Preview of the 2003 Comprehensive Revision of the National Income and Product Accounts

Statistical Changes

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ON December 10, 2003, the Bureau of Economic Analysis (BEA) will release the results of the 12th comprehensive, or benchmark, revision of the national income and product accounts (NIPAs). The last such revision was released in October 1999.

This article, which describes statistical changes, is the fourth in a series of SURVEY OF CURRENT BUSINESS articles about the comprehensive revision. An article in the January 2003 issue described the effects of incorporating the 1997 benchmark input-output (I-O) accounts and identified some of the proposals being considered for this comprehensive revision.[1] An article in the June 2003 issue described major changes in definitions and classifications that will be introduced as part of this comprehensive revision.[2] An article in the August 2003 issue described the new and redesigned tables that will be presented as part of the comprehensive revision.[3] The results of the comprehensive revision will be released in December 2003 and an article in the January 2004 SURVEY will describe the revised NIPA estimates, discuss the effects of the definitional and statistical changes, and present the new tables.

Statistical changes are changes in estimation procedures that are generally made to incorporate new methods or techniques or to incorporate data from new sources; an example is the adoption of chain-type indexes in the 1996 comprehensive revision, so that the growth rate of real gross domestic product (GDP) and its components became invariant to the choice of reference period.[4] Other statistical changes address data gaps and other shortcomings; an example is the adoption of the Census Bureau's annual *Government*

Finances tabulations as the source for most state and local taxes in the 1999 comprehensive revision; BEA is extending this change as part of this comprehensive revision (see the section "Changes in Methodology").[5]

The major statistical changes that will be introduced in this comprehensive revision are as follows.

- Incorporate the 1997 benchmark I-O accounts, which provide the most comprehensive and detailed picture available of the U.S. economy; these accounts set the level of GDP and other NIPA components for the benchmark year, and they provide key information for the estimates before and after the benchmark year
- Convert the estimates of income and employment by industry to the North American Industry Classification System basis in order to better measure the changing composition of economic activity, especially for the services industries
- Incorporate a new adjustment to the estimates of corporate profits for the most recent year of an annual revision (2002 for this benchmark revision) in order to reflect available information on the exercise of employee stock options
- Incorporate new BEA price indexes for deflation of nonresidential structures and photocopying equipment in order to improve the measures of real GDP by adjusting for quality change
- Improve the estimates of motor vehicle output to reflect new methodologies for estimating total dealers' margins and net transactions in used motor vehicles and for allocating exports and imports of motor vehicles between autos and trucks
- Improve the estimates of personal consumption expenditures (PCE) for hotel and motel services to reflect new source data on the consumer share of U.S. residents' lodging expenditures by sector and on lodging expenditures by foreign visitors
- Improve the estimates of employer contributions to pension and profit-sharing plans to reflect the

1. Stephanie H. McCulla and Carol E. Moylan, "Preview of Revised NIPA Estimates for 1997: Effects of Incorporating the 1997 Benchmark I-O Accounts and Proposed Definitional and Statistical Changes," SURVEY 83 (January 2003): 10–16.

2. Brent R. Moulton and Eugene P. Seskin, "Preview of the 2003 Comprehensive Revision of the National Income and Product Accounts: Changes in Definitions and Classifications," SURVEY 83 (June 2003): 17–34.

3. Nicole Mayerhauser, Shelly Smith, and David F. Sullivan, "Preview of the 2003 Comprehensive Revision of the National Income and Product Accounts: New and Redesigned Tables," SURVEY 83 (August 2003): 7–31.

4. See Improved Estimates of the National Income and Product Accounts for 1959–95: Results of the Comprehensive Revision," SURVEY 76 (January/February 1996): 19–20.

5. See Brent R. Moulton and Eugene P. Seskin, "A Preview of the 1999 Comprehensive Revision of the National Income and Product Accounts: Statistical Changes," SURVEY 79 (October 1999): 13.

adoption of accrual accounting and new coverage adjustments[6]
- Improve the estimates of Medicare social benefits to reflect the adoption of accrual accounting
- Improve the estimates of imputed interest paid by life insurance carriers to better reflect their investment income
- Incorporate a new methodology for estimating state and local current taxes to reflect more reliable source data

As described in the June SURVEY, BEA will incorporate two important definitional changes—one for insurance services and one for banking services—that will also feature significant statistical changes.[7] First, property and casualty insurance services (other than health insurance) will be redefined to recognize the implicit services that are funded by investment income and to provide a more appropriate treatment of insured losses. To supplement the value of the premiums received, BEA plans to add the value of the expected investment income on the funds on which policyholders have claim. Additionally, in calculating the value of insurance services, expected losses, rather than actual losses incurred in a period, will be deducted.[8]

Second, PCE, exports of services, government consumption expenditures, and interest paid and received will reflect the change in definition that recognizes the implicit services provided to borrowers by commercial banks. BEA will allocate a portion of the interest paid by borrowers to banks as an expenditure for implicit services, and the interest paid by the borrower and received by the bank will be reduced by the amount of the imputed expenditures for borrower services. This reduction in borrower interest will be accomplished by recording negative imputed interest paid by borrowers and received by banks.[9]

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6. Leading up to this comprehensive revision, BEA undertook research to improve the accrual-accounting basis of the NIPA estimates. Accrual accounting records flows at the time economic value is created, transformed, exchanged, transferred, or extinguished. This effort was called for in *BEA's Strategic Plan for FY 2003–FY 2007* in order to improve the consistency between the NIPAs and international guidelines. (Go to BEA's Web site <www.bea.gov>, click on "About BEA," and find the bullet for "Strategic Plan for 2003–2007" near the bottom of the page.)

7. See Moulton and Seskin, 19–27.

8. An article that provides the methodology for preparing NIPA estimates of property and casualty insurance services under the new definition will appear in a forthcoming issue of the SURVEY.

9. For the methodology used to prepare NIPA estimates of the implicit services provided by commercial banks under the new definition, see Dennis J. Fixler, Marshall B. Reinsdorf, and George M. Smith, "Measuring the Services of Commercial Banks in the NIPAs: Changes in Concepts and Methods," in this issue.

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 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 annual NIPA revision, when typically only the estimates for 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 1999 comprehensive revision that would not normally be fully incorporated in a regular annual NIPA revision are referred to as "regular benchmark source data." These data are typically available with a long lag, and they generally go back no further than 10 years; examples include the data from the decennial and quinquennial censuses.

This comprehensive revision also includes the annual NIPA revision that would normally have occurred in July 2003. The source data that would normally have been incorporated in that revision are referred to as "regular source data for 2000–2002"; an example is the 2001 *Statistics of Income* (SOI) data from the Internal Revenue Service (IRS).

The first step in preparing this comprehensive NIPA revision is the incorporation of the 1997 levels for key components from BEA's 1997 benchmark I-O accounts, adjusted to reflect NIPA changes in definition and classification. 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 1997. The NIPA estimates are also revised to reflect newly available and revised source data.

Regular benchmark source data

The revised NIPA estimates will incorporate the following regular benchmark source data: Data from BEA's benchmark 1997 I-O accounts, data from the 1997 quinquennial economic censuses, and annual source data that were not available in time for incorporation during the annual NIPA revisions.

The 1997 benchmark I-O accounts. The benchmark I-O accounts are the single most important sta-

tistical source for the comprehensive revisions of the NIPAs. The I-O accounts are used to establish the NIPA level of GDP for the benchmark year, and they provide critical information for estimating GDP for

