

A Preview of the 1999 Comprehensive Revision of the National Income and Product Accounts

Statistical Changes

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ON OCTOBER 28, 1999, the Bureau of Economic Analysis (BEA) will release the initial results of a comprehensive, or benchmark, revision of the national income and product accounts (NIPA's). This revision is the 11th of its kind; the last such revision was released in January 1996.

Comprehensive revisions differ from annual NIPA revisions because of the scope of the changes and because of the number of years subject to revision. Comprehensive revisions incorporate three major types of improvements: (1) Definitional and classificational changes that update the accounts to more accurately portray the evolving U.S. economy, (2) statistical changes that update the accounts to reflect the introduction of new and improved methodologies and the incorporation of newly available and revised source data, and (3) presentational changes that update the NIPA tables to reflect the definitional, classificational, and statistical changes and to make the tables more informative.

This article, which describes the statistical changes, is the third in a series of articles about the comprehensive revision. An article in the August issue described the definitional and classificational changes, and an article in the September issue described the new and redesigned tables.¹ Subsequent articles will present the revised estimates and describe the sources of the revisions.

The major statistical changes include the following:

- Incorporation of the 1992 benchmark input-output (I-O) accounts, benchmarking the expenditure components of gross domestic product (GDP) and some of the income com-

ponents to the best available source data and estimating procedures

- Incorporation of the preliminary results of 1996 annual update of the 1992 I-O accounts, improving the estimates of personal consumption expenditures (PCE) for goods
- Improved estimates of farm proprietors' income, basing them on U.S. Department of Agriculture (USDA) definitions and making them consistent with BEA's regional estimates of farm income
- Improved adjustments that convert tax return data to national accounting concepts, making the income estimates more consistent with the product estimates
- Improved estimates of State and local government taxes, leading to better estimates of the government current surplus or deficit and of gross domestic income
- Improved estimates of the real value of unpriced bank services, reflecting the incorporation of a new measure of banking activity that better captures productivity growth in the industry by including such services as ATM transactions and electronic fund transfers
- Incorporation of an industry-based price index to deflate the gross product of non-financial corporate business, reflecting the changing industrial composition of this sector and providing better measures of productivity, costs, and profits per unit of gross product
- Improved estimates of prices for private higher education and for expenditures by nonresidents in the United States, providing better estimates of real PCE and of real GDP
- Incorporation of the geometric-mean-type consumer price indexes (CPI's) that are currently used to deflate consumer expenditures beginning with 1995 to deflate consumer

1. See Brent R. Moulton, Robert P. Parker, and Eugene P. Seskin, "A Preview of the 1999 Comprehensive Revision of the National Income and Product Accounts: Definitional and Classificational Changes," *SURVEY OF CURRENT BUSINESS* 79 (August 1999): 7-20 and Brent R. Moulton and David F. Sullivan, "A Preview of the 1999 Comprehensive Revision of the National Income and Product Accounts: New and Redesigned Tables," *SURVEY* 79 (September 1999): 15-28.

expenditures back to 1978, increasing the consistency and accuracy of the time series for real PCE and real GDP

The remainder of this article describes the newly available and revised source data and the major methodological changes that will be incorporated in this comprehensive revision (see also table 1).

Newly Available and Revised Source Data

In a comprehensive NIPA revision, the number of years subject to revision is greater than in an an-

nual NIPA revision, when typically only the 3 most recent years are revised. Consequently, newly available and revised source data that become available less often than annually or that cover periods outside the scope of annual revisions are incorporated in comprehensive revisions. Source data that have become available since the 1996 comprehensive revision are referred to as "regular benchmark source data"; they generally go back no further than 10 years. Source data that have become available since the last annual NIPA revision in July 1998 are referred to as "regular source data for 1996-98."

Table 1.—Major Statistical Changes

Change	Components	Initial year of revision
Product-side changes		
Commodity distribution of PCE for goods	PCE	1993
Improved estimates of new autos	PCE, private nonresidential equipment and software	1988
Improved estimates of used autos	PCE, private nonresidential equipment and software	1993
Improved estimates of electricity services	PCE	1959
Improved estimates of change in private inventories	Change in private inventories	
For construction in the "all other" category	1959
For mining in the "all other" category	1977
Income-side changes		
Improved estimates of farm proprietors' income	Farm proprietors' income	1969
Improved estimates of rental income from nonfarm nonresidential properties	Rental income of persons	1929
Improved estimates of interest receipts of captive finance companies	Net interest	1988
Improved estimates of partnership income	Nonfarm proprietors' income	1987
Improved adjustment for foreign factor income	Corporate profits	1987
Improved adjustments for differences in the definition of investment	Corporate profits, nonfarm proprietors' income, CCA	1986
Improved depreciation-related changes:		
Personal computers	CFC, CCAadj	1982
Highways and streets	CFC	1929
Abandoned nuclear power plants	CFC, CCA, CCAadj	1984
State and local government taxes	State and local government receipts, IBT	1985
Quantities and prices		
Improved estimates of banking services	PCE, government consumption expenditures and gross investment, exports	1929
Improved estimates of gross product of nonfinancial corporate business	Gross corporate product	1977
New prices:		
For operating expenses for private higher education	PCE	1988
For operating expenses for other nonprofit institutions serving individuals	PCE	1993
For expenditures in the U.S. by nonresidents	PCE	1988
For brokers' commissions on sale of structures	Private nonresidential structures	1996
For semiconductors	Change in private inventories	1983
For telephone switching equipment	Exports and imports of goods	1985
For computer parts and accessories	Exports and imports of goods	1993
Chain-type indexes and contributions to change		
Updated reference year	All product components	1929
Improved Fisher calculation of chain-type quantity and price indexes	All product components	1947
Improved Federal Government indexes	Federal Government consumption expenditures and gross investment	1972
Improved formula for contributions to percent change	All product components	1958
Changes carried back from the 1997 and 1998 annual revisions ¹		
Improved indicator for trust services of commercial banks (1998)	PCE	1991
Improved indicator for cellular telephone services (1998)	PCE	1985
Improved methodology for change in private inventories (1998)	Change in private inventories, IVA	1982
Improved quarterly and monthly estimates of Federal personal income taxes (1998)	Federal Government receipts, personal tax and nontax payments	1988
New prices:		
Geometric-mean-type consumer price indexes (CPI's) (1998)	PCE, government consumption expenditures and gross investment	1978
For cellular telephone service (1998)	PCE	1987
For auto and truck leasing (1998)	PCE	1993
For "other professional (medical) services" (1998)	PCE	1987
For telephone switching and switchboard equipment (1997)	Private nonresidential equipment and software	1985
Improved timing adjustment for weapons systems (1997)	Change in private inventories	1991

