.1 |
| 1992 | 0.850 | 1,804.6 | 0.966 | 1,180.9 | 0.598 | 657.7 | 0.181 | 1,722.3 | 0.304 | 2,315.0 |
| 1993 | 0.972 | 1,675.4 | 0.980 | 1,214.7 | 0.957 | 458.0 | 0.535 | 1,849.5 | 0.693 | 2,061.4 |
| 1994 | 0.998 | 1,799.6 | 0.998 | 1,259.7 | 1.002 | 537.4 | 0.394 | 2,014.6 | 0.578 | 2,305.6 |
| 1995 | 1.007 | 1,884.5 | 1.014 | 1,315.8 | 0.995 | 566.1 | 0.508 | 1,538.3 | 0.669 | 2,009.7 |
| 1996 | 1.008 | 2,021.4 | 1.015 | 1,375.0 | 0.996 | 644.2 | 0.435 | 1,841.7 | 0.613 | 2,354.0 |
| 1997 | 1.016 | 2,190.1 | 1.010 | 1,444.3 | 1.029 | 743.5 | 0.340 | 1,377.4 | 0.556 | 2,217.9 |
| 1998 | 1.025 | 2,277.6 | 1.001 | 1,527.5 | 1.076 | 748.9 | 0.422 | 1,483.1 | 0.624 | 2,295.7 |
| 1999 | 1.011 | 2,428.5 | 0.997 | 1,626.6 | 1.043 | 800.5 | 0.676 | 1,952.9 | 0.787 | 2,737.7 |
| 2000 | 1.000 | 2,506.5 | 1.000 | 1,743.7 | 1.000 | 762.8 | 1.000 | 1,654.1 | 1.000 | 2,416.9 |
| 2001 | 1.018 | 2,408.7 | 1.000 | 1,860.5 | 1.066 | 554.6 | 1.012 | 1,541.3 | 1.028 | 2,093.0 |
| 2002 | 1.018 | 2,343.2 | 0.991 | 1,951.8 | 1.101 | 409.6 | 1.022 | 2,076.8 | 1.045 | 2,463.4 |

*Wealth Accounts*

Changes in the value of wealth from period to period can be separated between price and quantity components. Net Investment is the quantity component of the change in the value of wealth under the assumption of geometric decline in efficiency of capital goods, while revaluation is the price component. The value of wealth is

$$W_t = q_{A,t} K_t.$$

Wealth is the product of the price index $q_{A,t}$ and quantity index $K_t$. Acquisition prices and quantities of capital stocks can be combined into price and quantity indexes for wealth, using chained Fisher index numbers.

Our Wealth Account for the U.S. economy includes tangible assets held by businesses, households and institutions, and government and net claims on foreigners. We estimate the price and quantity of assets for each of the five sectors by applying chained Fisher ideal index numbers to price and quantity data for each class of assets held by the sector. We have constructed the price and quantity indexes of private domestic tangible assets, government tangible assets, and wealth for 1948–2002 given in table 1.32 by applying these index numbers to the price and quantity indexes for the five sectors.

### 1.4.7 The Sources and Uses of Economic Growth

In this section we illustrate the applications of our prototype system of national accounts for the United States. The main advantage of these prototype accounts is that they provide a framework for an integrated analysis of the U.S. economy. This framework consists of (a) an integrated production account; (b) an integrated capital and wealth account; and (c) the linking of these accounts to underlying industry, asset, and liability accounts detail. These accounts can be used for both aggregate and disaggregated analysis of such issues as the sources of economic growth, the effect of changes in the size and composition of wealth on consumption and saving, and the effect of trade deficits on wealth.

We first consider the sources of postwar U.S. economic growth. This application utilizes measures of output, input, and multifactor productivity from the Production Account presented in table 1.25. We next discuss the uses of economic growth. This draws on estimates of income, expenditures, and the level of living from the Domestic Income and Expenditures Account given in table 1.29. Finally, we present an analysis of data on investment, saving, and wealth from the Domestic Capital and Wealth Accounts in tables 1.30, 1.31, and 1.32.

The interpretation of outputs, inputs, and productivity requires the production possibility frontier introduced by Jorgenson (1996a):

