Preview of the Comprehensive Revision of the Annual Industry Accounts

Changes in Definitions, Classification, and Statistical Methods

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ON MAY 25, 2010, the Bureau of Economic Analysis (BEA) will release the initial results of its comprehensive revision of the annual industry accounts. These widely used accounts provide statistics on industries—their interactions with each other and the roles they play in the economy. More specifically, the annual industry accounts provide statistics on 65 industries and commodities, detailing the goods and services produced and purchased as part of production processes and the incomes earned from production. The value of the accounts is symbolized by the "use" table (chart 1), which shows the interdependencies among industries, the contribution of each industry to gross domestic product (GDP), and expenditure-based categories of GDP (consumer spending, exports, investment, government spending).

The annual industry accounts—which include the annual GDP by industry accounts and the annual input-output (I-O) accounts—are typically updated once a year in annual revisions. Comprehensive revisions, which occur every 5 years, typically go beyond annual revisions by incorporating more detailed methodological and other changes. Traditionally, comprehensive revisions adopt two major types of improvements: (1) changes in definitions and classifications that update the accounts to more accurately portray the evolving U.S. economy and (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.

While this comprehensive revision of the annual industry accounts is in keeping with traditional comprehensive revisions, BEA will soon move toward "flexible annual revisions," which will allow for annual improvements that traditionally were reserved for comprehensive revisions (see the box "Flexible Annual Revisions").

This article presents the major changes that will be introduced in the 2010 comprehensive revision of the annual industry accounts (chart 2, page 23). This comprehensive revision incorporates the results from the 2002 benchmark I-O accounts and the 2009 national income and product accounts (NIPAs) comprehensive revision as well as a range of other changes that, taken together, provide more accurate industry statistics.[1] It also incorporates an improved methodology to prepare an integrated time series of annual industry accounts for 1998–2008.

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1. For a complete discussion of the changes made in the 2002 benchmark input-output accounts, see Ricky L. Stewart, Jessica Brede Stone, and Mary L. Streitwieser, "U.S. Benchmark Input-Output Accounts, 2002," SURVEY OF CURRENT BUSINESS 87 (October 2007): 19–48. For a complete discussion of the changes made in the 2009 NIPA comprehensive revision, see Eugene P. Seskin and Shelly Smith, "Improved Estimates of the National Income and Product Accounts: Results of the 2009 Comprehensive Revision," SURVEY 89 (September 2009): 15–35.

Flexible Annual Revisions

As part of its goal to accurately portray the changing U.S. economy, the Bureau of Economic Analysis (BEA) in 2010 will introduce "flexible" annual revisions that will retain the features of the current annual revisions but that will also allow for the kind of improvements that previously were reserved for comprehensive revisions.[1] For example, when necessary, the current 3-year period of revision will be expanded to earlier periods. In some cases, changes in definitions and presentations, as well as new and improved estimating methodologies, may also be incorporated as part of the flexible annual revisions. To keep BEA's customers up to date, BEA will continue to announce these planned improvements and the periods subject to revision in advance of their implementation to ensure that users have adequate time to prepare.

Comprehensive revisions and the future "flexible" annual revisions provide the opportunity to introduce major changes that are outlined in BEA's strategic plan for maintaining and improving its economic accounts. In discussing the national and industry accounts, BEA's strategic plan outlines several major objectives, including addressing data gaps and other shortcomings, improving consistency and integration with other accounts, and improving consistency with international guidelines. The changes in definitions and presentations described in this article and the planned statistical improvements constitute important steps toward meeting each of these objectives.

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1. See "Improving BEA's Accounts Through Flexible Annual Revisions," SURVEY OF CURRENT BUSINESS 88 (June 2008): 29–32.