1. The year in parentheses refers to the August issue of the SURVEY in which the change was described.

CCA Capital consumption allowance
 CCAadj Capital consumption adjustment
 CFC Consumption of fixed capital

IBT Indirect business taxes
 IVA Inventory valuation adjustment
 PCE Personal consumption expenditures

The first step in preparing the comprehensive NIPA revision is the incorporation of the 1992 levels for key components from BEA's 1992 benchmark I-O accounts, adjusted to reflect NIPA definitional and classificational changes. In addition, detailed industry and commodity information from the I-O accounts is used to revise the proportions of final and intermediate purchases that are used in the abbreviated commodity-flow, retail-control, and other methods to extrapolate product-side estimates for years after 1992. The NIPA estimates are also revised to reflect the incorporation of newly available and revised source data, including preliminary estimates of the 1996 annual update of the 1992 I-O accounts, preliminary information from the 1997 economic censuses, and other data that have become available since the release of the July 1998 annual NIPA revision.

Regular benchmark source data

The revised NIPA estimates will incorporate the following regular benchmark source data: BEA's benchmark 1992 I-O accounts, selected data from the most recent quinquennial economic censuses, and annual series that were not available in time for incorporation in the annual NIPA revisions.

The 1992 benchmark I-O accounts.—Except as modified by definitional and classificational changes, such as the change recognizing expenditures for software as investment, and by improvements in methodology, the 1992 I-O accounts provide the benchmark for the estimates of several major product-side components of

GDP—PCE, private fixed investment, the commodity weights for the change in private inventories, and the type-of-product detail for State and local government consumption expenditures and gross investment—and of parts of several income components.² The I-O estimates are used as benchmarks because they are based on detailed industry and commodity statistics collected by the Census Bureau in the quinquennial economic censuses and in the censuses of governments and because they are prepared within an internally consistent framework that tracks the input and output flows in the economy.³ In addition, the 1992 I-O estimates incorporated detailed data that had not been available to be incorporated into the NIPA's, including data on industries that were covered for the first time in the 1992 economic censuses for the finance, insurance, and real estate industries and the transportation, communications, and utilities industries.

The incorporation of the 1992 benchmark I-O accounts will result in revisions to NIPA estimates for selected components, beginning with 1988; estimates from the 1987 benchmark I-O accounts were incorporated in the 1996 comprehensive revision of the NIPA's.

Other regular benchmark source data.—This comprehensive revision will incorporate preliminary data on inventories and sales from the 1997 Censuses of Wholesale Trade and Retail Trade and on shipments of computers from the 1997 Census of Manufactures. The data on wholesale and retail trade, which the Census Bureau has also incorporated into the corresponding annual and monthly surveys, will affect the NIPA estimates of PCE for goods and of the change in private inventories, beginning with 1993.

In addition, annual series that became available too late for the annual NIPA revisions will be incorporated. NIPA estimates that are based on the international transactions accounts (ITA's)—primarily net exports of goods and services and income receipts and payments—will be revised to reflect improvements to the ITA's that were introduced since 1995 and that affected years not covered by the annual NIPA revisions in

The Comprehensive NIPA Revision on the Internet

Information on the comprehensive revision of the national income and product accounts (NIPA's) is being posted on the BEA Web site at <www.bea.doc.gov> and on the STAT-USA Web site at <www.stat-usa.gov>.

On the BEA site, a separate page has been set up that can be reached directly from the BEA home page. At present, the following information is available:

- A short summary of the major improvements that will be introduced in the comprehensive revision;
- The three articles in the SURVEY OF CURRENT BUSINESS that preview the major changes that will be incorporated;
- A file containing the titles, line numbers, and stubs for the redesigned NIPA tables; and
- The tentative release schedule for NIPA and related estimates.

The GDP news release that presents the initial results of the comprehensive revision will be posted within minutes of the official release at 8:30 a.m. on October 28, 1999. The "Selected NIPA Tables," which present the revised estimates for recent years and quarters, will be posted later that day. Additional information will be posted as soon as it becomes available.

2. For a discussion of the preliminary effects of the input-output accounts on the NIPA estimates for 1992, see Leon W. Taub and Robert P. Parker, "Preview of Revised NIPA Estimates for 1992 From the 1992 I-O Accounts," SURVEY 77 (December 1997): 11-15.

3. For a description of these accounts, see U.S. Department of Commerce, Bureau of Economic Analysis, *Benchmark Input-Output Accounts of the United States, 1992* (Washington, DC: U.S. Government Printing Office, 1998).

1996–98.⁴ Other series that will be incorporated into the NIPA's include the following: Final fiscal year data on expenditures and receipts of State and local governments for 1992–95 from the Census Bureau; final data on employer pension and profit-sharing plans for 1995 from the Department of Labor; and revised data on mortgage debt outstanding, beginning with 1982, and on consumer credit outstanding, beginning with 1989, from the Federal Reserve Board.