$$Y(I, C) = A \cdot X(K, L)$$

**Table 1.32 Wealth, 1948–2002 (constant prices of 2000)**

| | Wealth | | Private domestic tangible assets | | Government tangible assets | |
|---|---|---|---|---|---|---|
| Year | Price | Quantity | Price | Quantity | Price | Quantity |
| 1948 | 0.107 | 7,202.7 | 0.118 | 4,158.6 | 0.092 | 2,878.3 |
| 1949 | 0.108 | 7,424.4 | 0.118 | 4,448.2 | 0.094 | 2,765.7 |
| 1950 | 0.111 | 7,893.5 | 0.124 | 4,876.6 | 0.093 | 2,758.3 |
| 1951 | 0.120 | 8,400.3 | 0.133 | 5,264.5 | 0.104 | 2,846.7 |
| 1952 | 0.122 | 8,861.0 | 0.134 | 5,582.2 | 0.107 | 2,973.6 |
| 1953 | 0.126 | 9,319.9 | 0.139 | 5,882.0 | 0.110 | 3,121.1 |
| 1954 | 0.127 | 9,710.3 | 0.140 | 6,141.4 | 0.111 | 3,241.2 |
| 1955 | 0.130 | 10,189.4 | 0.143 | 6,516.7 | 0.114 | 3,316.5 |
| 1956 | 0.140 | 10,558.4 | 0.153 | 6,840.5 | 0.127 | 3,333.6 |
| 1957 | 0.148 | 10,919.1 | 0.160 | 7,141.2 | 0.135 | 3,372.7 |
| 1958 | 0.151 | 11,222.2 | 0.163 | 7,364.8 | 0.138 | 3,441.0 |
| 1959 | 0.155 | 11,595.0 | 0.167 | 7,653.7 | 0.141 | 3,508.6 |
| 1960 | 0.160 | 11,893.8 | 0.172 | 7,920.1 | 0.145 | 3,521.4 |
| 1961 | 0.165 | 12,155.7 | 0.178 | 8,139.8 | 0.150 | 3,549.3 |
| 1962 | 0.171 | 12,550.1 | 0.183 | 8,449.3 | 0.156 | 3,617.6 |
| 1963 | 0.174 | 13,004.7 | 0.186 | 8,786.2 | 0.161 | 3,720.6 |
| 1964 | 0.174 | 13,586.7 | 0.185 | 9,166.7 | 0.160 | 3,912.9 |
| 1965 | 0.177 | 14,162.0 | 0.188 | 9,604.6 | 0.163 | 4,032.8 |
| 1966 | 0.183 | 14,822.9 | 0.194 | 10,125.4 | 0.169 | 4,151.5 |
| 1967 | 0.187 | 15,477.9 | 0.198 | 10,577.2 | 0.173 | 4,343.1 |
| 1968 | 0.200 | 15,993.5 | 0.212 | 11,050.8 | 0.185 | 4,357.9 |
| 1969 | 0.214 | 16,538.8 | 0.227 | 11,513.3 | 0.200 | 4,417.4 |
| 1970 | 0.224 | 17,103.6 | 0.236 | 11,914.0 | 0.215 | 4,567.0 |
| 1971 | 0.235 | 17,650.7 | 0.248 | 12,342.9 | 0.228 | 4,665.6 |
| 1972 | 0.249 | 18,788.9 | 0.261 | 13,340.2 | 0.250 | 4,758.4 |
| 1973 | 0.269 | 19,701.6 | 0.279 | 14,124.8 | 0.269 | 4,853.8 |
| 1974 | 0.300 | 19,277.6 | 0.308 | 13,555.4 | 0.308 | 5,015.1 |
| 1975 | 0.330 | 20,108.9 | 0.338 | 14,257.3 | 0.336 | 5,124.6 |
| 1976 | 0.347 | 20,781.6 | 0.358 | 14,807.1 | 0.350 | 5,230.4 |
| 1977 | 0.376 | 21,652.0 | 0.386 | 15,535.1 | 0.371 | 5,351.4 |
| 1978 | 0.415 | 22,529.9 | 0.426 | 16,334.9 | 0.403 | 5,409.1 |
| 1979 | 0.464 | 23,502.1 | 0.471 | 17,205.7 | 0.447 | 5,494.5 |
| 1980 | 0.510 | 24,360.7 | 0.518 | 17,813.6 | 0.492 | 5,744.8 |
| 1981 | 0.545 | 25,870.9 | 0.556 | 19,022.9 | 0.534 | 6,032.4 |
| 1982 | 0.567 | 26,480.1 | 0.581 | 19,534.5 | 0.559 | 6,119.8 |
| 1983 | 0.580 | 26,938.7 | 0.594 | 19,943.9 | 0.571 | 6,186.0 |
| 1984 | 0.593 | 28,788.4 | 0.609 | 21,790.3 | 0.583 | 6,287.0 |
| 1985 | 0.613 | 30,440.3 | 0.629 | 23,542.2 | 0.599 | 6,271.5 |
| 1986 | 0.641 | 31,165.3 | 0.656 | 24,229.2 | 0.624 | 6,413.5 |
| 1987 | 0.675 | 31,624.9 | 0.688 | 24,722.5 | 0.655 | 6,538.7 |
| 1988 | 0.709 | 32,427.9 | 0.723 | 25,481.0 | 0.683 | 6,691.5 |
| 1989 | 0.741 | 33,372.5 | 0.757 | 26,252.6 | 0.713 | 6,854.6 |
| 1990 | 0.762 | 33,075.5 | 0.781 | 26,067.9 | 0.738 | 6,788.9 |
| 1991 | 0.773 | 33,527.8 | 0.794 | 26,446.8 | 0.753 | 6,891.9 |
| 1992 | 0.782 | 33,480.3 | 0.806 | 26,469.8 | 0.764 | 6,916.3 |
| 1993 | 0.815 | 33,221.6 | 0.824 | 26,463.6 | 0.782 | 6,906.9 |
| 1994 | 0.843 | 32,710.5 | 0.844 | 26,304.4 | 0.803 | 6,854.4 |
| 1995 | 0.866 | 33,899.2 | 0.870 | 27,364.6 | 0.833 | 7,051.6 |
| 1996 | 0.890 | 34,187.2 | 0.889 | 27,747.5 | 0.860 | 7,107.0 |
| 1997 | 0.902 | 35,184.9 | 0.908 | 28,742.2 | 0.884 | 7,288.2 |
| 1998 | 0.921 | 36,874.2 | 0.931 | 30,235.7 | 0.913 | 7,525.6 |
| 1999 | 0.958 | 38,171.2 | 0.959 | 31,523.6 | 0.948 | 7,779.3 |
| 2000 | 1.000 | 39,504.6 | 1.000 | 33,046.6 | 1.000 | 8,046.6 |
| 2001 | 1.042 | 39,939.6 | 1.048 | 33,764.5 | 1.055 | 8,122.7 |
| 2002 | 1.096 | 49,950.4 | 1.088 | 35,021.8 | 1.107 | 8,428.4 |

Gross Domestic Product in constant prices $Y$ consists of outputs of investment goods $I$ and consumption goods $C$. These products are produced from capital services $K$ and labor services $L$. These factor services are components of GDI in constant prices $X$ and are augmented by multifactor productivity $A$.

The key feature of the production possibility frontier is the explicit role it provides for changes in the relative prices of investment and consumption outputs. The aggregate production function, a competing methodology, gives a single output as a function of capital and labor inputs. There is no role for separate prices of investment and consumption goods. Under the assumption that product and factor markets are in competitive equilibrium, the share-weighted growth of outputs is the sum of the share-weighted growth of inputs and growth in multifactor productivity:

$$\overline{w}_I \Delta I + \overline{w}_C \Delta \ln C = \overline{v}_K \Delta \ln K + \overline{v}_L \Delta \ln L + \Delta \ln A,$$

where $\overline{w}$ and $\overline{v}$ denote average shares of the outputs and inputs, respectively, in the value of GDP in current prices.