Table 1. Major Methodological Changes

Changes	Components	Initial year of revision
Product-side changes		
Improved estimates of property and casualty insurance services	Personal consumption expenditures, exports and imports of services, state and local government consumption expenditures	1929
Improved estimates of banking services	Personal consumption expenditures, exports of services, Federal and state and local government consumption expenditures	1929
Improved estimates of motor vehicle output	Personal consumption expenditures, private equipment and software, change in private inventories	1985
Improved estimates of hotel and motel services	Personal consumption expenditures	1978
Improved estimates of gasoline	Personal consumption expenditures	1993
Improved estimates of prescription drugs	Personal consumption expenditures	1997
Improved estimates of output and income of nonprofit institutions serving households	Personal consumption expenditures, components of personal income	1992
Improved estimates of software	Private equipment and software, Federal and state and local government gross investment	1977
Improved estimates of residential improvements	Residential structures	1987
Improved estimates of nondefense gross investment in enterprise equipment	Federal nondefense gross investment, current surplus of government enterprises	1993
Income-side changes		
Incorporation of NAICS data	Income and employment	1998
Improved estimates of employer contributions to pension plans	Employer contributions for employee pension and insurance funds	1978
Improved estimates of private and state and local government employer contributions for health insurance	Personal consumption expenditures, employer contributions for employee pension and insurance funds	1987
Improved estimates of Federal employer contributions for health insurance	Employer contributions for employee pension and insurance funds	1993
Improved estimates of partnership income	Nonfarm proprietors' income	1987
New employee stock-options adjustment	Corporate profits	2002
Improved estimates of property and casualty insurance services	Rental income of persons, net interest, business transfer payments to persons and government, personal interest income, rest-of-the-world income	1929
Improved estimates of banking services	Net interest	1929
Improved estimates of portfolio interest	Nonfarm proprietors' income, net interest	1987
Improved estimates of imputed interest	Personal consumption expenditures, net interest	1977
Improved estimates of state and local government current taxes	State and local government current taxes	1988
Improved estimates of Federal Medicare social benefits	Federal current transfer payments	1967
Improved estimates of state and local Medicaid social benefits	State and local government current transfer payments	2003
Quantities and prices		
New PCE market-based prices and quantities	Personal consumption expenditures	1929
New prices:		
For medical care and hospitalization insurance benefits	Personal consumption expenditures, state and local government consumption expenditures	1988
For change in farm inventories	Change in farm inventories	1977
For selected types of nonresidential structures	Nonresidential, Federal, and state and local government gross investment in structures	1997
For photocopying equipment	Private equipment and software, imports of goods	1992
For own-account software	Private equipment and software, Federal and state and local government gross investment in equipment and software	1959
For Federal nondefense sales of services	Federal nondefense consumption expenditures	1998
Consumption of fixed capital		
Improved estimates of aircraft	Corporate profits, nonfarm proprietors' income	1960
New estimates of light trucks separately identified	Corporate profits, nonfarm proprietors' income	1992
Improved estimates of autos	Corporate profits, nonfarm proprietors' income	1991
Changes carried back from the 2000–2002 annual revisions [1]		
NAICS-based estimates of services (2001)	Personal consumption expenditures	1997
Improved estimates of closing costs (2002)	Rental income of persons	1998
Improved estimates of interest paid by persons to business (2001)	Personal interest payments	1980
Improvements to the international transactions accounts (2000–2002)	Exports and imports of goods and services	1982
New prices:		
For net foreign travel (2002)	Personal consumption expenditures	1987
For local area network equipment (2001)	Private equipment and software	1992
For Federal defense and nondefense consumption expenditures (2002)	Federal consumption expenditures	1993

1. The year in parentheses refers to the August SURVEY in which the change was described.
NAICS North American Industry Classification System

periods after the benchmark year.[10] For NIPA benchmark year estimates, the I-O accounts provide information on the portion of gross output going to final uses. As a result, the estimate of GDP avoids double counting (of, for example, the semiconductors that go into computers or the flour that goes into bread).

The 1997 I-O accounts provide the benchmark for the estimates of PCE, private fixed investment (PFI), and parts of several income components, and they provide 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.[11] 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 because they are prepared within an internally consistent framework that tracks the flows of inputs and outputs in the economy.[12] In addition, the 1997 I-O estimates incorporated detailed data that had not been available for the NIPA estimates. As part of the incorporation into the NIPAs, the I-O estimates must be modified to account for the changes in definitions and classifications, such as the change that recognizes the implicit services provided by property and casualty insurance and the change that provides a more appropriate treatment of insured losses, as described in the June article.[13]

The incorporation of the 1997 benchmark I-O accounts will result in revisions to NIPA estimates for selected components, beginning with 1993; estimates from the 1992 benchmark I-O accounts were incorporated in the 1999 comprehensive revision of the NIPAs.

Other regular benchmark source data. This comprehensive revision will incorporate data on inventories, on the receipts and expenses of business establishments and of governments, on sales by detailed commodity and by merchandise line, on final industry and product shipments from the 1997 Economic Census, and on trade margins from both the 1997 Economic Census and the 1997 annual surveys of merchant wholesale and retail trade.[14] The data on manufacturing, wholesale trade, 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, of private fixed investment in equipment, and of the change in private inventories, beginning with 1993.

In addition, annual series that became available too late for the annual NIPA revisions in 2000, 2001, and 2002 will be incorporated. NIPA estimates that are based on the international transactions accounts (ITAs)—primarily net exports of goods and services and rest-of-the-world income receipts and payments—will be revised to reflect improvements to the ITAs that were introduced since 1999 and that affected years not covered by the annual NIPA revisions.[15] Similarly, estimates of private structures will be revised to reflect Census Bureau revisions to the surveys of value-put-in-place data that go back to 1983.[16] Other data that will be incorporated into the NIPAs include the following: Data on expenditures and receipts of state and local governments for fiscal years 1997–99 from the Census Bureau; final data on employer pension and profit-sharing plans for 1995–98 from the Department of Labor; revised data on mortgage debt outstanding beginning with 1982, and on consumer debt outstanding and the effective rate of interest on consumer debt outstanding beginning with 1980, from the Federal Reserve Board (FRB); and data for 1996 and 1999 nonfiler adjustments based on tabulations of IRS tax returns and new "exact-match" studies.[17]

Regular source data for 2000–2002

The revised estimates for 2000–2002 will reflect the incorporation of newly available and revised source data that became available since the last annual NIPA revision in July 2002. The most important of these data are the following: Census Bureau data from annual surveys of state and local governments (for fiscal years 2000 (final) and 2001 (preliminary)), of manufactures, of merchant wholesale trade, and of retail trade (for 2001 (preliminary) and 2000 (revised)); Census Bureau data from the services annual survey and from the

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10. Benchmark years occur at about 5-year intervals. Quinquennial economic censuses are taken for these years, and benchmark estimates are prepared using data from these censuses.

11. For a discussion of the preliminary effects of the I-O accounts on the NIPA estimates for 1997, see McCulla and Moylan, 10–14.

12. See Ann M. Lawson, Kurt S. Bersani, Mahnaz Fahim-Nader, and Jiemin Guo, "Benchmark Input-Output Accounts of the United States, 1997," Survey 82 (December 2002): 19–109.

13. Moulton and Seskin, 17–34.

14. In the 1999 comprehensive revision, preliminary retail sales data and product shipments for computers from the 1997 Economic Census were incorporated.

15. The annual revisions of the ITAs are usually published in the July issue of the Survey, most recently in Christopher L. Bach, "Annual Revision of the U.S. International Accounts, 1992–2002," Survey 83 (July 2003): 32–45.

16. In 2000, the Census Bureau introduced significant revisions to selected value-put-in-place series: One-unit housing, residential improvements, and private industrial buildings. The revisions, which extended back to 1983, could not be incorporated fully in the 2000–2002 annual NIPA revisions. See U.S. Bureau of the Census, *Current Construction Reports—Value of New Construction Put in Place,* May 2000.

17. For information on previous nonfiler adjustments, see "Improved Estimates of the National Income and Product Accounts for 1959–94: Results of the Comprehensive Revision," Survey 76 (January/February 1996): 24–25. The 1996 nonfiler adjustment was incorporated on a best-change basis in the 2001 annual NIPA revision.

surveys of the value of construction put-in-place for 2001–02; Federal Government budget data (for fiscal years 2002 and 2003); ITA data for 2000–2002 (revised); Bureau of Labor Statistics (BLS) tabulations of wages and salaries of employees covered by state unemployment insurance (UI) for 2001–02 (revised); newly available IRS tabulations of corporate tax returns for 2000 (final) and 2001 (preliminary); U.S. Department of Agriculture farm statistics (for 2002); and newly available IRS tabulations of sole proprietorship and partnership tax returns for 2001.[18]

Changes in Methodology

This section describes the new and improved methodologies that will be introduced as part of this comprehensive revision.[19] The discussion includes changes to product- and income-side components, changes to price and quantity measures, changes to estimates of consumption of fixed capital, and extensions of several methodology changes that were incorporated in the 2000–2002 annual NIPA revisions.

Product-side changes

Motor vehicle output. Estimates of current-dollar and real motor vehicle output will reflect improved methodologies for net purchases of used motor vehicles and a new allocation between autos and trucks for the estimates of exports and imports in the motor vehicle output table. Net purchases of used motor vehicles by business, government, and persons consist of dealers' margins on used motor vehicles purchased and net transactions (purchases less sales) of used motor vehicles valued at wholesale prices. Dealers' margins affect GDP, but net transactions do not, because they represent changes in the ownership of previously produced goods.

The new method responds to user requests for more consistency between estimates of autos and light trucks, and it responds to the discontinuance of key source data that were used to prepare the auto estimates.