Regular source data for 1996–98

The revised estimates for 1996–98 will reflect the incorporation of other newly available and revised source data that became available since the last annual NIPA revision. The most important of these data include the following: Census Bureau data on the value of construction put in place for 1997 (final) and 1998 (preliminary) and on State and local receipts and expenditures for fiscal year 1997 (final) and 1998 (preliminary), ITA data for 1996–98 (revised), Bureau of Labor Statistics (BLS) tabulations of wages and salaries of employees covered by State unemployment insurance for 1997 (final) and 1998 (preliminary), and Internal Revenue Service (IRS) tabulations of business tax returns for 1997.⁵

Changes in Methodology

This section describes the new and improved methodologies that will be introduced in this comprehensive revision.⁶

Product-side changes

Commodity distribution of PCE for goods.—Beginning with 1993, the estimates of the underlying commodity distribution of most PCE goods will be derived using newly available source data, the incorporation of which requires a change in methodology. First, the commodity distribution for 1996 for most goods will be derived from preliminary estimates of the 1996 annual update of the I-O accounts.⁷ Second, interpolation between

1992 and 1996 and extrapolation beginning with 1997 will be based on annual retail sales by kind of business that have recently been benchmarked to preliminary estimates from the 1997 Census of Retail Trade and on merchandise-line sales by kind of business from the 1992 Census of Retail Trade. Beginning with 1993, levels for this group of goods will continue to be based on the retail-control method using these source data.⁸ Data on merchandise-line sales from the 1997 Census of Retail Trade were not available in time for use in this comprehensive revision.

The 1996 I-O estimates are derived using 1996 data from several Census Bureau annual surveys on commodity and industry output and trade margins and on Census Bureau data on trade in goods. Estimates of PCE for goods are derived using the output data together with relationships from the 1992 benchmark I-O accounts.

New autos.—The estimates of 1992 purchases of new autos for PCE and private fixed investment will reflect an improved methodology introduced for the first time in the 1992 I-O estimates. In the new method, Census Bureau data are used to estimate the transportation costs, wholesale and retail trade margins, and sales and excise taxes that are used to adjust the value of domestic sales at producers' prices to the value at purchasers' prices.⁹

Currently, expenditures for new autos for all years are estimated by valuing unit sales to persons, private business, and government by their average expenditures per car. Unit sales are allocated among households, private business, and government using auto registration data; a portion of sales to households is allocated to private business. Sales to households are valued using retail list prices that have been adjusted for discounts, taxes, and transportation costs; sales to private business and to government are valued using wholesale prices. This method will

net foreign remittances. The 1996 annual update of the I-O accounts will be available in late 1999.

8. For additional information on the retail-control method, see U.S. Department of Commerce, Bureau of Economic Analysis, *Personal Consumption Expenditures*, Methodology Paper No. 6 (Washington, DC: U.S. Government Printing Office, 1990): 41.

9. Retail margins on autos are derived by first determining the total retail margin for franchised car dealers and then allocating this total among commodities sold by those dealers. The total retail margin for franchised car dealers is based on sales and the cost of goods sold from the Census Bureau's annual retail trade survey and on sales from the census of retail trade. The margin is allocated to new autos by multiplying the franchised car dealers' margin rate by their sales of new cars, multiplying the sales of other commodities sold by franchised dealers—such as used autos and auto parts—by the margin rates for the establishment industries in which these commodities are primary, and then adjusting the sum over all commodities sold by franchised dealers to equal their total retail margin. The same method is used to allocate sales taxes to new autos.

4. The annual revisions of the ITA's are usually published in the July issue of the SURVEY, mostly recently in Christopher L. Bach, "U.S. International Transactions, Revised Estimates for 1982–98," SURVEY 79 (July 1999): 60–74.

5. For a more complete listing of the "regular" source data incorporated in an annual revision, see "Updated Summary NIPA Methodologies," SURVEY 78 (September 1998): 14–35.

6. These changes update the methodologies that are described in "Updated Summary NIPA Methodologies" and in the series of NIPA methodology papers.

7. The commodity-flow-based estimates from the 1996 I-O accounts will be used for the commodity distribution of PCE goods except for the following: Motor vehicles; gasoline and oil; tobacco; computers, peripherals, and software; food furnished to employees; food and fuel produced and consumed on farms; standard clothing issued to military personnel; school lunches; and

continue to be used to extrapolate estimates for nonbenchmark years.

Used autos.—Net purchases of used autos by business, government, and persons consist of dealers' margins on used autos purchased and net transactions (purchases less sales) of used autos valued at wholesale prices. Dealers' margins affect GDP; net transactions do not, because they represent changes in the ownership of previously produced goods. Net transactions by business is measured by valuing the change in the unit stock of autos owned by business. Net transactions by persons is estimated as a residual, after accounting for the change in the total stock of used autos, the net transactions by business and by government, exports and imports of used autos, scrappage, and the change in dealers' inventories.

Beginning with 1993, estimates of the unit stock of autos owned by business will reflect modified retention periods and rates for three categories of autos: Leased autos, rental autos, and all other autos owned by business. New purchases of these three categories will be based on detailed registration data. Retention periods for leased autos will range from 2 to 4 years; periods for rental autos and for all other autos owned by business will be based on periods underlying currently published BEA estimates.¹⁰ Currently, unit stocks of autos owned by business are measured using their total purchases of new autos in current and previous years and assumed retention rates fixed by age. Businesses are assumed to retain 100 percent of autos that are less than 1 year old and 70 percent of autos that are from 1 to 2 years old; thereafter, the percentage of the previous year's stock retained is reduced by 5 percentage points each year until it reaches 45 percent for years 6 to 9.

PCE for electricity.—Estimates of PCE for electricity will be improved by adding commodity, or excise, taxes to the reported source data on residential electricity revenue from the Energy Information Administration (EIA). Currently, the estimates reflect an assumption that these taxes were already included in the underlying revenue data. However, new information from EIA and the Rural Electrification Administration indicated that they had not been included, so they were incorporated into the 1992 I-O estimates.

Change in private inventories.—Beginning with 1959, estimates of the change in private inventories for construction—a component of "other"

inventories—will be based on data on construction inventory levels from the Censuses of Construction Industries for 1982, 1987, and 1992. Currently, these inventory changes are estimated using data on the stock of inventories from tabulations of IRS tax returns for all years.