We calculate the average value shares for the two outputs from estimates of investment and consumption goods in current prices presented in table 1.6. The growth rates of these outputs are obtained from estimates in constant prices in table 1.20. Similarly, we calculate the average value shares for capital and labor inputs from the estimates of capital and labor services in current prices from table 1.6. The growth rates of labor input are generated from the estimates in constant prices in table 1.21 and the growth rates of capital input from constant price estimates in table 1.24. Given the accounting identity between the value of outputs and the value of inputs, the value shares of outputs and inputs sum to one.

Table 1.33 presents accounts for U.S. economic growth during the period 1948–2002 and various subperiods, following Jorgenson (2001). The earlier subperiods are divided by the business cycle peaks in 1973 and 1989. The period since 1989 is divided in 1995, the beginning of a powerful resurgence in U.S. economic growth linked to information technology. The con-

**Table 1.33 Contributions to output and growth, 1948–2002**

| | 1948–2002 | 1948–1973 | 1973–1989 | 1989–1995 | 1995–2002 |
|---|---|---|---|---|---|
| *Output* | | | | | |
| Gross domestic product | 3.52 | 4.06 | 3.06 | 2.33 | 3.64 |
| Contribution of consumption | 2.55 | 2.91 | 2.30 | 1.72 | 2.59 |
| Contribution of investment | 0.97 | 1.16 | 0.77 | 0.62 | 1.05 |
| *Growth* | | | | | |
| Gross domestic income | 2.90 | 3.13 | 2.96 | 1.77 | 2.93 |
| Contribution of capital services | 1.83 | 2.00 | 1.79 | 0.87 | 2.14 |
| Contribution of labor services | 1.07 | 1.13 | 1.17 | 0.90 | 0.79 |
| Multifactor productivity | 0.62 | 0.93 | 0.11 | 0.56 | 0.71 |

tribution of each output is its growth rate weighted by the relative value share. Similarly, the contribution of each input is its weighted growth rate. The contribution of multifactor productivity is the difference between growth rates of output and input.

The value shares of outputs and inputs are represented in figure 1.2. The shares of capital and labor inputs reveal little evidence of trends over the period 1948–2002. The share of investment has gradually declined, while the share of consumption has risen. Figure 1.3 depicts the contributions to U.S. economic growth by investment and consumption goods outputs and the sources of economic growth—the contributions of capital and labor services and multifactor productivity.

The graphical picture of the growth of the U.S. economy before and after 1973 reveals familiar features of the historical record. After strong output and productivity growth in the 1950s, 1960s, and early 1970s, the U.S. economy slowed markedly from 1973 through 1989. Output growth fell from 4.06 to 3.06 percent, and multifactor productivity growth declined precipitously from 0.93 to 0.11 percent. The contribution of capital input also slowed from 2.00 percent for 1948–73 to 1.79 percent for 1973–89, more than offsetting the slight increase in the labor input contribution from 1.13 to 1.17 percent. U.S. economic growth declined further from 1989 to 1995, as the contributions of capital and labor inputs slumped to 0.87 percent and 0.90 percent, counterbalancing a revival in productivity growth to 0.56 percent.

U.S. economic growth surged to 3.64 percent during the period 1995–2002. Between 1989–95 and 1995–2002 the contribution of capital input jumped by 1.27 percentage points, accounting for almost all of the increase

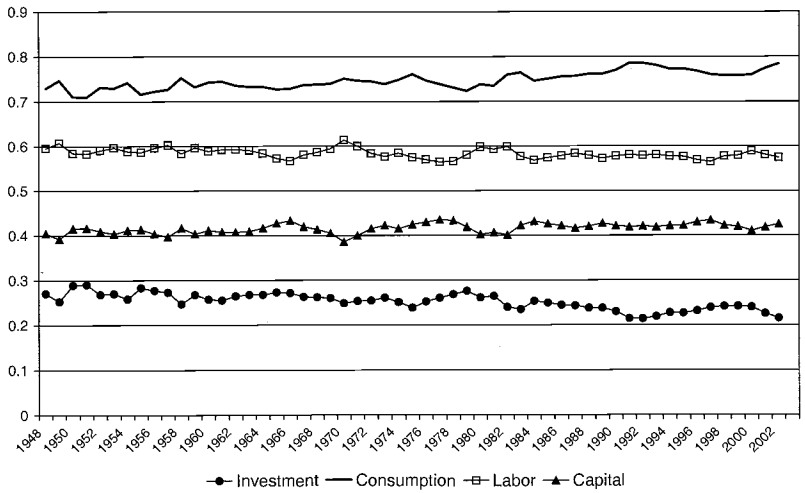


**Fig. 1.2 Output and input shares**

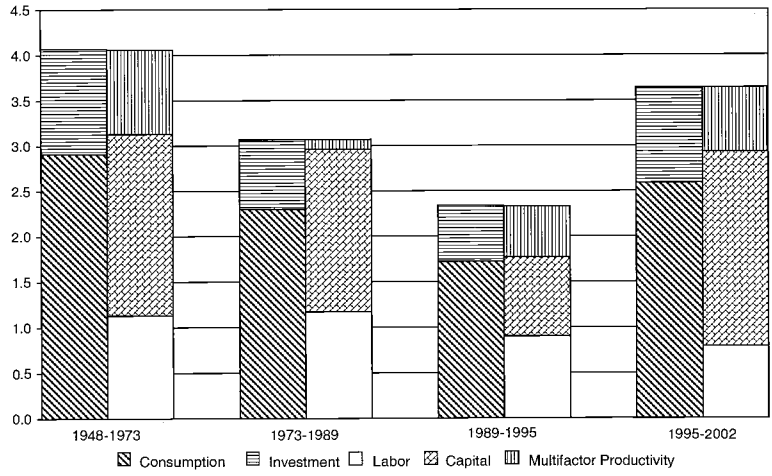


**Fig. 1.3 Contributions to output and economic growth**

in output growth of 1.31 percent. The contribution of capital input reflects the investment boom of the late 1990s, as businesses, households, and governments poured resources into plant and equipment, especially computers, software, and communications equipment. However, this period also includes the short and shallow recession of 2001 and the recovery of 2002. The contribution of labor input declined by 0.11 percent, while multifactor productivity growth accelerated by 0.15 percent.