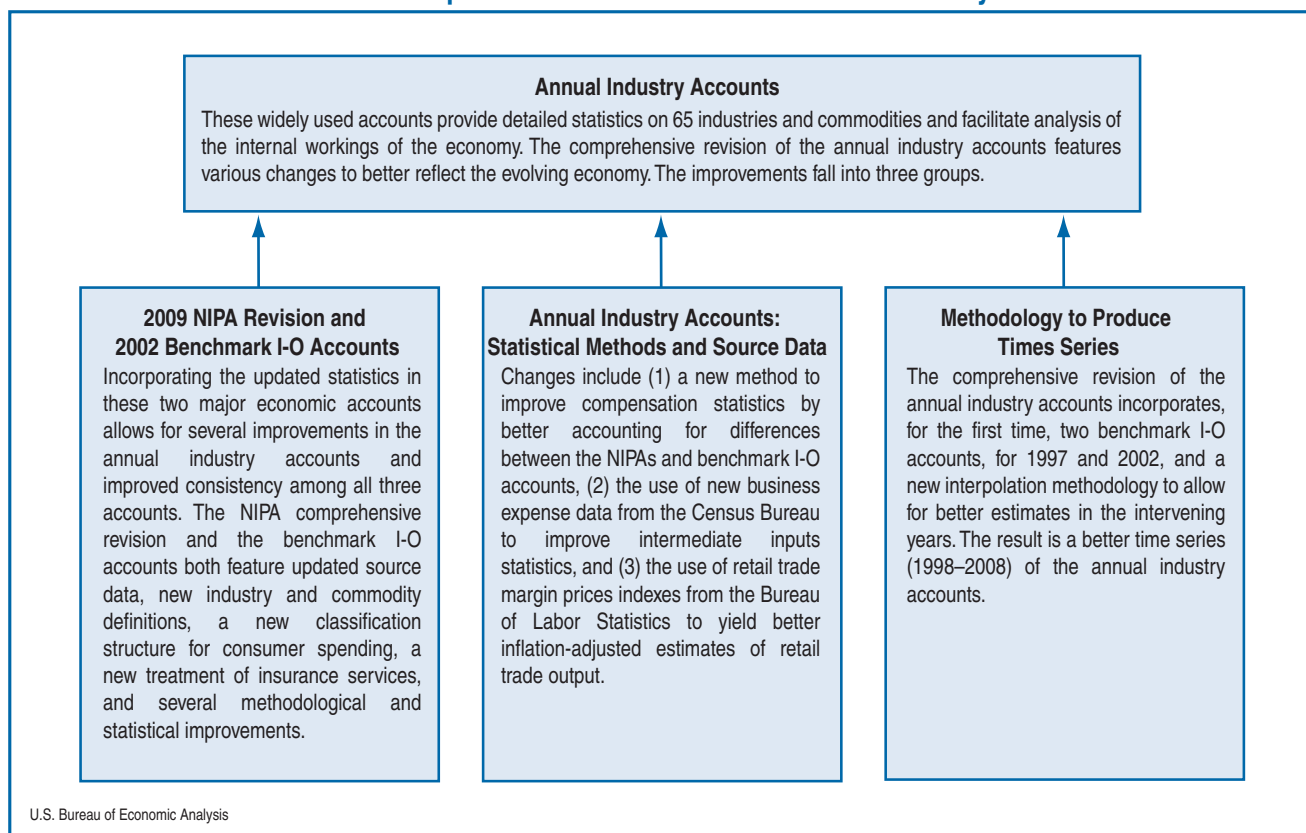**Chart 1. Use Table: Commodities Used by Industries and Final Uses**

		Industries																	Final uses							Total commodity output
		Agriculture, forestry, fishing and hunting	Mining	Utilities	Construction	Manufacturing	Wholesale trade	Retail trade	Transportation and warehousing	Information	Finance, insurance, real estate, rental, and leasing	Professional and business services	Educational services, health care, and social assistance	Arts, entertainment, recreation, accommodation, and food services	Other services, except government	Government	Total intermediate use	Personal consumption expenditures	Private fixed investment	Change in private inventories	Exports of goods and services	Imports of goods and services	Government consumption expenditures and gross investment	Total final uses	
Commodities	Agriculture, forestry, fishing and hunting																								
	Mining																								
	Utilities																								
	Construction																								
	Manufacturing																								
	Wholesale trade																								
	Retail trade																								
	Transportation and warehousing																								
	Information																								
	Finance, insurance, real estate, rental, and leasing																								
	Professional and business services																								
	Educational services, health care, and social assistance																								
	Arts, entertainment, recreation, accommodation, and food services																								
	Other services, except government																								
	Government																								
	Other inputs																								
	Scrap, used and secondhand goods																								
	Total intermediate use																								
Value added	Compensation of employees																								
	Taxes on production and imports less subsidies																								
	Gross operating surplus																								
	Total value added																								
Total industry output																									

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An article in the June issue of the SURVEY OF CURRENT BUSINESS will describe the results of this comprehensive revision and will include the results of the advance GDP by industry statistics for 2009.

The comprehensive revision of the annual industry accounts will do the following:

- Incorporate the 2002 benchmark I-O account to reflect structural changes in the economy and classification changes such as moving to the 2002 North American Industry Classification System (NAICS) and the new personal consumption expenditures (PCE) classification structure. The comprehensive revision will also incorporate revised measures of industry and commodity output and intermediate inputs that reflect 2002 economic census data and improved measurement techniques for a variety of industry output measures and final use components.
- Incorporate the results of the NIPA comprehensive revision released in July 2009, which improved misreporting adjustments on industry output and business income, improved measures of insurance output for government enterprises, and incorporated a wide range of statistical improvements throughout the NIPAs.
- Incorporate an improved method for updating the industry-specific adjustments that were made to

account for differences in compensation statistics that result from classification and methodological differences between the Bureau of Labor Statistics (BLS)-based NIPA industry distributions and the Census-Bureau based statistics published in the 2002 benchmark I-O accounts.