The shift to census-based data is being made for two reasons. First, these data cover only purchased materials and supplies, which are consistent with the NIPA definition of inventories of construction. In contrast, the IRS data also include the value of construction work-in-progress and unsold finished structures; construction work-in-progress is recorded as investment in the NIPA's. Second, the Census Bureau data are based on establishment data, which are consistent with the coverage of inventories for most other industries. In contrast, the IRS data are based on enterprise data, and thus they include inventories of nonconstruction establishments owned by construction enterprises and exclude construction inventories of construction establishments owned by nonconstruction firms. (Estimates for noncensus years will continue to be based on IRS data.)

Beginning with 1977, estimates of the change in private inventories for mining—a component of "other" inventories—will be based on data on mining levels from the Censuses of Mineral Industries for 1977, 1982, 1987, and 1992. Currently, these inventory changes are estimated using data on the stock of inventories from IRS tax returns for all years. The Census Bureau data will be used because they are based on establishment data, which are consistent with the coverage of inventories for most other industries. In contrast, the IRS data are based on enterprise data and thus include inventories of nonmining establishments owned by mining enterprises and exclude mining inventories of mining establishments owned by nonmining firms. (Estimates for noncensus years will continue to be based on IRS data.)

Income-side changes

Farm proprietors' income.—In the NIPA's, farm proprietors' income is estimated by subtracting IRS tax-return-based estimates of corporate profits of farm establishments from USDA-based estimates of net farm income.¹¹ Beginning with 1969, corporate profits of farm establishments will be estimated using data on output and expenses from Census Bureau and USDA surveys. The new methodology will disaggregate net farm

10. Retention periods for rental autos are from 1 to less than 2 years, with an average of 1¼ years; retention periods for fleets and all other autos held by business are from 2 to less than 9 years, with an average of 3½ years.

11. NIPA table 8.24 (old table number 8.22) shows the derivation of NIPA measures of farm income from USDA net farm income.

income into six component estimates: Four that comprise farm output; subsidies to operators; and an expense component that is the sum of intermediate goods and services purchased, consumption of fixed capital, indirect business tax and nontax liability, compensation of employees, and net interest. Each of these component estimates will be multiplied by the corresponding ratio of the value for corporate farm establishments to the value for all farm establishments, based on the quinquennial census of agriculture. These ratios will be interpolated and extrapolated annually with corresponding ratios that are based on USDA's agricultural resource management survey.

Currently, corporate profits of farm establishments is estimated in two pieces: Corporate profits of farm corporations is based on IRS tax returns, and corporate profits of farm establishments of nonfarm corporations is estimated by BEA using the estimates of the corporate profits of farm corporations and data from the census of agriculture.

As a result of this change, estimates of farm proprietors' income will be based on USDA definitions rather than on a mixture of USDA and IRS definitions. In addition, the new methodology will be consistent with that used for preparing the farm proprietors' income component of BEA's State and local area estimates of personal income.

The improved methodology will not affect the estimates of total corporate profits. The estimates of corporate profits for the farm industry will continue to be based on IRS tabulations of corporate tax returns.

Rental income from nonfarm nonresidential properties.—Beginning with 1929, income of persons from the rental of nonfarm nonresidential properties will be estimated by multiplying an IRS-based rate of return on capital of small corporate real estate operators and lessors by a BEA estimate of nonfarm nonresidential fixed assets owned by persons.¹² Currently, for 1984 forward, these estimates are judgmental extrapolations of estimates based on business income tax returns.¹³

12. Rental income of persons excludes the income of persons primarily engaged in the real estate business. The rental income of these persons from both residential and nonresidential property is included in either corporate profits or proprietors' income.

13. The estimates before 1984 were derived as the difference between reported rents paid by business and government and rents received by business and government. Data on business rents were from the IRS tabulations of business tax returns, adjusted for rental receipts reported as business receipts; government data were from BEA's government-sector estimates of business nontaxes. The judgmental extrapolations became necessary when these "residual" estimates became unreliable.

Interest receipts of "captive" finance companies.—For most years, the estimates of the monetary interest paid and received by corporations and by sole proprietorships and partnerships, which are components of net interest, are based on business tax return data on interest receipts and payments. This methodology provides comprehensive estimates of net monetary interest to the extent that these tax return data reflect all receipts and payments. A previous analysis by BEA of the reporting by corporations whose tax returns cover "captive" finance subsidiaries determined that a large portion of the interest receipts of these subsidiaries were being reported as some other type of receipts; thus, to properly measure net interest, BEA adjusted the reported interest receipts to include the missing amounts.¹⁴ However, a recently completed analysis for tax year 1994 indicated that this misreporting is not as large as previously indicated; therefore, beginning with 1988, BEA will reduce the amount of the adjustment to interest receipts.

Partnership income.—The adjustment to nonfarm proprietors' income that removes a double-counting of the income of corporate partners in the estimates of both corporate profits and nonfarm proprietors' income will be improved.¹⁵ Based on a review of partnership tax returns, BEA will revise the adjustment to remove portfolio income and to increase the amount of ordinary income attributed to corporate partners, which is then deducted from proprietors' income. For the current adjustment, income is attributed to corporate partners based on the corporate amount of total partnership ordinary income less expenses reported elsewhere on the tax return rather than on the distributive share amount reported under partnership income by type of partner. This method has been used because the sum of the incomes by type of partner tends to be less than the total partnership income reported on the same tax return; furthermore, portfolio income is included in incomes by type of partner, but it should be omitted in partnership income as defined in the NIPA's.

Foreign profits adjustment.—In the NIPA's, two measures of corporate profits are presented: One that is consistent with GDP, a measure of output

14. NIPA table 8.26 (old table number 8.24) shows the derivation of NIPA measures of monetary interest paid and received from the corresponding IRS measures; the adjustment for captive finance companies is included in line 23.