Although consumption predominates in the growth of output throughout the postwar period, investment has increased in relative importance since 1995. Capital input is the most important source of economic growth for the postwar period; labor input is next in importance and multifactor productivity the least important. Productivity accounts for a little over 20 percent of postwar U.S. economic growth, while capital and labor inputs account for almost 80 percent. The contribution of capital input exceeds that of labor input, except for the period 1989–95.

The estimates of the sources of U.S. economic growth can be further decomposed to show, for example, how much of the spurt in the growth of output and productivity after 1995 was due to the increased efficiency in the production of information technology equipment and software and other investment goods. These estimates can be used to identify the proportion of growth due to increased investment and capital deepening. The accounts also show how much of the growth in labor inputs was due to growth in labor hours and the quality of labor.

Without an integrated set of production accounts, the analysis of sources of economic growth at the aggregate and industry level must rely on a mixture of BEA industry accounts estimates and BLS productivity estimates,

combined with an analyst's estimates of missing information, such as labor quality growth. Different analysts can produce inconsistent results on the sources of economic growth during periods of higher or lower growth, such as the post-1973 productivity slowdown and the more recent spurt in productivity growth since 1995.[26]

We next consider the uses of economic growth, based on the measures of income, expenditures, and the level of living from the Income and Expenditures Account presented in table 1.29. The interpretation of expenditures requires a social welfare function, like the one considered by Weitzman (2003). Expenditures include personal and government consumption and represent the flow of goods and services for current consumption. Expenditures also include saving, net of depreciation, corresponding to the increment in future flows of consumption during the current period.

Economic growth creates opportunities for both present and future consumption. These opportunities are generated by expansion in the supply of capital and labor services, augmented by changes in the level of living:

$$Z(C, S) = B \cdot W(L, N),$$

where net domestic expenditures in constant prices $Z$ consist of consumption expenditures $C$ and saving $S$, net of depreciation. These expenditures are generated by net incomes in constant prices $W$, comprising labor incomes $L$ and property incomes $N$, also net of depreciation.

The level of living $B$ must be carefully distinguished from multifactor productivity $A$. An increase in the level of living implies that for given supplies of the factor services that generate labor and property incomes, the U.S. economy generates greater opportunities for present and future consumption. The share-weighted growth of expenditures is the sum of the share-weighted growth of incomes and growth in the level of living:

$$\overline{w}_C \Delta \ln C + \overline{w}_S \Delta S = \overline{v}_L \Delta \ln L + \overline{v}_N \Delta \ln N + \Delta \ln B,$$

where $\overline{w}$ and $\overline{v}$ denote average value shares for expenditures and incomes, respectively.

We calculate the average shares for the two components of expenditures—consumption and saving—from the estimates of personal consumption expenditures, government consumption expenditures, and net saving in current prices in table 1.8. The shares of labor and capital incomes are obtained from current price estimates of these incomes in the same table. We generate the growth rates of expenditures from the estimates in constant prices in table 1.26 and the growth rates of labor and property incomes from the constant price estimates in table 1.18. The level of living is given in table 1.29.

26. An integrated set of U.S. accounts, using common methodology and source data, will help to eliminate differences due to variations in source data and methods. This will provide an improved baseline for analysis of economic growth, extensions of the accounting system, and alternative sets of estimates.

**Table 1.34 Contributions to expenditure, 1948–2002**

| Expenditure | 1948–2002 | 1948–1973 | 1973–1989 | 1989–1995 | 1995–2002 |
|---|---|---|---|---|---|
| Income | 2.60 | 2.93 | 2.59 | 1.52 | 2.36 |
| Contribution of labor income | 1.21 | 1.26 | 1.34 | 1.02 | 0.90 |
| Contribution of net property income | 1.39 | 1.66 | 1.26 | 0.50 | 1.46 |
| Level of living | 0.63 | 0.93 | 0.14 | 0.59 | 0.71 |
| Net expenditures | 3.23 | 3.86 | 2.73 | 2.11 | 3.07 |
| Consumption | 3.00 | 3.38 | 2.69 | 1.93 | 3.25 |
| Contribution of personal consumption | 2.51 | 2.74 | 2.24 | 1.80 | 2.90 |
| Contribution of government consumption | 0.49 | 0.64 | 0.45 | 0.13 | 0.35 |
| Net saving | 0.23 | 0.48 | 0.04 | 0.18 | –0.18 |

Table 1.34 presents a decomposition of the uses of economic growth for the period 1948–2002. The growth rate of expenditures is a weighted average of growth rates of personal consumption expenditures, government consumption expenditures, and net saving. The contribution of each category of expenditures is the growth rate weighted by the relative share. Similarly, the contributions of labor and property incomes are the growth rates weighted by the relative shares. The contribution of the level of living is the difference between growth rates of expenditures and incomes.

The value shares of expenditures and incomes are represented in figure 1.4. The shares of capital and labor incomes, like the shares of capital and labor inputs in the Production Account, are stationary over the period 1948–2002. The share of personal consumption expenditures has gradually risen over this period, especially after 1973, while the share of government consumption rose and fell. Net saving has steadily trended downward. Figure 1.5 shows the contributions to the growth of expenditures by supplies of capital and labor services and increases in the level of living. This figure also portrays current consumption and increments to future consumption through net saving.