Dealers' margins. Beginning with 1993, BEA will change the method used to calculate annual estimates of dealers' margins. The dealers' margin for total light motor vehicles—autos and light trucks—will be computed for new (franchised) car dealers and for used (independent) car dealers, using data on used light motor vehicle sales, average retail prices, and used-car

dealers' margin rates.[20] For new-car dealers, retail sales of used light motor vehicles will be based on used-vehicle unit sales and used-vehicle average retail prices from a trade source; for used-car dealers, retail sales will be based on Census Bureau data for used-car dealer sales. Margin rates will be interpolated and extrapolated from the 1997 benchmark I-O estimates using the margin rates for used-car dealers as the indicator. The total margins will be allocated to used autos and to used light trucks using data on changes in used-vehicle registrations and average wholesale auction prices.[21]

Currently, autos are estimated independently from light trucks. For used light trucks, the new method will replace a judgmental estimate that assumed a lagged relationship between new-truck purchases and unit sales of used trucks, adjusted for price change. For used autos, the new method will replace a judgmental estimate based on trended sales of new-car dealers, retail prices of used autos sold at new-car dealers that were based on overall used-vehicle prices, and used-car margins of used-vehicle dealers based on overall margins of used-vehicle dealers.

Beginning with 1997, monthly and quarterly dealers' margins on used autos and on used light trucks will be interpolated and extrapolated using the change in used-vehicle registrations times the average auction price as the indicator.

The estimates of real margins for used autos and light trucks will be prepared by direct base-year valuation.[22] New-car dealers' margins will be estimated using base-year average margin per light vehicle sold multiplied by unit sales of new-car dealers from a trade source. Used-car dealers' margins will be estimated using the base-year average margin per light vehicle sold multiplied by derived unit sales.[23] Total margins will be allocated to autos and to light trucks and to PCE and PFI using the current-dollar distribution. For used trucks, the new method will replace deflation with the BLS consumer price index (CPI) for new trucks for PCE and with a truck component of the producer price index (PPI) for new trucks for PFI. For used autos, the new method will replace a base-year valuation using judgmentally trended unit sales.

18. For a more detailed listing of the "regular" source data incorporated in an annual revision, see "Updated Summary NIPA Methodologies," SURVEY 82 (October 2002): 20–38.

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

20. In this article, "light trucks" refers to the NIPA category "light trucks (including utility vehicles)," which includes pickup trucks, sport-utility vehicles, and vans.

21. A change in registration occurs when a used auto or a used light truck is registered with a new owner name and address. The changes are believed to be a reliable indicator of used-vehicle sales.

22. In direct base-year valuation, quantity indexes are derived by multiplying the base-year price by actual quantity data for the index period, then expressing the results as an index with the reference year equal to 100.

23. Unit sales are derived by dividing Census Bureau retail sales (less margins) by an average value based on average auction prices.

Net transactions. Beginning with 1991, current-dollar net transactions in used autos and used light trucks by business and by government will be estimated directly by valuing the change in their unit stocks using vehicle average auction prices.[24] Net transactions by persons will be estimated as a residual, after accounting for the change in the value of stocks held by business and by government, exports and imports, scrappage, and change in dealers' inventories. In the current method for used autos' net transactions, the change in unit stocks is valued using indirectly measured wholesale values.[25] The current method for net transactions in used trucks is the same as that for dealers' margins on used trucks.

Estimates of real net transactions in light trucks will be prepared by deflating the current-dollar estimates using the CPI for used cars and trucks.[26] The new method will replace deflation with the CPI for new trucks for PCE and with a truck component of the PPI for new trucks for PFI.

As a result of these improvements, the motor vehicle output table will present estimates of used light trucks and of used autos for PCE, for PFI, and for the change in private inventories.[27] Currently, net purchases of used light trucks are not shown in this table.

Exports and imports. Beginning with 1985, estimates of exports and imports of autos and trucks will reflect classifications that are consistent with those used for estimates of PFI, government investment, change in private inventories, and PCE; passenger cars, including station wagons, will be classified as autos, and pickup trucks, vans, and sport-utility vehicles will be classified as trucks.[28] Currently, exports and imports of autos and trucks reflect Census Bureau end-use categories, which classify most vans and sport-utility vehicles as autos. Consistency between exports, imports, final sales, and change in private inventories of autos and trucks will improve the measures of truck output, auto output, and domestic output of new autos.

PCE for hotel and motel services. Annual estimates of PCE for hotel and motel services will be improved. Beginning with 1990, the consumer share of lodging expenditures will be updated annually to reflect newly available trade-source data on U.S. residents' domestic lodging expenditures by sector, and the consumer shares for 1978–89 will be recomputed.[29] Currently, the consumer share is based on data for 1977 on overnight accommodations of U.S. residents for U.S. travel from the quinquennial National Travel Survey. After 1977, the National Travel Survey was discontinued, and because the consumer shares for 1972 and 1977 were about equal, the consumer share has been held constant since then.

In addition, spending by foreign visitors on lodging will be included for the first time using travel exports data from the ITAs. This change will provide consistency with the general treatment of expenditures by foreign visitors in the United States, which are included in the definition of PCE categories and are removed from total PCE as a deduction in net foreign travel.[30]

PCE for prescription drugs. Beginning with 1997, monthly expenditures for prescription drugs will be estimated using data on retail sales of prescription drugs from a continuous trade-source survey of more than 20,000 retail pharmaceutical outlets. This improvement will make the monthly estimates of expenditures more comparable with the annual estimates of expenditures, which are based on the annual retail sales data from the trade source, beginning with 1998. Currently, the monthly expenditures are estimated using the CPI for prescription drugs prices and trended quantities. Prescription drugs continue to be a part of the "PCE control group," the value of which is not affected by this change.[31] However, the independent estimate of prescription drugs affects the other

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24. Motor vehicles are grouped by age—determined by year of original sale—and the calculations are made by age group. Motor vehicle sales in a given year generally include sales from 3 model years: The model year corresponding to the previous calendar year; the model year corresponding to the current calendar year; and the model year corresponding to the next calendar year. For example, in 2001, vehicles were sold for model year 2000, model year 2001, and model year 2002.

25. These wholesale values are based on deflated new-car values adjusted for depreciation and restated to current dollars using the CPI for used vehicles.

26. Net transactions in used autos will continue to be deflated using the CPI for used cars and trucks.

27. See Mayerhauser, Smith, and Sullivan, 24.

28. Trucks consists of "light trucks" and "other trucks, buses, and truck trailers," which include medium-duty and heavy-duty trucks over 15,000 pounds.

29. The consumer share represents the portion of total hotel and motel guestroom rentals that are purchased by U.S. consumers. Business, government, and foreign visitors are assumed to account for the remainder.

30. PCE measures total purchases of U.S. residents wherever the goods and services were produced. In the source data underlying many of the estimates of detailed PCE components, the expenditures of foreigners traveling in the United States are indistinguishable from those of U.S. residents. These outlays are removed in the aggregate from PCE and are shown instead as exports. Purchases abroad of goods and services by U.S. residents are included in total in the PCE category, "foreign travel and other, net" and are also shown as imports; these purchases are not distributed among the individual commodities in PCE.

31. The PCE control group consists of most PCE goods other than motor vehicles, school lunches, food furnished to employees (including military), food produced and consumed on farms, clothing issued to military personnel, and net foreign remittances. The PCE control group is estimated using Census Bureau data on retail sales to extrapolate an overall value. The commodity composition of the PCE control group is determined by merchandise-line allocations by kind of business on the basis of the 1997 Economic Census. See U.S. Bureau of Economic Analysis, *Personal Consumption Expenditures* (Washington, DC: U.S. Government Printing Office, June 1990): 41.

categories in the control group because it affects the commodity allocation of sales.[32]

PCE for gasoline. Beginning with 1993, the monthly estimates of PCE for gasoline will be improved by preparing estimates for each of the three grades (regular, mid-grade, and premium). The estimates are prepared using seasonally adjusted quantities supplied and average prices for each grade. The independent estimate of PCE for gasoline, which is estimated as price times quantity, will remain in the PCE control group, the value of which is not affected by the change.[33] This new method will make the monthly estimation of expenditures for gasoline comparable with the annual estimation of expenditures by accounting for changes that occur in the mix of gasoline by grade on a monthly basis.

Nonprofit institutions serving households. In the NIPAs, the personal sector comprises households and nonprofit institutions serving households (NPISHs). As part of the comprehensive revision, BEA plans to introduce a new annual table that separates the income and outlays of households from those of NPISHs; this information can be used to answer questions about differences in economic behavior of households and nonprofit institutions in the U.S. economy. These estimates will reflect the introduction of additional data sources and methods to separately identify households from NPISHs.[34] The primary data sources used for the NIPAs do not currently provide separate measures for all the income and outlays of NPISHs. For example, there are no separate measures of the property income of NPISHs and the property income of households.