15. This adjustment, which was described in "An Advance Overview of the Comprehensive Revision of the National Income and Product Accounts," SURVEY 65 (October 1985): 26, is shown in line 3 of NIPA table 8.23 (old table number 8.21).

produced by labor and capital located in the United States, and another that is consistent with gross national product (GNP), a measure of output related to the labor and capital supplied by U.S. residents. The primary source data for these estimates are IRS tabulations of corporate tax returns that BEA adjusts to a NIPA basis.¹⁶

In order to adjust the tax return source data to a GNP basis, BEA makes three adjustments. First, the amount of profits on U.S. domestic production earned by foreign investors is subtracted from the tax return data. The amount of this adjustment is based on these earnings as recorded in the income payments component of the U.S. international transactions accounts (ITA's). Second, earnings of U.S. corporations from production outside the United States as reported on the tax returns are subtracted. Third, the ITA estimate of earnings of U.S. corporations from production outside the United States is added. The resulting NIPA measure reflects only earnings by U.S. residents, and it includes a component for "rest-of-the-world" profits that is statistically consistent with the ITA's. Profits on a GDP basis equals profits on a GNP basis excluding this component.

Beginning with 1987, the adjustment to remove foreign earnings of U.S. corporations—specifically to remove profits received from unincorporated foreign operations of U.S. corporations—will be improved by the use of newly available IRS tax return data. Currently, this adjustment is based on information reported on Schedule A, "Income (or Loss) Before Adjustments," of IRS Form 1118 "Foreign Tax Credit—Corporations" and on ITA data on receipts from exports of services. The newly available IRS data, which begin with tax year 1993, are reported on Schedule F, "Gross Income and Definitely Allocable Deductions From Sources Outside the U.S. Under Section 863(b) and for Foreign Branches," of IRS Form 1118. The new data indicate that the current methodology does not accurately allocate expenses between domestic expenditures and foreign activities and thus overstates the extent to which exports of services were reported as foreign income on Form 1118.¹⁷

Adjustments for differences in the definition of investment.—For business tax reporting purposes, intangibles other than software—such as movies, videos, and rental clothing—may be capitalized

and treated as investment; however, in the NIPA's, these items are not treated as investment and are not capitalized. Currently, adjustments are made by BEA to convert the tax return data on depreciation and amortization to the corresponding estimates of capital consumption allowances (CCA).¹⁸ However, adjustments for these items are not made in converting tax return estimates for corporate profits and for nonfarm proprietors' income. To eliminate this inconsistency, the adjustments for the estimates of CCA will be applied to the estimates of business incomes, beginning with 1986.

In addition, the adjustment for intangibles will be improved to reflect the rapid growth in the amortization of intangibles—such as goodwill, customer and products lists, and the costs of mergers and acquisitions—that is allowed for under section 197 of the IRS code. These items are also not treated as investment in the NIPA's.

Depreciation-related changes.—In this comprehensive revision, several depreciation-related changes will be introduced that relate to personal computers (PC's), to highways and streets, and to abandoned nuclear power plants.

Beginning with 1982, the method for estimating the depreciation, or consumption of fixed capital (CFC), of PC's will be based on a California study of fair-market values of personal property, including PC's.¹⁹ The revised estimates will reflect a geometric pattern of depreciation that, by the fifth year, results in a residual value for a PC of less than 10 percent of its original value.

Currently, depreciation for PC's is based on work by Stephen Oliner of the Federal Reserve Board that included a general schedule for computers, but nothing specific for PC's.²⁰ The modified method will be consistent with the general procedure for calculating depreciation that was adopted in the 1996 comprehensive NIPA revision, in which assets are depreciated using empirical evidence on used-asset prices and geometric patterns of price declines.

18. NIPA table 8.22 (old table number 8.20) shows the derivation of NIPA measures of CCA from the corresponding IRS measures; the adjustment for intangibles is shown in line 3.

19. As a result of an earlier application of this methodology, the California State Board of Equalization recommended depreciation schedules for computers that were widely adopted across California and in several other western States. For further details, see Richard N. Lane, "Appraisal Report 'Large Aerospace Firm' Personal Property, Los Angeles County, March 1, 1995," revised February 2, 1999.

20. See Stephen D. Oliner, "Price Change, Depreciation and Retirement of Mainframe Computers," in *Price Measurements and Their Uses*, Studies in Income and Wealth vol. 57, edited by Murray F. Foss, Marilyn E. Manser, and Allan H. Young (Chicago: University of Chicago Press, for the National Bureau of Economic Research, 1993): 19–61.

16. The adjustments are shown in NIPA table 8.25 (old table number 8.23).

17. Allocated expenses are those that U.S. taxpayers typically incur in the United States, including legal, accounting, general and administrative, and many other types of expenses—in support of their foreign operations.

For the estimates of government *CFC*, the service life for highways and streets will be reduced from 60 years to 45 years, based on two recent studies of highway capital.²¹

In addition, the value of abandoned nuclear power plants will no longer be included in the *NIPA* estimates of *CFC*, *CCA*, and the difference between *CCA* and *CFC*, the capital consumption adjustment (*CCAdj*). Currently, the value of these plants is included in the *NIPA CFC* estimates but not in the wealth *CFC* estimates.²²

For this comprehensive revision, new *NIPA* table 5.16, "Changes in Net Stock of Produced Assets (Fixed Assets and Inventories)," will integrate investment flows and stocks of fixed assets. The change in the treatment of the abandoned plants will facilitate this integration. (The value of these abandonments will still be published as an addenda item in table 5.16.)

State and local government taxes.—For this comprehensive revision, tabulations from the Census Bureau annual *Government Finances (GF)* survey will replace the Census Bureau's *Quarterly Summary of State and Local Tax Revenue (QS)* as the annual source data for most State and local taxes. This change represents the continuation of a process that began with the 1997 annual *NIPA* revision, when *GF* became the source data for State income taxes, for State general sales taxes, and for local property taxes. Beginning with the 1998 annual *NIPA* revision, *GF* became the source data for additional tax-related series. The change will affect the estimates of the taxes back to 1993, except that property taxes will be affected back to 1985. The change is being implemented because *GF* has better coverage of local governments, complete coverage of all States, and better reporting. A recent *BEA* study indicated that as a result of these differences, *GF*-based tax revenues grew much faster than *QS*-based tax revenues.