The growth of net expenditures largely reflects the pattern of output growth with strong growth of expenditures during the period 1948–73, followed by a showdown after 1973, a further deceleration after 1989, and a sharp revival after 1995. The growth of expenditures for the postwar period as a whole was 3.23 percent, by comparison with output growth of 3.52 percent. However, the growth of expenditures diverged from the growth of output after 1995, rebounding by only 0.96 percent, by comparison with a jump in output of 1.31 percent.

The precipitous fall in saving has attracted a great deal of attention, for example, in the work of Gale and Sablehaus (1999) and Reinsdorf (2005). The most arresting feature of the uses of economic growth is the gradual disappearance of Net Saving. This added a healthy 0.48 percent to growth during 1948–73. The contribution of current consumption, both personal

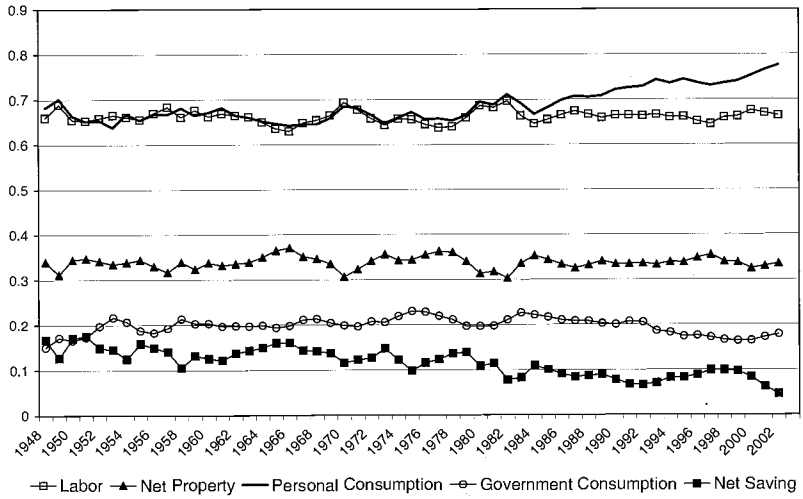


**Fig. 1.4 Income and expenditure shares**

and government, declined during 1973–89, but the contribution of Net Saving nearly vanished, falling to 0.04 percent before reviving modestly to 0.18 percent from 1989 to 1995, and plunging to a negative 0.18 percent during 1995–2002. Both the investment boom of the late 1990s and the resurgence of consumption were financed by foreign borrowing.

The integration of wealth accounts can help explain the long-term decline in saving out of current income. The U.S. tax system taxes future consumption more than current consumption and provides incentives for saving in the form of capital gains for residential housing and corporate equities. The effect of the these provisions of the tax code can be seen in table 1.13, which shows the rise in the share of the annual change in wealth accounted for by revaluations versus saving out of current income from an average of 41 percent between 1950 and 1960 to 54 percent between 1995 and 2000.

We obtain further insight into the relationship between investment and saving from the Domestic Capital and Wealth Accounts presented in tables 1.30, 1.31, and 1.32. Gross Investment and Gross Saving are identical in both current and constant prices. Gross Saving is reduced by Depreciation to yield Net Saving. This is combined with Revaluation to generate the Change in Wealth. Finally, Wealth is comprised of private domestic tangible assets, government tangible assets, and the U.S. International Position. With integrated accounts and the underlying detail in the Federal Reserve Board Balance Sheets and the NIPAs we can focus on the household sector. Much of the increase in net worth was in the household sector. Between 1990 and 2000 39 percent was in equity values and mutual funds and 22 percent in residential housing.

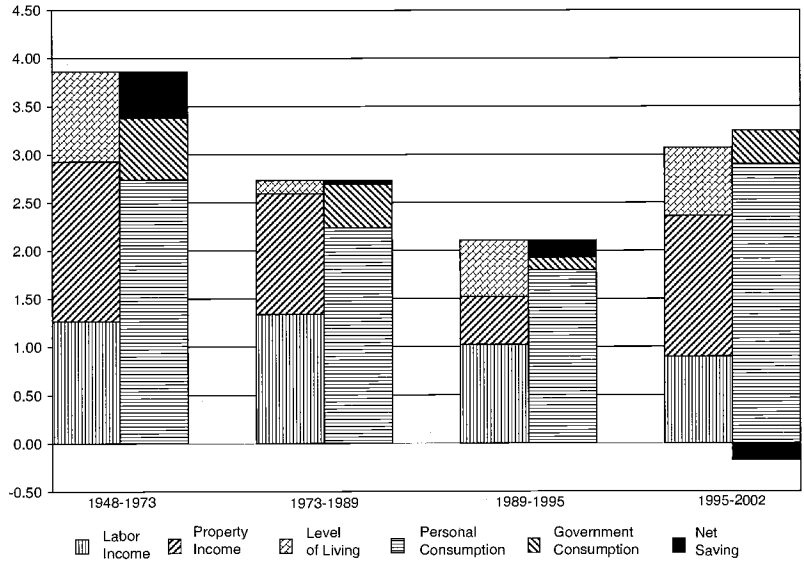


**Fig. 1.5 Contributions to net expenditure and income**

We calculate the average value shares of private investment, government investment, and ROW investment, the components of Gross Investment, from the estimates in current prices presented in table 1.12. The growth rates of these components are obtained from the estimates in constant prices given in table 1.30. Similarly, we calculate the average value shares of Depreciation and Net Saving from the current price estimates in table 1.13. The growth rates of these components of Gross Saving are generated from the constant price estimates in table 1.31.

One link from the Domestic Capital Account to the Domestic Wealth Account is Net Saving, a measure of change in the quantity of assets; a second link is Revaluation, a measure of change in asset prices. The two together make up the Change in Wealth presented in current prices in table 1.13, and the average value shares are obtained from this table. We calculate the growth rates of the two components of Change in Wealth from the constant price estimates in table 1.31. Finally, we provide the asset side of the Domestic Wealth Account in current prices in table 1.17. The estimates in this table are utilized in generating average value shares of the three components. Growth rates are calculated from the constant price estimates in table 1.32.