- Incorporate BLS producer prices indexes (PPIs) for retail trade margin output by type of retailer, replacing BEA's current methodology of using retail sales prices and improving the annual industry accounts' measures of the retail trade sector.
- Incorporate available Census Bureau data on detailed industry operating expenses from the Services Annual Survey (SAS) and Annual Survey of Manufactures (ASM) in order to update the mix of intermediate input commodities purchased by an industry annually, providing for a more accurate deflation of intermediate inputs and a more accurate measure of real value added by industry.
- Introduce an interpolation methodology in order to develop a consistent time series of annual industry accounts. The new method will ensure that the structures of the revised 1997 and 2002 benchmark I-O accounts inform the preparation of the annual industry statistics for the years between the benchmarks.
- Incorporate an improved method for reconciling

Chart 2. Overview of the 2010 Comprehensive Revision of the Annual Industry Accounts

Annual Industry Accounts

These widely used accounts provide detailed statistics on 65 industries and commodities and facilitate analysis of the internal workings of the economy. The comprehensive revision of the annual industry accounts features various changes to better reflect the evolving economy. The improvements fall into three groups.

2009 NIPA Revision and 2002 Benchmark I-O Accounts

Incorporating the updated statistics in these two major economic accounts allows for several improvements in the annual industry accounts and improved consistency among all three accounts. The NIPA comprehensive revision and the benchmark I-O accounts both feature updated source data, new industry and commodity definitions, a new classification structure for consumer spending, a new treatment of insurance services, and several methodological and statistical improvements.

Annual Industry Accounts: Statistical Methods and Source Data

Changes include (1) a new method to improve compensation statistics by better accounting for differences between the NIPAs and benchmark I-O accounts, (2) the use of new business expense data from the Census Bureau to improve intermediate inputs statistics, and (3) the use of retail trade margin prices indexes from the Bureau of Labor Statistics to yield better inflation-adjusted estimates of retail trade output.

Methodology to Produce Times Series

The comprehensive revision of the annual industry accounts incorporates, for the first time, two benchmark I-O accounts, for 1997 and 2002, and a new interpolation methodology to allow for better estimates in the intervening years. The result is a better time series (1998–2008) of the annual industry accounts.

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value added in the revised 2002 benchmark I-O accounts with the annual industry accounts. The new method will continue to impose the I-O accounting constraints while considering also the relative quality of the initial estimates. Relative quality is determined by quantitative and qualitative information.

Changes From the 2002 Benchmark I-O Accounts and the 2009 NIPA Comprehensive Revision

As part of its comprehensive revision, the annual industry accounts benchmark industry gross output, industry intermediate inputs and commodity gross output to the 2002 benchmark I-O accounts published in September 2007.[2] The comprehensive revision also incorporates the comprehensive revision of the NIPAs, released in July 2009, into its final use components and value added components.[3] The final use categories are PCE, private gross investment, and government consumption expenditures and investment. The value added categories are compensation, taxes on production and imports less subsidies, and gross operating surplus (table A).

Source data, classification, and definition changes

Source data. An important improvement to the annual industry accounts is the incorporation of more accurate data into the measures of industry and commodity output, industry intermediate purchases, and commodity final uses, which are provided through detailed 2002 economic census data and data on industry expenses collected by the Census Bureau. These data are available every 5 years and provide detailed information on shipments, revenues, inventories, expenses, and class of customer—all of which are used to develop the detailed benchmark I-O accounts and composition of GDP. Along with newly available Census Bureau data, the annual industry accounts incorporate revised NIPA data on compensation, taxes on production and imports less subsidies, and the components of gross domestic income (GDI) by industry.[4]

2002 NAICS. The annual industry accounts' industry and commodity definitions will be updated to reflect the 2002 NAICS.[5] NAICS primarily classifies establishments that have similar production processes in the same industry. NAICS recognizes new and emerging industries and new and advanced technologies and provides greater industry detail for the in-

creasingly important services-producing sector. The annual industry accounts will continue to be published at roughly the three-digit NAICS industry and commodity level, but the underlying structure of aggregation is updated to reflect changes introduced in the 2002 NAICS.