Residential improvements. Estimates of residential improvements, a component of residential structures, will be revised to incorporate a moving-average methodology that will dampen the volatility in the source data. Currently, the NIPA benchmark, annual, and quarterly estimates are based on Census Bureau surveys of value-put-in-place residential improvements. In recent years, the Census Bureau series has shown considerable volatility because the permissible upper-bound values for projects that were included in the survey sample have been increased periodically.

For the annual estimates beginning with 1987, BEA will adopt the following methodology. The 1997

benchmark estimate, which is equal to the Census Bureau value, will be extrapolated forward to 2002 and backward to 1987 using a weighted 3-year moving average of the Census Bureau series.[35] The annual estimates for the most recent year (2002) will be based on the new moving-average methodology, with the value for that year estimated by BEA on a trend basis. Currently, the NIPA series is extrapolated using the Census Bureau improvements series as the indicator.

Software. The following improvements to the measurement of computer software that were incorporated into the 1997 I-O accounts will be incorporated into the NIPAs. Software originals used for reproduction were capitalized, more detailed occupational data were used in estimating own-account software by industry, the total costs of producing own-account software were calculated more directly, the estimates of intermediate consumption of software (embedded or bundled with other equipment) were improved, and the coverage of international trade in software was expanded.[36]

Enterprise equipment investment. Estimates of investment in Federal Government enterprise equipment, which are included in Federal Government nondefense gross investment, will be improved. Beginning with 1993, judgmental estimates of enterprise equipment will be replaced with estimates based on Federal budget data. For consistency, BEA will reconcile the enterprise equipment investment data from the Federal budget with the enterprise equipment investment data that are published in the annual reports of Federal enterprises, which are used to calculate the Federal current surplus of government enterprises. As part of this change, data on investment in computers from the U.S. Postal Service, which is a Federal Government enterprise, will be used to supplement the budget data.

Income-side changes

Income and employment by industry. The annual estimates of income and employment by industry will be converted to the 1997 North American Industry Classification (NAICS) basis from the 1987 Standard Industrial Classification (SIC) basis, beginning with 1998, and the quarterly estimates will be presented on a NAICS basis, beginning with 2001. Through 2000, the annual and quarterly estimates will continue to be presented on an SIC basis. The August Survey article described the new table stubs for the estimates of income and employment.[37]

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32. Under the new treatment, the value of the drugs is removed from the control group before the commodity composition of the remainder of the group is determined.

33. The treatment of gasoline within the PCE control group is similar to the treatment of prescription drugs; see footnote 32.

34. Preliminary estimates for 1992–2001 were presented in Charles Ian Mead, Clinton P. McCully, and Marshall B. Reinsdorf, "Income and Outlays of Households and of Nonprofit Institutions Serving Households," Survey 83 (April 2003): 13–17.

35. The weights for the 3-year moving average are 50 percent for year t and 25 percent each for years $t-1$ and $t+1$.

36. See Lawson et al., "Benchmark Input-Output Accounts," 26–28.

37. Mayerhauser, Smith, and Sullivan, 22–24.

Employee stock options. A stock-options adjustment will be made to corporate profits estimates for the most recent year of an annual NIPA revision (2002 for this benchmark revision) in order to offset a timing problem between the treatment of nonqualified stock options (NSOs) in reported wages and salaries and the exercise of these options in the corporate profits data.[38] In the NIPAs, when an NSO is exercised, the difference between the exercise price and the current market price of the stock is treated as wages and, therefore, as an expense in measuring corporate profits.

The NIPA treatment of employee stock options is based on the treatment of stock options in the administrative source data that are currently used to estimate the wages and salaries and the corporate profits components of gross domestic income. BLS tabulations of UI data provide the key source data for BEA's annual and quarterly estimates of wages and salaries. These tabulations generally include the employee exercise of NSOs, but they are not separately identified. Tabulations of Federal corporate income tax returns from the IRS SOI program provide the key source data for BEA's annual detailed industry estimates of corporate profits. These tabulations are net of the expense of NSO stock-option exercises, which are separately recorded on Schedule M–1, a supporting form to IRS Form 1120 for corporate tax returns.

Although companies take a tax deduction for the exercising of these options, the expensing of exercised stock options is not typically reflected in their public financial reports.[39] Thus, for time periods for which the estimates of corporate profits are extrapolated using the data on profits from the public financial reports, the exercising of NSOs measured in wages and salaries are not offset correctly in corporate profits.

To correct this reporting mismatch, BEA will incorporate a stock-options adjustment to corporate profits for the periods that are estimated using public financial reports. For example, in the NIPA estimates that will be released at the end of this year, the extrapolated corporate profits estimates for 2002 and 2003 will be adjusted for exercised stock options. Because the gains on exercised stock options declined from 2001 to 2002, this adjustment will increase BEA's estimate of corporate profits for 2002 from what it would otherwise have been.

The adjustment to the annual estimates of corporate profits will be based on an ongoing BEA study to measure the gains on exercised stock options. Estimates from this study have been developed using a matched sample of approximately 100 firms that account for approximately 70 percent of the stock-option activity of the S&P 500 corporations.[40] When the SOI data become available for a particular year, this adjustment will no longer be needed for that year.

Employer contributions to pension and profit-sharing plans. Two adjustments will be removed from employer contributions for private pension and profit-sharing plans—a component of employer contributions for employee pension and insurance funds—in order to measure these contributions on an accrual basis rather than on a cash basis.[41] In addition, new adjustments to the source data will be introduced to improve the estimates of these contributions.

The Department of Labor Employee Benefits Security Administration tabulates employer contributions to both defined-benefit plans and defined-contribution plans for private pension and profit-sharing plans (Form 5500). BEA adjusts these data for timing and for coverage. Under the new methodology, two timing adjustments will be removed in order to measure these contributions on an accrual basis rather than on a cash basis. Currently, BEA assumes that most employers defer contributions until the end of their fiscal years, so BEA makes an adjustment that shifts the contributions of firms with fiscal years that begin in the second half of a calendar year to the next calendar year. By dropping this adjustment, these contributions will be shown in the calendar year in which the fiscal year of the plan begins. Currently, BEA also adjusts for the timing of accounts receivable because plan administrators report the amount of contributions owed, but not paid, during the plan year. To make the contributions net of receivables, BEA assumes that these receivables are paid during the following year. On an accrual basis, this adjustment will no longer be necessary.

The coverage adjustment for contributions to multiemployee Keogh-type plans will be improved, and new adjustments will be added for the contributions to simplified employee pension plans (SEPs) and to sav-

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38. For details on NSOs and the NIPAs, see Carol E. Moylan, "Treatment of Employee Stock Options in the U.S. National Economic Accounts" (paper presented at the Organisation for Economic Cooperation and Development Meeting of National Accounts Experts, Paris, September 26–29, 2000); <www.bea.gov/bea/papers/empstop.pdf>.

39. However, a growing number of firms are starting to include information about the expensing of the fair value of newly granted stock options in their public financial reports.

40. In the notes to their annual financial statements, corporations are required to disclose information on their stock-option activity for the most recent 3 fiscal years. This information includes the number of options outstanding at the beginning of the year, the number granted, the number exercised, the number canceled, and the number outstanding at the end of the year. Corporations are required to disclose the weighted-average exercise price for each category, but they are not required to disclose the weighted-average market price at exercise.

41. Ideally, for accrual estimates, it would be appropriate to incorporate a timing adjustment based on the starting date of the plan's fiscal year. However, over 80 percent of the plans have fiscal years beginning on January 1, and BEA does not have the resources to reprocess the Form 5500 data to implement this adjustment.

ing incentive match plans for employees of small employers (SIMPLEs).[42] Multiemployee Keogh-type plans include employer contributions for both the proprietors and the employees, but they cannot be separately identified. BEA treats contributions to the proprietors' plan as part of proprietors' income, so these contributions must be subtracted from total employer contributions. Currently, on the basis of a small one-time study of sample 1987 SOI data, BEA subtracts 50 percent of the contributions to multiemployee Keogh-type plans as contributions for proprietors' plans. Based on a new SOI study for 1997–99, BEA will lower this percentage to 25 percent.

Contributions to SEPs and SIMPLEs are not included in the Form 5500 tabulations and must be added to total employer contributions.[43] BEA will add an adjustment for the employer contributions to these plans using SOI information that is available beginning with 1997. Estimates for employee SEP plans will be extrapolated back to 1978. Currently, BEA makes no adjustment for employee SEPs and SIMPLEs.