Table 1.35 presents decompositions of Gross Investment and Gross Saving. The contribution of each component is its growth rate, weighted by the relative value share. The contribution of private investment is almost the same as the growth of Gross Investment for the period 1948–2002. The contribution of government investment nearly offsets the negative contri-

**Table 1.35 Contributions to investment and saving, 1948–2002**

| | 1948–2002 | 1948–1973 | 1973–1989 | 1989–1995 | 1995–2002 |
|---|---|---|---|---|---|
| Gross investment | 3.61 | 4.16 | 3.13 | 3.16 | 3.11 |
| Contribution of private investment | 3.57 | 3.58 | 2.98 | 2.97 | 5.39 |
| Contribution of government investment | 0.55 | 0.65 | 0.55 | 0.10 | 0.54 |
| Contribution of ROW investment | –0.51 | –0.07 | –0.41 | 0.09 | –2.82 |
| Saving | 3.61 | 4.16 | 3.13 | 3.16 | 3.11 |
| Contribution of net saving | 0.76 | 1.55 | 0.23 | 0.67 | –0.79 |
| Contribution of depreciation | 2.85 | 2.61 | 2.89 | 2.49 | 3.91 |

bution of ROW investment. Throughout the postwar period foreigners have been accumulating assets in the United States faster than the United States has been accumulating assets abroad. In fact, the contribution of ROW investment was negative in all subperiods, except 1989–95, when it was very slightly positive.

The value shares of gross investment and gross saving are presented in figure 1.6. The share of private investment has been trending upward throughout the postwar period and exceeded 100 percent after 1995. Government investment peaked in the early 1950s and has been declining gradually. ROW investment was essentially zero until the early 1980s, then dipped into negative territory until 1991, when it was positive for a single year, and then plunged deeper and deeper into the negative range through the end of the period in 2002. Net Saving has been declining as a share of Gross Saving in current prices, while Depreciation has been rising. This reflects the shift in the composition of investment toward shorter-lived assets, including information technology equipment and software.

Figure 1.7 depicts the contributions to capital formation by private investment, government investment, and ROW investment. Gross Investment dropped from 4.16 percent in 1948–73 to 3.13 percent in 1973–89. This remained essentially constant through the end of the period in 2002. However, dramatic changes in the composition of Gross Investment took place after 1995. The contribution of private investment was surprisingly stable until it soared to 5.39 percent for 1995–2002 from 2.97 percent for 1989–95. This reflects the spectacular boom in investment after 1995, powered by the surge of investment in information technology equipment and software. However, the rise in private investment was completely offset by a decline in the contribution of ROW investment, which sank from a positive 0.09 percent in 1989–95 to a negative 2.82 percent in 1995–2002.

The contribution of Net Saving has a strong negative trend, falling from 1.55 percent in 1948–73 to 0.23 percent in 1973–89, before recovering to 0.67 percent in 1989–95. Net Saving then plunged to a negative 0.79 percent in 1995–2002. By contrast the contribution of Depreciation rose grad-

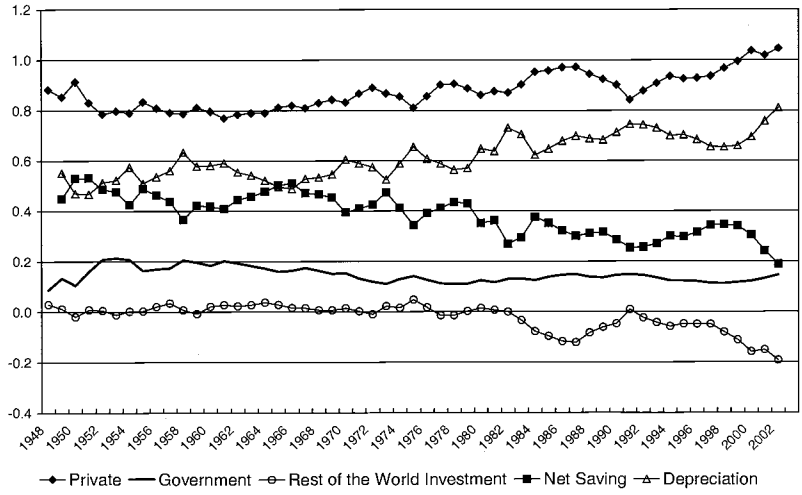


**Fig. 1.6 Investment and saving shares**

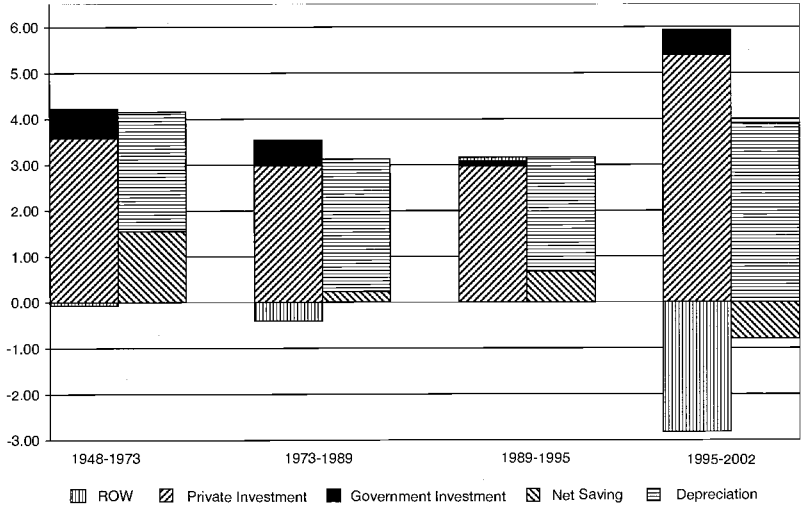


**Fig. 1.7 Contributions to investment and saving**

ually, reaching 3.91 percent in 1995–2002. A different perspective on Net Saving is presented in table 1.36, where the contributions of Net Saving and Revaluation are combined to generate Change in Wealth. The contribution of Revaluation has fluctuated sharply from a negative 0.13 percent in 1948–73, when asset prices were falling, to a positive 3.61 percent in 1973–89, a period of relatively rapid asset inflation that included much of the