The 2002 NAICS includes major changes to the classification of industries within the information sector, NAICS 51. The sector was restructured, and new industries were created to account for new services and emerging technologies. Internet publishing and broadcasting was moved from 1997 NAICS 511 and 514 into its own industry, NAICS 5161. This new

Table A. Major Annual Industry Accounts Changes

Type of change	Effect of change
From the 2002 benchmark input-output (I-O) accounts	
Incorporated the following data on industry and product receipts and shipments and industry expenses: 2002 Census Bureau 2002 Business Expense Survey 2002 Services Annual Survey.	Benchmarked industry and commodity gross output, intermediate inputs, and gross operating surplus for all industries to the 2002 benchmark I-O accounts.
Shifted to 2002 North American Industry Classification System (NAICS) from 1997 NAICS.	Reclassified industry and commodity gross output, intermediate inputs, and gross operating surplus, mainly for industries in NAICS sector 51.
Improved measures of royalty output.	Improved measures of industry and commodity gross output of rental and leasing services and all industries' purchases of rental and leasing services (NAICS 532).
New treatment of inventory valuation adjustment.	Included inventory valuation adjustments on specific commodities in industries' intermediate inputs.
Updated methods for distributing passenger air transportation services, purchases of food away from home, and telecommunications services across intermediate business use and final demand.	Benchmarked all industries' intermediate inputs of telecommunication services, food purchases away from home, and air passenger travel to the new 2002 benchmark I-O distributions.
From the 2009 comprehensive NIPA revision	
New personal consumption expenditures (PCE) classification.	Added new PCE categories in the annual industry accounts use table.
New estimates of underreporting and nonreporting of income using more recent Internal Revenue Service (IRS) data and Census Bureau data.	Improved industry and commodity gross output, industry intermediate inputs, and industry value added across the annual industry accounts.
New treatment of insurance services by government enterprises.	Improved measures of industry and commodity output and gross operating surplus of federal and state and local government enterprises.
From the annual industry accounts	
New method for adjusting compensation by industry to BLS-based NIPA distribution from Census Bureau-based distribution.	Improved measures of industry output, intermediate inputs, and gross operating surplus for central administrative offices (NAICS 55) and professional employer organizations (NAICS 56) and industries supported by these establishments.
New retail trade margin prices from BLS.	Improved measures of real gross output and value added of the retail trade industry.
New business expense data from the Census Bureau.	Improved the commodity mix of most industries' intermediate inputs.

BLS Bureau of Labor Statistics
NIPAs National income and product accounts

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2. See Stewart, Stone, and Streitwieser, 19–48.
3. See Seskin and Smith, 15–35.
4. See Seskin and Smith, 15–35.
5. This is consistent with 2002 Economic Census data.

industry includes electronic publishing by newspapers, periodicals, books, databases, greeting cards, and atlases and maps. "Web search portals" was moved from "other information services" (NAICS 51419), and a new industry, "Internet service providers, Web search portals, and data processing" (NAICS 5180), was created. "Online information services" was renamed "Internet service providers" to better reflect the activity of the industry.

New PCE classification. The annual industry accounts reflect the new classification system for PCE introduced with the 2002 benchmark I-O accounts and the 2009 NIPA comprehensive revision. This new system defines new categories of expenditures by type of product and by function to reflect changes that have occurred in consumer buying patterns since the 1940s, when the currently used classifications were developed, and to bring the classifications closer to the SNA 2008.[6]

New treatment of insurance services by government enterprises. In order to improve consistency with the treatment of the services provided by private property and casualty insurance companies, the annual industry accounts revised its measure of gross output of government enterprises to account for the implicit services funded by investment income and to provide a more appropriate treatment of insured losses. The new treatment will be made for two federal government insurance enterprises—the National Flood Insurance Program and the Federal Crop Insurance Corporation—and by one state enterprise—the Florida Citizens Property Insurance Corporation.[7]

Methodological and statistical changes

In addition to classification and definition changes, the 2002 benchmark I-O accounts and 2009 NIPA comprehensive revision incorporate a number of statistical changes that have improved the accuracy of the accounts. The annual industry accounts incorporate these changes as part of its comprehensive revision:

- Improved measures of gross output and operating surplus that incorporate underreporting and nonreporting of income using more recent Internal Revenue Service (IRS) data and Census Bureau data.[8]

- Improved measures of royalty output from the 2002 benchmark I-O accounts that incorporated data on international services on royalties and licensing fees. These data supplemented economic census data for royalty and licensing income and payments and IRS Statistics of Income data to allow the removal of copyright receipts from royalty receipts.[9]

- Improved estimates of PCE for telecommunications, air transportation, and "food away from home," which reflect extensive research into new source data and estimation methodologies.

- Improved estimates of PCE for consumer electronics introduced in the 2009 NIPA comprehensive revision. Beginning with 2003, new retail point-of-sale scanner data from a trade group is being used in the NIPAs to measure the annual composition of goods sold at electronics stores. The annual industry accounts incorporated these revised PCE values into its annual process of balancing the use table.[10]

- New treatment of inventory valuation adjustment (IVA) adopted in the 2002 benchmark I-O account. This new treatment explicitly accounts for the IVA by holding industry, commodity, and inventory type, which includes materials and supplies, work-in-process, finished goods, and merchandise trade inventories. Currently, the IVA is included as a secondary product in industry gross output and as a separate commodity in final uses.