BEA will continue to make a 401(k)-type plan misreporting adjustment to correct for employee contributions that are included as part of employer contributions to private pension plans. Until the mid-1990s, the Form 5500 instructions did not specify how these contributions should be reported. BEA has determined that several plans are still reporting both employer and employee contributions.

Employer contributions for health insurance. Beginning with 1987, estimates of employer contributions for group health insurance, which accounts for about half of employer contributions for employee pension and insurance funds, and estimates of PCE for health insurance will be improved.[44] For 1996-2001, the estimates will reflect the following: Annual growth rates for total employer contributions to private plans that will be based on the growth rates for total private plans from the annual medical expenditure panel survey (MEPS), an adjustment to the MEPS data to better capture family-plan health insurance costs, and the removal of a 1996–97 discontinuity in BEA's published estimates for employer contributions to group health insurance.

In 1999, the Department of Health and Human Services released the results of the MEPS for 1996 that provided a benchmark for the level of employer health insurance costs by industry.[45] MEPS covers both health insurance purchased by employers for their employees and health insurance provided by employers on a self-insured basis.

In the 2000 annual NIPA revision, BEA incorporated MEPS-based estimates on a "best-level" basis for 1997, which resulted in a roughly $20 billion discontinuity between the 1996 and the 1997 published estimates of employer contributions to group health insurance and a smaller discontinuity in the estimates of PCE.[46] The MEPS-based annual growth rates were not incorporated into the estimates for 1998 forward, because a sufficient time series was not available to assess the quality and reliability of the estimates. Instead, the estimates for later years were extrapolated using BLS data on employer costs for employee compensation (ECEC) and BLS tabulations of wages and salaries of employees covered by UI.[47]

The MEPS-based estimates for 1996–2000 will be adjusted to incorporate an improvement to the 2001 MEPS, which now provides a better measure of the value of employer contributions for family-plan health insurance. For 1996–2000, MEPS provided data on the costs of employer contributions for enrollees with single coverage and for enrollees with family coverage. If a plan offered more than one arrangement for family coverage, employers were required to report the costs of coverage based on the plan for a family of four, which did not accurately represent the actual costs or growth pattern of family coverage. Beginning with the 2001 MEPS, the cost of family coverage is shown for a two-person family (husband and wife or single parent and one child) and for a family of four. This survey change resulted in a substantial drop in the estimates of the total cost of family coverage. The 2001 MEPS showed rapid growth in two-person family coverage from 2000 to 2001. Consequently, the MEPS annual growth rate for previous years will be revised down to produce a consistent time series.

After adjusting for two-person family coverage, the MEPS all-industry annual growth rate will be used for total employer contributions to private plans. The sample size for MEPS is too small to use for estimates

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42. Small employers are firms with less than 100 employees.

43. SEP plans began in 1978, and SIMPLE plans began in 1997.

44. Employer contributions for employee pension and insurance funds, formerly "other labor income," will consist of employer payments (including payments-in-kind) to private pension and profit-sharing plans, publicly administered government employee retirement plans, private group health and life insurance plans, privately administered workers' compensation plans, and supplemental unemployment benefit plans. Miscellaneous compensation of employees will be reclassified as wages and salaries, as noted in Mayerhauser, Smith, and Sullivan, 12–13.

45. MEPS, an annual survey of about 50,000 respondents, provides estimates of the direct expenditures by employers for health insurance for their employees.

46. For the 2000 annual revision, 1997 was the earliest year open to revision. For more information on the implementation of MEPS in the 2000 annual revision, see Eugene P. Seskin and David F. Sullivan, "Annual Revision of the National Income and Product Accounts," SURVEY 80 (August 2000): 28.

47. The ECEC—a quarterly survey of around 4,000 respondents—provides the cost of health insurance as a percentage of wages.

by industry, which will continue to be calculated using ECEC industry data and industry wage tabulations. To remove the discontinuity between 1996 and 1997, the MEPS-based estimates will be extended back to 1987 using ECEC data and BLS tabulations of UI wages and salaries.

In addition, beginning with 2002, quarterly estimates of private employer contributions for group health insurance will be based on newly available quarterly ECEC data and BLS tabulations of UI wages and salaries. Currently, these estimates are based on a judgmental trend.

Federal Government health insurance. Beginning with 1993, quarterly estimates of Federal employer contributions for health insurance, a component of employer contributions for employee pension and insurance funds, will be improved by interpolating annual estimates of these contributions from the Office of Personal Management (OPM) using the trend in OPM data on Federal employment as an indicator.[48] Currently, estimates of Federal wages and salaries are used to interpolate this series. These wage and salary estimates include a number of special factors—such as pay raises, the wages and salaries of temporary workers who may not receive health insurance coverage, buyouts, and overtime pay—that are not directly related to Federal employer contributions for employee health insurance. Thus, the new method is expected to produce quarterly estimates that are more representative of these employer contributions.

Partnership income. An adjustment to nonfarm proprietors' income that removes a double-counting of the income remitted by other partnerships will be improved. In SOI tabulations of partnership income, net income received from other partnerships is counted twice—once by the receiving partnership and again by the remitting partnership. Currently, in the calculation of nonfarm proprietors' income, SOI partnership income is reduced by the ordinary income from other partnerships less the ordinary loss from other partnerships to eliminate double counting. However, no adjustment is made to account for other types of income received by partnerships from other partnerships, including guaranteed payments to partners, portfolio interest, real estate rental income, and net income from other rental activity. Beginning with 1987, the adjustment to account for the double-counting of partnership income received from other partnerships will take into account these other types of income.

Portfolio interest. The estimates of nonfarm proprietors' income and of net interest will reflect a change to fully incorporate portfolio interest received by financial partnerships.[49] Currently, estimates for these components do not fully reflect SOI-based source data on portfolio interest that are available from Schedule K, a supporting form to IRS Form 1065 for partnership tax returns.

The Tax Reform Act of 1986 resulted in several tax reporting changes for partnerships, one of which was the move of portfolio interest income of partnerships from Form 1065 to Schedule K. BEA did not recognize at the time that the SOI category of "other holding companies" comprises establishments engaged in financial activities and that the interest received by these establishments should be included in nonfarm proprietors' income. Consequently, beginning with 1987, nonfarm proprietors' income was understated.[50] For net interest, the data from Schedule K will replace an indirect extrapolation.

Imputed interest. The revised estimates of net interest will reflect a change in the source data used for estimating imputed interest paid by life insurance carriers. These carriers earn investment income on policyholders' reserves, and an interest imputation is made to pass this investment income through to persons as it is earned.[51] Beginning with 1977, the imputation for monetary interest, dividends, net rent, and royalties earned on policyholders' reserves will be estimated using investment income reported by the American Council of Life Insurance (ACLI).[52]

Currently, the portion of the imputation related to dividends, net rent, and royalties earned on policyholders' reserves is based on IRS tabulations of corporate income tax returns for life insurance companies

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48. Annual estimates of Federal employer contributions for health insurance will not be affected by this change.

49. In the NIPAs, portfolio interest income received by financial partnerships is considered to be related to the business operation and is included in "income receipts on assets" and, thus, in nonfarm proprietors' income and in the calculation of net interest; in contrast, portfolio interest income received by nonfinancial partnerships is considered to be unrelated to the business operation and is excluded from nonfarm proprietors' income and from the calculation of net interest.

50. For 1986 and earlier years, portfolio interest was included in total receipts as an item on Form 1065, and it was subtracted from the income of nonfinancial partnerships; no adjustment was needed to financial partnerships. Beginning with 1987, because portfolio interest was no longer included in total receipts, it was no longer necessary to subtract this interest from the income of nonfinancial partnerships, but it was necessary to add this interest to the income of financial partnerships.

51. This imputation consists of the monetary interest, dividends, net rent, and royalties earned on policyholders' reserves, plus imputed interest received on life insurance carriers' deposits with commercial banks and investment companies, less profits of mutual life insurance companies.