**Table 1.36 Contributions to change in wealth, 1948–2002**

| | 1948–2002 | 1948–1973 | 1973–1989 | 1989–1995 | 1995–2002 |
|---|---|---|---|---|---|
| Change in wealth | 3.41 | 3.51 | 4.58 | 0.47 | 2.91 |
| Contribution of net saving | 2.11 | 3.65 | 0.97 | 1.61 | –0.16 |
| Contribution of revaluation | 1.30 | –0.13 | 3.61 | –1.14 | 3.07 |
| Wealth | 3.22 | 4.02 | 3.29 | 0.26 | 2.70 |
| Contribution of private tangible assets | 2.92 | 3.47 | 2.95 | 0.56 | 2.93 |
| Contribution of government tangible assets | 0.48 | 0.56 | 0.49 | 0.09 | 0.52 |
| Contribution of international position | –0.18 | 0.00 | –0.15 | –0.39 | –0.74 |

1970s and 1980s. The contribution of Revaluation was a negative 1.14 percent during 1989–95, before leaping to 3.07 percent from 1995 to 2002.

Finally, table 1.36 provides a decomposition of the growth of Domestic Wealth. The growth rate of Domestic Wealth attained a postwar high of 4.02 percent during 1948–73, before declining to 3.29 percent during 1973–89. Wealth grew at only 0.26 percent during 1989–95, but recovered to 2.70 percent in 1995–2002. The contribution of the U.S. International Investment Position was essentially zero from 1948 to 1973 before moving into the negative range, ultimately declining at 0.74 percent in 1995–2002. Private tangible assets increased in relative importance throughout the period.

These integrated and consistent accounts can extend the double-entry capacity of the existing accounts to put the U.S. trade deficit in perspective. The key features are the accounting identity between national saving and investment and the trade deficit and the relationship between the trade deficit, net borrowings from abroad, and the U.S. international investment position. The extended accounts show that U.S. trade surpluses and net U.S. lending resulted in an international investment position that rose from 1.7 percent of wealth in 1948 to a peak of 3.1 percent in 1980. After that domestic demand, represented by expenditures, grew faster than supply, given by GDP, and trade surpluses turned to deficits. Net lending by the U.S. turned to net borrowing, so that by 1989 the international position was a negative 0.2 percent of U.S. wealth, falling to a negative –5.7 percent in 2002.

The integrated accounts facilitate relative comparisons of net debt to wealth that provide perspective on the magnitude of the U.S. net international position, a negative $2.6 trillion, and comparisons with external debt levels of other countries. Similarly, the NIPAs help put in perspective the trade deficit and the federal budget deficit as a percent of GDP. Currently, differences in the concepts and methods make it difficult to trace changes in the BEA's data on net exports and the U.S. International Investment Position to changes in the FRB's balance sheets.

In summary, the sources of U.S. economic growth reveal the origins of the slowdown that followed 1973 and worsened after 1989, but also the genesis of the U.S. growth resurgence after 1995. The uses of economic growth display the vanishing role of Net Saving throughout the postwar period. The investment boom and the surge in consumption of the late 1990s were financed by foreign borrowing. This is put into sharp relief by the behavior of ROW investment. Rapid accumulation of U.S. assets by foreigners is a long-standing trend that is also apparent in the deterioration in the U.S. International Investment Position. A less familiar fact, put into sharp relief by our prototype system, is the substantial fluctuations in asset prices reflected in Revaluation as a component of the Change in Wealth.

### 1.4.8 Summary and Conclusions

We have now completed our blueprint for a consistent and integrated system of national accounts for the United States. We have limited ourselves to national aggregates and accounts based on market transactions. The major innovation in our system of national accounts is the systematic utilization of imputed rental prices for capital assets, based on the user cost formula introduced by Jorgenson (1963). This is the key to integration of the NIPAs generated by the BEA with the BLS productivity accounts.

In order to achieve consistency between investment goods production and capital income we impute capital income to households, institutions, and governments, as well as corporations and noncorporate businesses. For residential housing we follow the BEA in imputing the rental value of owner-occupied housing from the rental value of renter-occupied housing. This imputation is based on market rental prices. We impute the rental value of consumer durables, as well as durables and real estate owned by nonprofit institutions, from market prices for the assets. We employ a similar approach for the rental value of government assets, including equipment and software, as well as government real estate.

We exclude investment in consumer durables from household consumption, but include this investment in the GDP, together with the imputed rental value of the services of the corresponding assets. We employ a similar approach for assets owned by nonprofit institutions and the government sector. As a consequence of treating investment goods production and capital income symmetrically for household, government, and business sectors, our estimate of GDP in table 1.5 is nearly 10 percent higher than the estimate of GDP given in the NIPAs.

The NIPAs present GDP in current and constant prices and GDI in current prices, while the Domestic Income and Product Account provides GDI in current and constant prices, as well as multifactor productivity, defined as the ratio of GDP in constant prices to GDI in constant prices. The Domestic Income and Product Account we have presented in table 1.6

gives the data required for the analysis of the sources of economic growth for the U.S. economy presented by Jorgenson (2001). The sources of economic growth are the contributions of labor and capital inputs and the growth of productivity.

Our blueprint continues with a consolidated Income and Expenditures Account. Income includes proceeds from the sale of factor services, plus income receipts from the rest of the world less income payments, and net current taxes and transfers from the rest of the world. Expenditures include personal and government expenditures at market prices, plus net saving from the Domestic Capital Account. Our Income and Expenditures Accounts consolidates three income and expenditures accounts from the NIPAs for household, business, and government income and expenditures. This has the advantage that payments among sectors cancel out in the consolidated account, resulting in a considerable simplification.