- Improved estimates of wages and salaries that incorporate new information on employee "cafeteria plans" introduced in the 2009 NIPA comprehensive revision. Under these plans, employees may use a portion of their salaries on a pretax basis to pay for health insurance and to contribute to "flexible spending arrangements," which reimburse them for medical care and dependent care expenses. Because employees' participation is voluntary, these contributions are included as part of NIPA wages and salaries.[11]

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6. See Clinton P. McCully and Teresita D. Teensma, "Preview of the 2009 Comprehensive Revision of the National Income and Product Accounts: New Classifications for Personal Consumption Expenditures," Survey 88 (May 2008): 6–17.

7. For more information on this change, see 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): 19–23 and Baoline Chen and Dennis J. Fixler, "Measuring the Services of Property-Casualty Insurance in the NIPAs," Survey 83 (October 2003): 10–26.

8. For more information, see Clinton P. McCully and Steven Payson, "Preview of the 2009 Comprehensive Revision of the NIPAs: Statistical Changes," Survey 89 (May 2009): 6–16.

9. See Stewart, Stone, and Streitwieser, 19–48.

10. The annual scanner data is used to adjust the composition of commodities sold for each of three retail industries: NAICS 443112 (radio, television, and electronics stores), NAICS 443120 (computer and software stores), and NAICS 443130 (camera and photographic supplies stores). The primary goods sold through these industries are televisions, other video equipment, audio equipment, computers and peripherals, telephones and facsimile equipment, other information processing equipment, and cameras and other photographic equipment. As part of the integration efforts between the annual industry accounts and the NIPAs, the annual industry accounts use the PCE category estimates derived in the NIPAs as controls when balancing commodity and industry output within the annual use table.

11. For more information, see McCully and Payson, 6–16.

Annual Industry Accounts: Statistical Methods and Source Data

Notable changes in statistical methods and source data that are incorporated as part of this comprehensive revision of the annual industry accounts include (1) an improved method for incorporating BLS-based industry distributions of compensation into the annual industry accounts, (2) the use of new business expense data from Census Bureau annual surveys, and (3) the use of retail trade margin PPIs from BLS.

Compensation in the annual industry accounts

The 2010 comprehensive revision of the annual industry accounts incorporates a new method to update the industry-specific adjustments that are designed to account for differences in compensation statistics between the BLS-based NIPA industry distributions and the Census Bureau-based statistics published in the 2002 benchmark I-O accounts. The new method takes into account more of the sources of classification and methodology differences in industry compensation estimates. Classification differences arise because of differences between BLS and the Census Bureau in the industry classifications of establishments, especially the identification and classification of central administrative offices (CAOs) and other types of auxiliaries. The differences primarily affect wages and salaries by industry, but they can also affect supplements to wages and salaries. Methodological differences involve differences due to the reporting and processing of source data and the estimation of adjustments to source data for items such as misreporting and supplements to wages and salaries.

The new method focuses on two special types of classification differences related to the classification of CAO auxiliaries and the treatment of establishments in the professional employer organizations (PEOs) industry.[12] For both of these industries, data was available for 2002 on the magnitude of the differences that can, in part, be attributed to classification. The method determines the size of the total downward adjustments to the gross output of the CAO and PEO industries and then adjusts downward the use of these services by other industries in proportion to their use in the published 2002 benchmark I-O accounts. In other words, the existing industry distributions remain the same. The total downward adjustment to the gross output of the CAO industry equals all of the expenses of Census

Bureau CAOs that BLS classifies in other (non-CAO) industries. This means that all of the value added and intermediate inputs of CAOs are reduced to match the dollar value of the gross output adjustment. The total downward adjustment to the gross output of the PEO industry equals the amount of compensation paid to the leased employees that BLS classifies in other (non-PEO) industries. The only adjustment to the inputs of the PEO industry is a downward adjustment of the same dollar value to its compensation. Industries that consume CAO and PEO services as intermediate inputs receive adjustments to their use of these services that in the aggregate, match the aggregate reduction in the gross output of these services. For 1997, adjustments to the industrial structure for CAOs and PEOs and to purchases of CAO and PEO services by other industries is based on percentages from 2002.