52. The SOI data remain the source for the net interest components of monetary payments and receipts for the life insurance industry in order to be consistent with the SOI-based NIPA estimates of monetary interest payments and receipts of other industries.

from the SOI program. Beginning with 1990, the portion of the imputation related to monetary interest is based on interest receipts from tabulations of income statements for life insurance carriers prepared by the ACLI; this portion will now be carried back to 1977.[53]

The use of ACLI data on investment income is preferable to the use of IRS data. ACLI investment income, compiled from regulatory filings of life insurance companies with state agencies, covers only life insurance operations, whereas the SOI life insurance industry data, which are from consolidated tax returns, are affected by changes in the industry classification of enterprises that have both life insurance and nonlife insurance operations.[54]

State and local current taxes. Beginning with 1988, the Census Bureau's *Government Finances* (*GF*) survey will become the primary source for all annual estimates of state and local current taxes, a receipt within the government receipts and expenditure account. BEA considers the *GF* tax data to be more accurate than the tax data available from the Census Bureau's *Quarterly Summary of State and Local Government Tax Revenue* (*QS*), which is the current source for several state and local tax series. The adoption of *GF* as the primary source for tax data will result in greater internal consistency for the estimates of state and local receipts and expenditures because most of the expenditure estimates are derived from *GF.*

The new methodology for estimating state and local current taxes will have three steps. First, categories of *GF* taxes will be compared with tax collections series from the *QS* and from the Nelson A. Rockefeller Institute of Government's *State Revenue Report* (*SRR*). The series that is most closely related on the basis of estimates of coefficients of determination will be used for interpolation and extrapolation.[55] Second, quarterly interpolations of the *GF* fiscal year data will be prepared using the matched *QS* or *SRR* series as indicators. Third, calendar year *GF*-based tax estimates will be calculated by averaging the interpolated fiscal year quarters. Preliminary annual estimates for 1988–99 indicated that this procedure generated revisions to total state and local current taxes that did not exceed $7.0 billion in absolute value.

Quarterly estimates will be prepared by interpolation using as indicators the matched *QS* and *SRR* data, seasonally adjusted by BEA. Current quarterly estimates will be prepared by extrapolating seasonally adjusted quarterly data from the *QS* and *SRR*. Monthly estimates will be prepared by interpolating quarterly estimates without an indicator. Estimates of personal current taxes for the most recent months will continue to be prepared by extrapolation using wage and salary disbursements.

Federal Medicare social benefits. Estimates of Federal Government Medicare social benefits (formerly Medicare transfer payments)—a current transfer payment within the government receipts and expenditures account—will be converted from a cash-accounting basis to an accrual-accounting basis.[56] Under the new method, the source for the annual estimates of Medicare social benefits for all but the 2 most recent years will be the Centers for Medicare and Medicaid Services (CMS), which prepares these estimates on an "incurred" or accrual basis. Currently, the NIPA estimates of Medicare social benefits are based on Monthly Treasury Statement (MTS) and Federal budget data, which are on a cash-accounting basis. The annual accrual-based CMS estimates will be incorporated beginning with 1967, and the quarterly and monthly NIPA estimates will be prepared by interpolation without an indicator.

Because the CMS estimates of Medicare social benefits for the most recent 2 years are subject to large revisions, the NIPA estimates for these years will continue to be based on MTS data. In addition, the current quarterly and monthly estimates will continue to be based primarily on interpolations of fiscal year Federal budget projections without an indicator.

State and local Medicaid social benefits. The current quarterly and monthly estimates of Medicaid social benefits (formerly Medicaid transfer payments)—a current transfer payment within the government receipts and expenditures account—will be improved.[57] The revised estimates will be based on data on Federal Medicaid grants to states from the MTS, adjusted to account for timing differences in billings and payments.[58] The parameters that will be used to adjust the MTS data for these differences were derived from a regression model of quarterly CMS Medicaid

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53. For further details on the earlier methodology change for monetary interest, see "Annual Revision of the U.S. National Income and Product Accounts," SURVEY 73 (August 1993): 29.

54. In the IRS data, some life insurance carriers are classified in the casualty insurance industry and others are classified in industries not related to insurance, because the IRS information is based on the filing of consolidated tax returns.

55. Coefficients of determination—also known as R^2s—are statistical indicators of the strength of the relationship between variables.

56. Medicare social benefits also appear in the personal income and outlay account.

57. Medicaid social benefits also appear in the personal income and outlay account.

58. Timing differences are defined as the differences between the CMS Medicaid social benefits data and the MTS Medicaid grants data.

transfer payments for period t on two independent variables: Federal Medicaid grants for period t and a variable representing the difference between CMS Medicaid transfer payments and MTS Medicaid grants in period $t–1$.[59]

The current quarterly and monthly estimates of state and local government Medicaid social benefits are now based on interpolations of annual projections developed from forecasts of Medicaid social benefits by CMS, the Congressional Budget Office, and others.

Quantities and prices

Most current-dollar NIPA estimates are based on source data that represent the value of market transactions in current prices. To remove the effects of price change from the value of these transactions—that is, to measure real economic activity—BEA relies heavily on price and quantity indexes.[60] In comprehensive revisions, BEA introduces changes that produce updated, new, and improved real NIPA estimates. As part of this comprehensive revision, the following changes will be introduced: The incorporation of an improved composite deflator for PCE for medical care and hospitalization insurance benefits, the introduction of new supplemental market-based PCE price and quantity measures, a modification to the price index used to deflate change in farm inventories, the development of new hedonic price indexes by BEA for private and government investment in nonresidential structures and equipment, and the incorporation of newly available PPIs from BLS into the estimates of real Federal Government consumption expenditures.

New price index for PCE for medical care and hospitalization insurance benefits. Beginning with 1988, the annual composite index that is used to deflate PCE for medical care and hospitalization insurance benefits will be improved. The new annual price index will be a weighted average of CPIs and PPIs for eight types of care. The weights will be based on estimates of private insurance benefits by type of care from CMS. The additional detail enables the benefit deflators to be more closely matched to the types of benefits. The new index will account for changes over time in private

insurance payments by type of care and for all types of care. Currently, the annual price index is a fixed-weighted average of the CPI for hospital and related services and the CPI for physicians' services.

Beginning with 1994, the monthly deflator for these benefits will be based on interpolation and extrapolation of the weighted average of the PPIs for general medical and surgical hospitals and for offices of physicians. For earlier years, the monthly deflator will continue to be a fixed-weighted average of the CPI for hospital and related services and the CPI for physicians' services.

Market-based PCE prices and quantities. New supplemental PCE price and quantity indexes that are based on market transactions for which there are corresponding price measures will be introduced. Specifically, the price index will provide a measure of the prices paid by persons for domestic purchases of goods and services, which may be a useful measure of consumer prices for some analytical purposes. The index will be composed of PCE components that are deflated by either a detailed CPI or a PPI. It will exclude expenses of nonprofit institutions serving households, most insurance purchases, gambling, margins on used light motor vehicles, expenditures by U.S. residents working and traveling abroad, and imputed expenditures other than owner-occupied nonfarm housing.[61]

Two price indexes will be prepared: An overall market-based PCE measure and a market-based PCE measure that excludes food and energy. Current-dollar estimates, chained (2000) dollar estimates, and chained-type price and quantity indexes will be shown as addenda items in the underlying detail PCE tables on BEA's Web site.[62]

New price index for change in farm inventories. Beginning with 1977, the quarterly composite index of crop prices that is used to calculate real change in private inventories for farm crops will be improved. In order to more accurately reflect the composition of crop inventories, the new index will exclude the prices of fruits, vegetables, and other perishable crops. Currently, the quarterly composite index of crop prices is calculated by weighting the quarterly market prices of

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59. The model's variables were constructed on a percent-change basis using data from the first quarter of 1991 through the first quarter of 2002. The coefficient of determination for the regression model is 0.82; the coefficients for the Medicaid grants variable and for the timing difference variable are 1.059 and –0.638, respectively. Both coefficients had p-values of less than 0.001.

60. For more details on preparing real NIPA estimates, see U.S. Bureau of Economic Analysis, *National Income and Product Accounts of the United States, 1929–97: Volume 1* (Washington, DC: U.S. Government Printing Office, September 2001): M–14—M–19.

61. Household insurance premiums, which is deflated by the CPI for tenants' and household insurance, will be included in market-based PCE; medical and hospitalization and income loss insurance, expense of handling life insurance, motor vehicle insurance, and workers' compensation will be excluded.

62. Go to <www.bea.gov>, click on "Gross Domestic Product" under "National," scroll down and click on "NIPA underlying detail and key source data tables," and then click on "Historical underlying detail files for personal consumption expenditures."

all crops reported by the Department of Agriculture on the basis of the composition of annual real open market sales of crops.

New price indexes for selected types of nonresidential structures. The absence of quality-adjusted, directly measured, output price indexes for preparing real estimates of investment in nonresidential structures has been a persistent shortcoming in the NIPAs. Currently, to deflate nonresidential buildings, BEA uses an indirect index that is an unweighted average of the Census Bureau price index for single-family houses under construction and a three-quarter moving average of the Turner Construction Company's building-cost index.[63]

BLS has initiated a research program on construction output price indexes and plans to begin publishing PPIs for warehouses, light industrial and factory buildings, office buildings, and schools within the next few years.