In order to provide data for an analysis of the disposition of income as expenditures and net saving, we present the Income and Expenditures Account in both current and constant prices in table 1.29. The uses of economic growth include personal consumption expenditures, government expenditures, and net saving. Net saving is generated in the Domestic Capital Account and the Foreign Transactions Capital Account and is equal to gross saving less depreciation. We present the level of living, defined as the ratio of Net Expenditures to Net Income. This gives current consumption and increments to future consumption in the current period as a proportion of the capital and labor services that generate the income that is required.

Our Domestic Capital Account parallels the corresponding account in the NIPAs. Investment includes private domestic investment, government investment, and expenditures on durable goods by households and nonprofit institutions, all evaluated at market prices. The Domestic Capital Account presents the change in wealth, which is equal to the sum of net saving and the revaluation of assets. This provides a necessary link between the current economic activity reflected in the Domestic Income and Product Account and the Income and Expenditures Account and the accumulation of the wealth presented in the Wealth Account. The boundaries of these accounts are consistent throughout our prototype system of national accounts.

Finally, our Wealth Account, together with the Domestic Capital Account, is consistent with the FRB flow-of-funds accounts. We consolidate the detailed accounts presented in the flow-of-funds accounts and the national balance sheets for different financial sectors. This simplifies the accounts for saving, investment, and wealth by eliminating claims among the domestic sectors, including household, government, and business sectors. We retain the Foreign Transactions Current and Capital Accounts from the NIPAs, as well as the U.S. International Position.

## Appendix

### *The U.S. National Accounts: Guide to Data, Concepts, and Methods*

Information on the availability of national accounts data, the concepts that underpin the estimates, and the methods used to develop them are spread among the agencies that produce the accounts and the international bodies that develop guides to national accounts. Below is a list of primary references for understanding the nation's economic accounts.

#### U.S. Resources

Bureau of Economic Analysis (BEA; www.bea.gov)

The upcoming schedule of releases for the following year is published in the December issue of the *Survey of Current Business* (SCB) and on the web site. The December issues also contain a subject guide to articles that have appeared in the SCB throughout the year, articles covering methodologies, research, and recent data releases. Articles since 1994 are available on the web site (www.bea.gov/bea/pubs.htm), and a link to the data release schedule is also available from the home page.

*National accounts* (www.bea.gov/bea/dn1.htm): Quarterly and annual data from the NIPAs and monthly and annual data on personal income and corporate profits are available in press releases, SCB articles, and in interactive formats on the web site, including underlying detail for selected NIPA series. Annual tangible wealth (fixed asset) data are also available in interactive table form. A brief history of the accounts can be found in an SCB article titled "GDP: One of the Great Inventions of the 20th Century," which appeared in January 2000 issue. Methodologies and source data are available from the national accounts section of the BEA web site as well as selected analytical articles and brief overviews on national accounts topics ranging from chain indexes to saving.

*International accounts* (www.bea.gov/bea/di1.htm): Quarterly and annual balance-of-payments (BOP) data and annual international investment position (IIP) data are available in press releases and in SCB articles. BOP interactive data and annual IIP data are accessible from the international section of the BEA web site. Methodology articles for the international accounts and other guides and articles are also available.

*Regional accounts* (www.bea.gov/bea/regional/data.htm): State personal income (SPI), local personal income, and GSP data and press releases are located in the regional section of the BEA web site. Separate interactive

tables are available for annual SPI, quarterly SPI, annual local area income, and annual GSP. Methodology articles, recent releases, and SCB articles for the regional accounts can be accessed from the main regional page.

*Industry accounts* (www.bea.gov/bea/dn2.htm): Quarterly and annual GDP-by-industry data and annual and benchmark input-output (I-O) account data are accessible from the main industry page of the BEA web site. Interactive tables are available for GDP by industry, for annual I-O tables, and for benchmark I-O tables.

Federal Reserve Board (FRB; www.federalreserve.gov)

*Flow-of-funds accounts (FOF):* Recent quarterly and annual FOF data are available at www.federalreserve.gov/releases/z1/. Longer time series of FOF data, including access to downloadable PRN files, are located at www.federalreserve.gov/releases/z1/Current/data.htm. Within the FOF data are the balance sheet data that use the tangible asset data provided by the BEA. The *Guide to the Flow-of-Funds Accounts* provides a thorough methodology of the accounts, and part of it can be viewed online. The entire two-volume book can be ordered from the FRB.

Bureau of Labor Statistics (BLS; www.bls.gov)

*Productivity accounts:* The BLS publishes three productivity series. Annual and quarterly major sector productivity and annual industry productivity data are located at www.bls.gov/lpc/home.htm#overview. This main page provides links to recent releases, methodology articles, and detailed data series. Articles are also published in the *Monthly Labor Review* and are available online since 1982 (www.bls.gov/opub/mlr/mlrhome.htm). Major sector productivity estimates are constructed based on GDP data published by the BEA. Industry productivity data are estimated using basic data published by various public and private agencies. Annual multifactor productivity (MFP) data, recent releases, methodology articles, and detailed data series are available at www.bls.gov/mfp/home.htm. The MFP data series is constructed using the investment and output data provided by the BEA and the labor data collected by the BLS. The BLS *Handbook of Methods* provides a thorough guide to methodologies for BLS data series (www.bls.gov/opub/hom/homtoc_pdf.htm).

**Additional Resources**

System of National Accounts 1993 (SNA 1993)

SNA 1993 is an internationally recognized integrated economic accounting system. The manual and accounting project was sponsored by the

Commission of the European Communities, International Monetary Fund (IMF), Organisation for Economic Co-operation and Development, United Nations (UN), and World Bank. The complete manual can be ordered from the UN (www.un.org).

Balance of Payments Manual, 5th ed. (www.imf.org/external/np/sta/bop/biblio.htm#mg)

Published by the IMF, this manual provides international guidelines for the compilation of international accounts. The fifth edition was published in 1993.

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