Annual business expense data from the Census Bureau

The 2010 comprehensive revision of the annual industry accounts incorporates source data for measuring industries' intermediate purchases. Starting with 2005, the Census Bureau expanded its Services Annual Survey (SAS) questionnaire to include a standard set of detailed expense questions aimed at collecting data on the different types of expenses incurred by industries. These categories cover 13 different types of expenses including 9 separate intermediate input categories. This set of consistent intermediate expense data across all SAS-covered industries will improve the quality of the annual I-O accounts and GDP by industry accounts by providing more accurate measures of the mix of intermediate inputs that an industry uses to produce its output on an annual basis.[13]

Previously, detailed expense data was only available for years corresponding with the Economic Census. In estimating an industry's intermediate purchases on a annual basis, the annual industry accounts assume that the intermediate inputs purchased by an industry move in line with the real (inflation-adjusted) output of the industry, and the mix of intermediate inputs an industry purchases to produce its output does not change from year to year. In other words, an industry's production function remains relatively the same as that of the benchmark I-O year from which the

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12. For all other industries, the compensation differences for each industry are offset in each industry's initial estimate of gross operating surplus in the revised 2002 benchmark I-O accounts, which is then reconciled with the gross domestic income-based GDP by industry measure of gross operating surplus.

13. Along with the SAS expense data, the annual industry accounts also incorporates existing materials and energy expense data collected in the Census Bureau's Annual Survey of Manufactures (ASM). Together, materials and energy purchases provide coverage of about 80 percent of the intermediate inputs purchased by manufacturers. Currently, data on purchased services by the manufacturing industries is limited. Starting in 2006, the ASM questionnaire was expanded to include questions on purchased service expenses, and BEA hopes to begin incorporating these data into the annual industry accounts in the future.

subsequent years are extrapolated (currently 1997).

Incorporating annual data on detailed expense categories by industry will help inform the annual industry accounts about how industries change their spending on intermediate inputs from year to year and allow a loosening of the assumption that real inputs move in line with real industry output.[14] These expense data will provide a more accurate breakout of the intermediate inputs purchased by an industry, which will improve the accuracy of real value added by industry. Currently, BEA measures real value added for an industry by deflating an industry's gross output and intermediate inputs separately, known as double deflation. A more accurate mix of intermediate inputs will provide more accurate weights for calculating the industry's real value added. These expense data will play a major role in better distributing the "pot" of intermediate inputs among different commodity groups. These data also provide an important first step toward a third independent measure of GDP using a full production approach in which value added is measured as the difference between gross output and intermediate inputs.

Retail trade margin price indexes from BLS

The 2010 comprehensive revision of the annual industry accounts introduces a new method for deflating output of the retail trade sector. Starting in 2000, BLS introduced new PPIs that better capture the margin activity of retail trade businesses and that are consistent with BEA's measure of retail trade sector gross output. Over the past several years, BLS expanded its coverage of these retail trade prices. BEA can now use these indexes to deflate about two-thirds of all gross output for the retail trade sector.

BEA measures gross output of the retail trade sector using a net sales concept, which measures the difference between sales and the costs of those goods purchased for sale; this difference is referred to as gross margin output. Gross margin output represents the service provided by retailers of moving goods from distributors to consumers and reflects the shelving, marketing, convenience, and other activity aimed at selling merchandise to customers.

Until BLS expanded its PPIs to include retail trade margin activity, there was no direct measure of retail margin price change, and BEA had few options for deflating retail margin output.[15] Previously, BEA prepared retail margin price deflators by type of retailer by multiplying the retailer's average margin rate times a corresponding sales price index. Margin rates are developed from the Census Bureau's Annual Retail Trade Survey data of sales, cost of goods sold, and inventories; the sales price indexes are retail industry price deflators calculated as the ratio between nominal industry sales and inflation-adjusted industry sales, the same sales values used to measure the real inventory-to-sales ratios published by BEA.[16] Using these derived retail margin price indexes yields real margin output that measures changes in each retailer's real sales, but does not account for changes in its real margin output per unit of real sale.

BEA will now be able to deflate retail margin directly using BLS retail trade PPIs. These PPIs measure the difference between sales and acquisition prices. This difference, the gross margin price, reflects the price for the retailer's services such as marketing, storing, displaying, and convenience. The BLS method for deriving a retail business's margin price is to take the total sales for an individual product and subtract the total purchase of the same product, yielding the margin. This margin value is divided by the number of units sold to yield the per unit price. The different margin prices are then summed to derive an average margin price for the retail industry as a whole.[17] These retail margin PPIs do not cover the full retail trade sector, and BEA will continue to use its methodology of applying margin rates to retail sales prices for those retail businesses for which PPIs are unavailable.