Quantities and prices

Banking services.—In the *NIPA*'s, an imputation is made for the services that commercial banks and certain other financial intermediaries provide

without explicit charge.²³ For this comprehensive revision, changes in the real value of the unpriced bank services provided by commercial banks will be estimated by assuming that the total output of these banks increases at the same rate of growth as the output of this industry in the *BLS* estimates of productivity by industry.²⁴ The *BLS* estimate of these services is based on a weighted average of various indexes of bank activity, including bank transactions (for example, checks cleared, *ATM* transactions, and electronic funds transfers), the number of outstanding loans of various types, and the net income from trust accounts. Currently, *BEA* estimates the change in real unpriced banking services by assuming that it increases at the same rate of growth as the hours worked by employees in this industry; no adjustment is made for changes in these employees' productivity. The change in methodology will mostly affect *PCE* because these services are predominantly furnished to persons; it will have small effects on government consumption expenditures and gross investment and on exports of services (components of *GDP*) and on income payments to the rest of the world (a component of *GNP*).

Gross product of nonfinancial corporate business.—A new price index will be used to deflate gross product of nonfinancial corporate business, which is shown in *NIPA* table 1.16. (This deflator, divided by 100, is also shown in *NIPA* table 7.15 as the price per unit of real gross product of nonfinancial corporate business.)

Beginning with 1977, an annual chain-type price index will be calculated using industry gross product price indexes for each nonfinancial industry. The weights for the price index will be based on estimates of corporate gross product by industry. Currently, the implicit price deflator for goods and structures in *GDP* is used to deflate gross product of nonfinancial corporate business. This deflator will continue to serve as the interpolator for the quarterly estimates, and it will continue to serve as the extrapolator for the current quarterly estimates and for the initial release of the annual estimates during annual and comprehensive revisions. When the new gross product index becomes available, usually about 4 months after each annual revision, the quarterly and annual estimates will be revised.

23. The methodology for estimating the services provided by commercial banks for which there is an explicit charge will not change.

24. A recent summary of the *BLS* methodology is found in Kent Kunze, Mary Jablonski and Mark Sieling, "Measuring Output and Labor Productivity of Commercial Banks (SIC 602): A Transactions-based Approach" (unpublished paper prepared for the Brookings Institution Workshop on Banking Output, Washington, D.C., November 20, 1998.)

21. For information on the service life of highways, see Richard Beemiller, "Experimental Estimates of State and Local Government Highway Capital Stocks" (paper presented at the 1999 annual meeting of the Southern Regional Science Association, Richmond, VA, April 1999); and Barbara M. Fraumeni, *Productive Highway Capital Stock Measures*, a report prepared for the Federal Highway Administration, U.S. Department of Transportation, January 1999.

22. In the *NIPA*'s, the value of construction put in place is recorded as investment, whereas in the wealth estimates, investment is recorded on a put-in-service basis. Because none of these plants were put into service, they are not included in the stock of fixed assets.

New price measures.—In this comprehensive revision, new price measures will be introduced into the estimates of PCE, private fixed investment, change in private inventories, and exports and imports.

Beginning with the annual estimates for 1988, the prices used to deflate expenditures for private higher education, a type of nonprofit institution serving individuals, will be improved.²⁵ The real measure of these expenditures will be the sum of real CFC and of current-dollar other expenditures deflated by an input-cost index that is a geometric mean of indexes for compensation and noncompensation goods and services. Weights for the index for 1988–95 will be interpolated using a combination of 1987 weights, based on a higher education price index, and 1996 weights, based on detailed expense data from the integrated post-secondary education data system (IPEDS) finance survey.²⁶ Weights after 1996 will be based on 1996 IPEDS data, and interpolation and extrapolation of the annual index will be based on the CPI for all items.

In addition, for many other types of nonprofit institutions serving individuals, the prices used to deflate consumption expenditures will be improved, beginning with 1993. The real measure of these expenditures will be the sum of real CFC and of current-dollar other expenditures deflated by weighted averages of indexes of average annual wages and salaries per employee and price indexes associated with noncompensation expenditures. Weights will be based on detailed expense data from the 1992 I-O tables. In most instances, the price indexes will be producer price indexes (PPI's) or consumer price indexes (CPI's).²⁷ Currently, these expenditures are deflated with annual input-cost indexes that are constructed as weighted averages of indexes of the average annual salaries per employee and the PPI for industrial commodities less fuels and re-

lated products and power; these annual indexes are interpolated and extrapolated with weighted averages of indexes of average hourly earnings and the PPI for industrial commodities less fuels and related products and power.

Beginning with 1988, the composite index of CPI components that is used to deflate expenditures in the United States by nonresidents will be changed.²⁸ The index will use updated weights that reflect more recent and detailed data on the composition of these expenditures, and many of the CPI components used in the index will incorporate additional detail on expenditures. Weights will be based on type-of-expenditure data from the 1996 In-Flight Survey, which is prepared by the International Trade Administration of the U.S. Department of Commerce, and distributed to more detailed commodities using data from the U.S. Travel and Tourism Satellite Accounts for 1992.²⁹ Currently, the index uses weights that are based on in-flight survey data from the 1970's and distributed to more detailed categories using CPI weights.

For nonresidential structures, brokers' commissions will be deflated using the PPI for nonresidential real estate brokers' commissions, beginning with 1996. Currently, nonresidential brokers' commissions are deflated using a weighted average of the residential brokers' commissions deflator and the Turner Construction Company index.³⁰

For change in private inventories, a BEA quality-adjusted annual price index for semiconductors will be used to deflate semiconductor commodities within manufacturing industries for 1983–96.³¹ This index will replace the BLS PPI for semiconductors that is currently used for that period; for 1997 forward, the PPI will continue to be used.