BEA has conducted research on construction price indexes intermittently over several decades.[64] Recently, BEA has produced cost-based price indexes for selected types of nonresidential buildings. Although the new indexes are cost based rather than output based, they represent a better match of costs to building types than the current indirect index, so they will be used for deflating nonresidential buildings in the comprehensive revision. BEA will link the new indexes to BLS construction PPIs when they become available.

BEA will introduce annual price indexes for four building types—warehouses, factories, office buildings, and schools; these indexes are derived using ordinary least squares hedonic regressions, and they therefore embody adjustments for quality change.[65] The specific model is a regression of the natural logarithm of the cost per square foot on the following independent variables: The natural logarithm of the total square feet excluding the basement; dummy variables

for the six possible combinations of exterior wall and interior supporting-frame type; and a dummy variable for the year.[66]

The data used to estimate the regressions were from R.S. Means Company's *Square Foot Costs* for 1997 and 1999–2003.[67] Separate regressions were estimated for the four building types, for building types with and without basements, and for selected building types by height class.[68] All regression coefficients had p-values of less than 0.001 and the appropriate signs.

Consistent with standard practice, coefficient estimates for the constant term and for the year dummy variables were used to construct price indexes for the four building types, which were then weighted together judgmentally to produce the final indexes for the four building types for 1997 and for 1999–2003.[69] For 1998, the R.S. Means national 30-city average price index was used to interpolate the new BEA price indexes between 1997 and 1999.

Because the cost data used in the regressions represented costs at the beginning of a year, BEA averaged adjacent-year indexes that were derived from the regressions. Quarterly indexes were prepared by interpolating the annual indexes using the current indirect index as an indicator.

BEA will use the newly developed construction price indexes to deflate related structure types for private nonresidential structures and for Federal Govern-

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63. The Turner Construction Company's building-cost index, which represents changes in the cost of constructing nonresidential buildings, is intended to capture changes in the costs associated with constructing large nonresidential buildings, such as office and industrial buildings, hospitals, and hotels. The Census Bureau price index for single-family houses under construction is intended to capture changes in costs associated with constructing smaller nonresidential buildings, such as commercial buildings (restaurants, gasoline service stations, and shopping centers) and religious buildings.

64. For example, see "Revised Deflators for New Construction," SURVEY 54 (August 1974): 18–27; Frank de Leeuw, "New Price Indexes for Construction" (discussion paper no. 50, Washington, DC: U.S. Bureau of Economic Analysis, June 1991); Frank de Leeuw, "Price Indexes Based on the Dodge Major Project File," (discussion paper no. 51, Washington, DC: U.S. Bureau of Economic Analysis, June 1991); and Frank de Leeuw, "A Price Index for New Multifamily Housing," SURVEY 73 (February 1993): 33–42.

65. For details on the use of hedonics in the NIPAs, see David W. Cartwright, "Improved Deflation of Purchases of Computers," SURVEY 66 (March 1986): 7–9; R. Cole, Y. C. Chen. J. Barquin-Stolleman, E. Dullberger, N. Helvacian, and J. H. Hodge, "Quality-Adjusted Price Indexes for Computer Processors and Selected Peripheral Equipment," SURVEY 66 (January 1986): 41–50; Jack E. Triplett, "The Economic Interpretation of Hedonic Models," SURVEY 66 (January 1986): 36–40; Bruce T. Grimm, "Price Indexes for Selected Semiconductors, 1974–96," SURVEY 78 (February 1998): 8–24; and J. Steven Landefeld and Bruce T. Grimm, "A Note on the Impact of Hedonics and Computers on Real GDP," SURVEY 82 (December 2000): 17–22.

66. The data sets for each of the four types of buildings were pooled time-series cross-sectional observations for 6 years (1997 and 1999–2003). Depending on the building type, the hedonic regressions included from three to five quality-characteristic dummy variables. In addition, separate regressions were estimated for each height class.

67. Data for 1998 were not available. A minimum of 648 observations were available for pooled regressions for 1997 and 1999–2003 for warehouses, factories, office buildings, and four types of schools.

68. There were two height classes for factories and three height classes for office buildings.

69. The methodology used to construct price indexes for schools differed slightly. Separate hedonic regressions were calculated for four types of school buildings—elementary, junior high, high, and vocational—on a with- and without-basement basis. The price indexes derived from the with- and without-basement regressions were weighted together using unpublished data from the Census Bureau to form subindexes by school type. The school-type subindexes were weighted together to form a summary index for schools using Census Bureau data on school enrollment by age and assuming that vocational school enrollment was equal to 20 percent of high school enrollment.

ment and state and local government gross investment in structures. Table 2 provides details on how the new price indexes will be matched with structure types for deflation purposes.

New price index for photocopying equipment. BLS introduced a PPI for photocopying equipment in 1993, but this index has only been available sporadically. Consequently, BEA undertook research to fill the gap using 1992–2002 trade-source data and a biennial hedonic regression model in which the natural logarithm of the price of a model of photocopying equipment is regressed on the following independent variables: The natural logarithm of the multicopy speed; quality-characteristic dummy variables for color, capability, multifunctionality, and capacity; and a time dummy variable that takes on the value 1 if the ith photocopy model was sold in the second year of the biennial regression data sets.[70]

The nine biennial regressions averaged over 200 observations each; they produced coefficients of determination that averaged 0.84, and they yielded highly significant p-values for the estimated coefficients. BEA used the antilog of the time dummy coefficients to construct price indexes for 1992–2001. The price indexes for periods after 2001 are prepared by extrapolation using the BLS PPI for photographic equipment and supplies with a BEA adjustment. The new BEA price index for photocopying equipment, which declines 7.2 percent at an average annual rate in 1992–2002, will be used to deflate annual estimates of both domestic and imported photocopying equipment. Quarterly estimates will be prepared by interpolation using the PPI for photographic equipment and supplies as an indicator.

Currently, real estimates of photocopying equipment, which is included in private equipment and software, are prepared by deflation using a related BLS PPI. Real estimates of imports of photocopying equipment, which is included in the business machinery and equipment end-use category, are prepared by deflation

using the BLS international price index (IPI) for that category.

New price index for own-account software. BEA will incorporate a new price index for own-account investment in software that will reflect productivity changes. Currently, the price index for own-account software investment is calculated from a weighted average of compensation rates for computer programmers and systems analysts and the costs of intermediate inputs associated with their work; it assumes no changes in productivity over time.[71]

Beginning with 1998, the new price index will be constructed as a weighted average of the percentage changes in the current input-cost index (75-percent weight) and the BLS PPI for "prepackaged software applications sold separately" (25-percent weight), which reflects changes in productivity.[72] For 1959–97, the price index will be constructed as a weighted average of the percentage changes in the improved input-cost index (75-percent weight) and the BEA prepackaged software price index (25-percent weight), which also reflects productivity changes. Quarterly indexes will be prepared by interpolation; the input-cost subcomponent will be interpolated using related BLS employment cost indexes and PPIs as indicators, and the prepackaged software subcomponent will be interpolated using the related PPI as an indicator.

The new price index, which shows a slower average annual growth rate for 1959–2002 (0.6 percent) than

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70. The biennial regression technique allows for changes in products and for changes in the composition of products sold.

71. For information on BEA's price index for own-account software see Eugene P. Seskin, "Improved Estimates of the National Income and Product Accounts for 1959–98: Results of the Comprehensive Revision," Survey 79 (December 1999): 37–39; Robert P. Parker and Bruce T. Grimm, "Recognition of Business and Government Expenditures for Software as Investment: Methodology and Quantitative Impacts, 1959–98" (paper presented at the May 5, 2000, meeting of the BEA Advisory Committee, Washington, DC, <www.bea.gov/bea/papers/software.pdf>); and Bruce T. Grimm, Brent R. Moulton, and David B. Wasshausen, "Information Processing Equipment and Software in the National Accounts" (paper prepared for the Conference on Measuring Capital in the New Economy, sponsored by the NBER/CRIW, April 26–27, 2002, at the Federal Reserve Board, Washington, DC, <www.bea.gov/bea/papers/IP-NIPA.pdf>).

72. The input-cost index will also be improved. National median wage rates that are calculated from current population statistics will be replaced by mean wage rates calculated from detailed BLS occupation-employment statistics.