Methodology to Produce Times Series

This comprehensive revision of the annual I-O accounts and GDP by industry accounts is the first to include more than 1 year of benchmark I-O accounts; specifically, it used the benchmark I-O accounts for 1997 and 2002. Benchmark I-O accounts are important because they set the "best levels" and the relationships for the annual industry accounts time series. This necessitated an interpolation methodology, which was developed to ensure that the underlying structure of

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14. The methodology for extrapolating initial intermediate inputs at a detailed item level (see the methodology section of this article) will not change. These expense categories represent groups of expenses to which the annual industry accounts have matched detailed intermediate purchases. These expense categories will act as controls during the balancing of the use table (see the methodology section of this article) such that the detailed intermediate inputs matched to these expense categories will be scaled during the balancing process. For those industries where expense category data are not available, the detailed intermediate inputs will continue to reflect the assumption that real inputs move in line with real industry gross output.

15. See Robert E. Yuskavage, "Distributive Services in the U.S. Economic Accounts" (paper prepared for the National Bureau for Economic Research Conference on Research in Income and Wealth Summer Institute 2006, July 17, 2006).

16. For more information on BEA's measures of inventory-to-sales ratios, see Enrico Tan, "Real Inventories, Sales, and Inventory-Sales Ratios for Manufacturing and Trade," SURVEY 89 (October 2009) 15–20.

17. For more information on the BLS PPI program and details on retail trade PPIs, see "Chapter 14, Producer Prices," BLS Handbook of Methods at www.bls.gov.

both the revised 1997 and 2002 benchmark I-O accounts informs the annual composition of industrial production, intermediate purchases by industry, and final demand (see the box "Interpolation").

The methodology can be described in a sequence of five steps: (1) converting the revised 1997 benchmark I-O accounts to the 2002 NAICS structure, (2) revising the 1997 benchmark and previously published 2002 benchmark I-O accounts, (3) updating the time series for the annual estimates of value added by industry for 1998–2008, (4) updating and balancing the annual I-O accounts for 1998–2008 on the basis of the revised 1997 and 2002 benchmark I-O accounts and on the 1998–2008 estimates of value added by industry, and (5) preparing price and quantity indexes and contributions to growth for the GDP by industry accounts and KLEMS statistics for 1998–2008.

Converting the revised 1997 benchmark I-O accounts to the 2002 NAICS

The first step in updating the annual industry accounts is to convert the revised 1997 benchmark I-O accounts to the 2002 NAICS basis because the annual time series of I-O accounts and GDP by industry accounts are based on the 2002 NAICS.[18]

The conversion of the revised 1997 benchmark I-O accounts is completed separately for the make and use tables. First, the make table for 1997 is converted using a concordance between 1997 and 2002 NAICS at the six-digit industry and detailed product level. This concordance is used to reallocate the 1997 make table to a 2002 structure using weights for 1997 that are the result of a back-extrapolation of the 2002 benchmark make table. Second, the 1997 use table is reallocated to a 2002 NAICS basis using concordances that separately convert the intermediate inputs and final demand structures to be consistent with that of the 2002 use table.

Revising the benchmark I-O accounts

The second step in updating the annual industry accounts is to revise the 1997 benchmark and previously published 2002 benchmark I-O accounts because the annual I-O accounts and GDP by industry accounts are based on the relationships and levels set by the revised accounts. The revisions are from two sources.

First, the benchmark I-O accounts are modified to incorporate the changes in definition, methodology, and statistics from the 2009 comprehensive NIPA revi-

sion. Incorporating these changes ensures that the annual industry accounts for 1998–2008 are consistent with the levels of GDP in the NIPAs.

Second, after the NIPA revision is incorporated, the level and the composition of value added for each industry are further modified on the basis of information from both the I-O accounts and GDP by industry accounts. For this comprehensive revision of the annual industry accounts, an improved model—first introduced as part of the 2002 benchmark I-O accounts—was used to "reconcile" independent measures of value added by industry from the revised 2002 benchmark I-O accounts and GDP by industry accounts.[19] BEA's new reconciliation method is based on a generalized least squares framework that imposes I-O accounting constraints to produce a "combined" value

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19. The estimates of "compensation of employees" and "taxes on production and imports, less subsidies" in the revised benchmark I-O accounts are consistent with those published in the NIPAs. For census-covered industries, the compensation in the previously published 2002 benchmark I-O accounts was based on the 2002 Economic Census.

Interpolation

The interpolation methodology used by the Bureau of Economic Analysis is known as the modified Denton proportional first difference method.[1] This method preserves the pattern of the annual growth series (indicator series) by minimizing the proportional period-to-period change, while meeting the benchmark year level constraints. The advantage of this method is that it makes full use of the wide array of high-quality annual source data available from the federal economic statistical system and other sources, including the Census Bureau annual survey data, to estimate the changes in the underlying structure of the U.S. economy, while ensuring that the best levels and relationships introduced through comprehensive, economic census-based benchmark year statistics are met.

The interpolation methodology is used to prepare a time series of annual industry and commodity gross output statistics in the make table and value added and intermediate inputs statistics in the use table. For each series, interpolation occurs after each series has been updated to reflect definitional, classification, and statistical changes introduced in the 2002 benchmark I-O accounts and in the 2009 NIPA comprehensive revision.