For exports and imports, beginning with 1985, a BEA quality-adjusted annual price index for telephone switching equipment will be used to deflate estimates for telephone switching

25. PCE consists of goods and services purchased by individuals and by nonprofit institutions serving individuals. For additional information on nonprofit institutions in PCE, see *Personal Consumption Expenditures*, 5–7.

26. For information on the higher education price index, see Research Associates of Washington, *Inflation Measures for Schools, Colleges & Libraries* (Arlington, VA: Research Associates of Washington, annually). For information on the IPEDS, see U.S. Department of Education, National Center for Education Statistics, *Current Funds Revenues and Expenditures of Degree-Granting Institutions: Fiscal Year 1996* (Washington, DC: National Center for Education Statistics, 1999).

27. This change will affect the deflation for nursery schools, elementary and secondary schools, commercial and vocational schools, foundations and noncommercial research organizations, religious and welfare organizations, labor unions, professional associations, and clubs and fraternal organizations. For elementary and secondary schools, interpolation and extrapolation of annual indexes will be done with the CPI for all items. For commercial and vocational schools, the CPI for technical and business school tuition and fees will be used, beginning with January 1998. For the others, annual indexes will be interpolated and extrapolated with a weighted average of indexes of average hourly earnings and the CPI for all items.

28. Expenditures in the United States by nonresidents are removed from PCE. In the source data underlying many of the estimates for detailed PCE components, the expenditures that are made by nonresidents while traveling in the United States are indistinguishable from those made by U.S. residents. These expenditures are included as exports in the NIPA's.

29. See Sumiye Okubo and Mark A. Planting, "U.S. Travel and Tourism Satellite Accounts for 1992," *SURVEY* 78 (July 1998): 8–22.

30. This index, which is compiled quarterly with 1967 as the base period, is a price index for national building construction costs and is derived from the firm's current-cost experience on wage rates, material prices, subcontractor prices, and competitive conditions.

31. For a detailed description of this index, which was incorporated into estimates of exports and imports of semiconductors and into estimates of gross product originating during the 1996 comprehensive revision, see "Improved Estimates of the National Income and Product Accounts for 1959–95: Results of the Comprehensive Revision," *SURVEY* 76 (January/February): 27.

equipment, a component of telecommunications equipment; currently, the BLS international price indexes for telephone communications equipment are used. In addition, beginning with 1993, the items classified as “parts and accessories” within “computers, peripherals, and parts” will be deflated using BLS export and import price indexes for “parts and accessories (not elsewhere specified or included) for computers and other office machines”; these indexes will be extrapolated back to 1992 using the corresponding deflators for exports and imports of the aggregate “computers, peripherals, and parts.” Currently, these parts and accessories, which account for a substantial share of “computers, peripherals, and parts,” are primarily categorized under “computers—mainframes and PC’s” and are deflated using the price indexes for mainframes and for PC’s.

Chain-type indexes and contributions to change

Updating the reference year.—In comprehensive revisions, a shift to a more recent reference year is a standard procedure that provides measures of real output and prices that are more relevant for many purposes. The NIPA’s were last “re-based” in the 1996 comprehensive revision, when the reference year was shifted from 1987 to 1992. In this comprehensive revision, the reference year will shift to 1996 for quantity indexes, price indexes, and chained-dollar estimates. Quantity and price indexes at the most detailed level will be expressed with 1996 equal to 100 and will provide the inputs used for calculating higher level chain-type measures, and chained-dollar estimates will be reported as “chained (1996) dollars.”³² The year 1996 was chosen as the reference year because it is the latest year for which the current-dollar estimates will not be revised until the next comprehensive revision.

Updating the reference year will not affect the percent changes in the price or quantity indexes or in the chained-dollar estimates, because these changes are measured with chain-type indexes. (However, the growth rates of NIPA aggregates will be revised as a result of the definitional and statistical changes that are introduced.) For recent years, updating the reference year will reduce the size of the “residual”—that is, the difference between the value of the largest chained-dollar aggregate shown and the sum of the most detailed

components—which usually is shown as the last line in the chained-dollar tables.

Quarterly measures.—Beginning with 1947, quarterly chain-type indexes and chained-dollar estimates will be computed with quarterly weights for all periods. Currently, quarterly weights are used only for the most recent quarters (that is, beginning with the third quarter of the latest complete year included in a comprehensive or annual revision); measures for all earlier quarters are computed using annual weights.³³ As a result of this change, the chain-type quarterly estimates will reflect the substitution effects of relative price and quantity changes within years as well as between years. The quarterly indexes through the most recent complete year included in an annual or comprehensive revision will continue to be adjusted to ensure that the average of the quarterly estimates conforms to the corresponding annual estimates.³⁴

In the new methodology, the annual chain-type measures will be calculated with annual weights, and the quarterly chain-type measures will be calculated with quarterly weights. The only exception will be that when the annual estimates for the most recent year are first calculated, they will be averages of quarterly estimates until the next annual revision.

The new method will more accurately measure changes in quantities and prices and will eliminate the revisions that result from changing quarterly weights to annual weights for recent quarters. Nevertheless, the effects on the NIPA estimates will be small.

Federal Government indexes.—Beginning with 1972, the price and quantity indexes for Federal Government consumption expenditures and gross investment will be constructed using quarterly chain-type indexes at the finest level of detail for a number of series, primarily in defense durable goods and defense equipment. Currently, many Federal Government chain-type price and quantity indexes are calculated from fixed-weighted aggregates of actual transaction prices and quantities; this technique has led to erratic movements in several BEA price indexes.

33. For further details, see Robert P. Parker and Eugene P. Seskin, “Annual Revision of the National Income and Product Accounts,” *SURVEY* 77 (August 1997): 29–30.