Table 2. New Construction Price Indexes Used to Deflate Private, Federal, and State and Local Structures

New construction price indexes	Private nonresidential structure types (5.4.B) [1]	Federal structure types (5.8.B)	State and local structure types (5.8.B)
Warehouses Factories Office buildings Schools	Food and beverage; multimerchandise shopping; warehouse and other commercial Manufacturing Office Educational	.... "Other" manufacturing Office Educational	.... "Other" manufacturing Office Educational

1 The numbers in parentheses represent NIPA table groups in which the structure types will appear.

the published price index (4.0 percent), will be incorporated beginning with 1959. It will be used to deflate investment in own-account software in private equipment and software and in Federal Government and state and local government gross investment in equipment and software.[73]

New prices for Federal Government consumption expenditures. Newly available PPIs will replace indexes of average hourly earnings (AHEs) as deflators for two categories of Federal Government nondefense services. First, beginning with the fourth quarter of 1998, Federal Housing Administration (FHA) sales of services will be deflated using an index derived as a weighted average of PPIs for real estate agents and managers (10-percent weight) and surety and financial guaranty insurance (90-percent weight). Currently, FHA sales of services is deflated using an index of AHEs for insurance services.

Second, beginning with the first quarter of 1997, sales of nondefense "other" services will be deflated using an index derived as the weighted average of PPIs for accounting, auditing, and bookkeeping services and for engineering design, analysis, and consulting services. The weights used to combine the PPIs were derived from the current-dollar value of the transactions in these service categories. Currently, sales of nondefense "other" services is deflated using an index derived as a weighted average of AHEs for business services, for miscellaneous repair services, and for engineer and management services.

Changes to estimates of consumption of fixed capital

Three key statistical changes will be incorporated into the NIPA estimates of private consumption of fixed capital (CFC): New expected service lives will be adopted for private aircraft; CFC for light trucks will be estimated separately for the first time; and the estimates of autos will reflect a revised depreciation schedule. These changes will be reflected in the aggregate CFC estimates for corporate profits and nonfarm proprietors' income.

Aircraft. Recent research at BEA indicated that expected service lives for private aircraft in the air transportation, depository and nondepository institutions, insurance carriers, and business service industries should be lengthened. Accordingly, the current geometric depreciation rate for aircraft in these industries of 0.0825 will be replaced by a new rate of 0.0660, beginning with 1960 investment. In addition, the

expected service lives for these aircraft will be extended to 25 years from the current 20 years, also beginning with 1960.

Light trucks. Estimates of CFC for light trucks used in the private sector will be prepared separately for the first time as part of this comprehensive revision. Currently, light trucks are included in the "truck, buses, and truck trailer" category. Beginning with 1992, light trucks will be assigned a geometric depreciation rate of 0.1925 and an expected service life of 17 years.

Autos. Estimates of CFC for autos used in the private sector will be based on a revised depreciation schedule, beginning with 1991 investment. On average, the estimates for autos will reflect a longer depreciation schedule based on longer service lives, and they will reflect purchasers' values rather than producers' values.

Extending the changes from the annual NIPA revisions

Between comprehensive revisions, BEA conducts annual NIPA revisions. Changes in methodology are sometimes adopted in annual NIPA revisions, but because annual revisions are limited to the most recent 3 years, these changes cannot be carried back to earlier years. In a comprehensive revision, BEA has the opportunity to incorporate more fully the changes that were adopted since the last comprehensive revision. The following sections describe extensions of methodology changes that were introduced in the annual revisions since the 1999 comprehensive revision.[74]

NAICS. BEA has incorporated the following changes as the NIPAs and their source data moved toward fully reflecting NAICS. In the 2001 annual revision, estimates of change in private inventories and the source data for estimating PCE for most goods other than motor vehicles were converted to a NAICS basis back to 1997 (other NAICS-based source data were converted to an SIC basis).[75] In the 2002 annual revision, the source data for estimating PCE for services

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73. In addition, this index is used to deflate custom software.

74. See Eugene P. Seskin and Stephanie H. McCulla, "Annual Revision of the National Income and Product Accounts," Survey 82 (August 2002): 29–31; Brent R. Moulton, Eugene P. Seskin, and David F. Sullivan, "Annual Revision of the National Income and Product Accounts," Survey 81 (August 2001): 25–28; and Eugene P. Seskin and David F. Sullivan, "Annual Revision of the National Income and Product Accounts," Survey 80 (August 2000): 27–29.

75. PCE is estimated on a commodity basis rather than on an industry basis. Data collected on an industry basis, such as those reported in the Census Bureau annual retail trade survey and service annual survey, are allocated to commodities using "merchandise-line" and "source of revenue" data from the 1997 Economic Census. The NAICS-based industry data improve the estimates of PCE by providing expanded coverage and greater detail than the SIC-based data.

were converted to a NAICS basis back to 1998 (other NAICS-based source data were converted to an SIC basis). In the upcoming comprehensive revision, the NAICS-based source data for estimating PCE for services will be incorporated back to 1997 on a best-level basis.

PCE for net foreign travel. As part of the 2002 annual NIPA revision, BEA began to separately deflate the two components of "air fares foreign travel"—imports and the value of payments to U.S. carriers—in the PCE category of net foreign travel. The imports component was deflated using a BLS import price index (MPI) for air passenger fares, and the value of payments to U.S. carriers was deflated using a BLS IPI for international air passenger fares of U.S. carriers.[76] In this comprehensive revision, BEA will incorporate this methodology back to 1987. For periods prior to 1987, the combined category of "air fares foreign travel" will continue to be deflated using the MPI for air passenger fares.

Closing costs in rental income of persons. In this comprehensive revision, BEA will carry back to 1998 a methodological change that affects closing costs and that was incorporated in the 2002 annual revision. Closing costs, a deduction in deriving rental income of persons, consists of mortgage origination fees and "all other" closing costs.[77] Beginning with 1998, annual estimates of mortgage origination fees will be derived from data from the Federal Home Loan Mortgage Corporation (Freddie Mac), as reported under the Home Mortgage Disclosure Act, with an adjustment by BEA for underreporting. These data are available with a 1-year lag. Prior to 1998, estimates of mortgage origination fees will be derived from the discontinued Department of Housing and Urban Development survey on mortgage lending activity (SMLA).

Quarterly estimates will be interpolations and extrapolations as follows: Prior to 1998, using SMLA data as an indicator; for 1998–2001, using Freddie Mac data on mortgage originations as an indicator; and beginning with 2002, using an index of mortgage loan applications from the Mortgage Bankers Association as an indicator.

Interest paid by persons to business. In this comprehensive revision, BEA will carry back the method used to estimate interest paid by persons to business, a component of both personal interest income and personal outlays, that was adopted on a best-change basis in the 2001 annual revision. Estimates of interest paid by persons are calculated as the product of consumer debt outstanding and of the effective rate of interest based on data from the FRB. Prior to the 2001 annual revision, the effective rate of interest was estimated judgmentally. The FRB's effective rate of interest is a weighted average of interest rates charged by commercial banks and finance companies on eight types of consumer loans and is incorporated into its measure of households' debt-service burden. BEA will adopt the new methodology on a best-level basis beginning with 1983, and it will judgmentally interpolate the estimates of interest paid by persons to business between 1980 and 1983.

Improvements to NIPA foreign transactions. Statistical differences that have arisen as a result of updated source data being incorporated into the ITAs, but not into the NIPAs, since the 1999 comprehensive NIPA revision will be eliminated. However, a new difference will arise because of a temporary difference in the definition of insurance services.[78] With this comprehensive revision, the NIPAs will reflect an estimate of "premium supplements" back to 1986. BEA plans to incorporate estimates of premium supplements into the ITAs in June 2004. However, with this comprehensive revision, the NIPAs and ITAs will reflect consistent historical estimates of insurance premiums and of "normal losses" and "net settlements" back to 1992.

New prices. The following are descriptions of extensions of new prices that were incorporated since the 1999 comprehensive revision.

An FRB price index for local area network (LAN) equipment that reflects quality improvements, which was adopted in the 2001 annual revision, will be incorporated back to 1992. The index is used to deflate communications equipment within private equipment and software.[79]

PPIs and employment cost indexes, which replaced indexes based on AHEs as deflators for certain components of Federal Government defense and nondefense consumption expenditures and gross investment in the 2002 annual revision, will be incorporated back to 1993.

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76. BEA seasonally adjusts the quarterly IPI and interpolates the quarterly estimates into months without using an indicator. Monthly IPIs are now available beginning with 2001, but the quarterly series is considered more reliable.

77. The change in the method for estimating closing costs will not affect "all other" closing costs.

78. For details on the new treatment of insurance services in the NIPAs, see Moulton and Seskin, 19–23. For details on the ITA treatment, see Bach, 35–37.

79. Beginning with 2001, the FRB's LAN price will be replaced with a newly available BLS PPI.