34. Monthly estimates of real PCE and real manufacturing and trade inventories will use monthly price weights. Monthly estimates of real PCE in completed quarters will be adjusted so that the average for the 3 months equals the average for the quarter, and monthly estimates of real manufacturing and trade inventories will be adjusted so that the end-of-third-month value equals the end-of-quarter value.

32. The tables that show “real,” or chained-dollar, estimates will begin with 1987. Quantity and price indexes will continue to be shown beginning with 1929 for annual estimates and 1947 for quarterly estimates.

Contributions to percent change.—A new formula will be used to calculate the contributions of components to the percent change in real GDP (shown in new NIPA table S.2, in NIPA table 8.2, and in table 2 of the GDP news release) and to the percent change in major aggregates other than GDP (new NIPA tables 8.3–8.6).³⁵ The contributions shown in these tables, *unlike the contributions calculated directly from the chained-dollar estimates*, will more accurately measure component contributions to real growth, particularly components for which relative prices are changing rapidly. These contributions are additive and are prepared using a methodology that determines the amount that each detailed component contributes to the percent change in the major aggregate. Currently, slightly different formulas are used depending on whether the estimates are quarterly or annual and whether they are for periods before or after the reference year.³⁶

The new formula will apply to both annual and quarterly estimates and to all time periods.³⁷ Specifically, the contribution to the percent change ($C\%\Delta_{i,t}$) in an aggregate, such as real GDP or real PCE, in period t that is attributable to the quantity change in component i will be

$$C\%\Delta_{i,t} = 100 \times \frac{((p_{i,t}/P_t^F) + p_{i,t-1}) \times (q_{i,t} - q_{i,t-1})}{\sum_j ((p_{j,t}/P_t^F) + p_{j,t-1}) \times q_{j,t-1}}$$

where P_t^F is the Fisher price index for the aggregate in period t relative to period $t - 1$;

$p_{i,t}$ is the price of component i in period t ; and

$q_{i,t}$ is the quantity of component i in period t .

The summation with subscript j in the denominator includes all the deflation-level components of the aggregate. Contributions of subaggregates, such as PCE goods, to the percent change of the aggregate will be calculated by summing the contributions of all the deflation-level components contained in the subaggregate.

The new formula produces estimates that are very close to those produced by the current formulas. One advantage of the new formula is that for annual estimates, no adjustments are

required to ensure that the contributions sum exactly to the percent change of the aggregate.³⁸ Another advantage is that a single formula can be used for both annual and quarterly estimates. The only exception will be that when the annual contributions for the most recent year are first calculated, they will be based on a weighted average of the quarterly contributions until the next annual revision.

Changes carried back from the 1997 and 1998 annual revisions

In this comprehensive revision, several changes in methodology that were introduced in the 1997 and 1998 annual revisions of the NIPA's will be carried back to earlier years.³⁹

From the 1998 annual revision, the following changes in methodology affecting the current-dollar estimates will be carried back to earlier years. For brokerage and investment counseling in PCE services, a new quarterly indicator for trust services of commercial banks will be carried back to 1991. For cellular telephone services in PCE, new indicators based on semiannual revenues of cellular telephone companies and monthly subscriber data will be carried back to 1985. For the change in private inventories for manufacturing and for merchant wholesale and retail trade, a new methodology to compute the quarterly and monthly estimates will be carried back to 1982. For declarations and settlements less refunds in Federal personal income taxes, a new methodology to derive the monthly and quarterly estimates will be carried back to 1988.

In addition, a number of new prices that were introduced in the 1998 annual revision will be carried back to earlier years.⁴⁰ First, for most PCE categories that use CPI's for deflation, historically consistent CPI's—including the geometric-mean-type CPI's that BLS began using in the official CPI in January 1999—will be carried back to 1978. These CPI's will be based on a CPI research series that BLS recently published for the period 1978–98; this series carries back a number of recent changes in the calculation of the CPI.⁴¹ Currently, the PCE estimates before 1995

38. Quarterly estimates will still be adjusted to offset adjustments that are needed to express quarterly percent changes at annual rates and to ensure that the average of the quarterly quantity indexes conforms to the corresponding annual quantity index.

39. For information on these annual revisions, see Parker and Seskin, "Annual Revision of the National Income and Product Accounts," 6–35; and Eugene P. Seskin, "Annual Revision of the National Income and Product Accounts," SURVEY 78 (August 1998): 7–35.

40. For additional details, see Seskin, "Annual Revision," 31–32.

41. For information on these geometric-mean-type CPI's, see Kenneth J. Stewart and Stephen B. Reed, "CPI Research Series Using Current Methods, 1978–98," *Monthly Labor Review* 122 (June 1999): 29–38.

35. BEA is indebted to Yuri Dikanov of the World Bank for suggesting this formula.

36. For the formulas that are currently used, see U.S. Department of Commerce, Bureau of Economic Analysis, *National Income and Product Accounts of the United States, 1929–94: Volume 1* (Washington, DC: U.S. Government Printing Office, 1998): M–13.

37. Annual estimates of contributions to percent change begin with 1930, and quarterly estimates begin with 1947.

reflect fixed-weighted component indexes that were based on the official CPI's prior to 1999. Second, for cellular telephone service in PCE, a price index developed by Hausman will be carried back to 1987.⁴² Third, auto and truck leasing in PCE will be deflated using implicit prices that reflect changes in the CPI's for new vehicles and changes in interest rates on new car loans by auto finance companies. Finally, within "other professional

(medical) services" in PCE, eye examinations will be deflated using the CPI for eyeglasses and eye care.

From the 1997 annual revision, a new BEA quality-adjusted annual price index for telephone switching and switchboard equipment in private fixed investment will be carried back to 1985. In addition, a timing adjustment for the production and sale of a major weapons system, the B-2 bomber, in the change in private inventories will be carried back to 1991. 

42. For more details, see Jerry Hausman, "Cellular Telephone, New Products, and the CPI," *Journal of Business & Economic Statistics* 17 (April 1999): 188-94.