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1. For more information on temporal distribution and interpolation procedures, see Baoline Chen and Stephen H. Andrews, "An Empirical Review of Methods for Temporal Distribution and Interpolation in the National Accounts," SURVEY OF CURRENT BUSINESS 88 (May 2008): 31–37.

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18. Preparing a revised 1997 best-level benchmark I-O accounts was the first step in integrating the annual I-O accounts and GDP by industry accounts during the 2004 comprehensive revision of the annual industry accounts. However, these statistics were not formalized into a full set of accounts.

added by industry that is an average, with weights determined by the relative quality of the initial estimates from each set of accounts.[20]

For 2002, value added by industry in the I-O accounts was computed as the difference between gross output and intermediate inputs by industry, and value added by industry in the GDP by industry accounts is computed from the industry distributions of GDI from the NIPAs.[21] In the reconciliation model, initial estimates of intermediate inputs from the revised benchmark I-O accounts and initial estimates of the components of gross operating surplus from the GDP by industry accounts are assigned a reliability indicator from two sources: (1) coefficients of variation, which measure sampling errors, from the source data provided by the Census Bureau and the IRS and (2) qualitative reliability weights determined by criteria that indicate the relative quality of underlying data for which there are no coefficients of variation.[22] The reconciliation method makes adjustments to initial estimates based on the strengths and weaknesses of the data that underlie those estimates. Initial estimates that are considered relatively weak are adjusted more than initial estimates that are considered relatively reliable. Essentially, the combined measure is an average of the two initial estimates; the weights are determined by the relative variances—an initial estimate with a smaller variance receives a larger weight. In other words, reconciliation results for a given industry are closer to the initial estimate that has the highest relative quality.

For 1997, the combined value added for each industry first established in the 2004 comprehensive revision of the annual industry accounts was updated to reflect the classification change to the 2002 NAICS and revisions in the GDI-based GDP by industry measures of value added that were introduced in the 2009 NIPA comprehensive revision.

The revised 1997 and 2002 benchmark I-O accounts are balanced after the two sets of revisions have been made. For this balancing, each industry's new measure of value added is fixed, and total intermediate inputs are estimated. Balancing ensures that the use of commodities equals the supply of commodities, the sum of value added and intermediate inputs by industry equals gross output by industry, and the sum of final uses equals GDP. The revised 1997 and 2002 benchmark I-O accounts then provide a starting point for preparing the annual I-O accounts for 1998–2008.

Developing a time series of value added

The third step in updating the annual industry accounts is to develop a time series of value added by industry. This requires (1) interpolating between the revised 1997 and 2002 value added by industry and (2) extrapolating forward the revised 2002 value added by industry to 2008 using the annual percent changes in the GDI-based measure of value added by industry. The components of GDI that compose value added by industry and information on the major source data and the industrial distribution for each component are shown in table B.

GDI-based value added measures consist of compensation of employees, taxes on production and imports less subsidies, and gross operating surplus. Gross operating surplus includes several items, such as corporate profits before tax, corporate net interest, and corporate capital consumption allowances, that are based on corporate tax return data from the IRS. Because the consolidated tax return data on an enterprise may account for activities of several industries, BEA converts these enterprise-based, or company-based, data to an establishment, or plant, basis. The conversion is based on the employment of establishments that are cross-classified by enterprises in Economic Census years. The annual percent change in gross operating surplus between 1997 and 2002 reflects an interpolation of establishment-based business income data based on both the 1997 and the 2002 economic censuses. As a final step, any differences between the sum of annual value added across all industries and GDP are distributed across industries.

Annual I-O accounts updates for 1998–2008

The fourth step in updating the annual industry accounts is updating and balancing the annual I-O accounts, which requires five steps for each year. Each task provides essential inputs for the next step. These steps include (1) calculating industry and commodity gross output, (2) estimating the commodity composition of intermediate inputs for each industry, (3) estimating the domestic supply of each commodity, (4) incorporating the commodity compositions of the GDP expenditure components for PCE, gross private fixed investment, and government consumption and

20. Initial work on reconciling gross operating surplus by industry using the improved method is described in Dylan G. Rassier, Thomas F. Howells III, Edward T. Morgan, Nicholas R. Empey, and Conrad E. Roesch, "Integrating the 2002 Benchmark Input-Output Accounts and the 2002 Annual Industry Accounts," SURVEY 87 (December 2007): 14–22.

21. In general, these two measures of value added for an industry will differ because of differences in implementation of the 2002 NAICS classification by agencies within the federal economic statistical system and because of differing source data and statistical methods.

22. The qualitative criteria used to evaluate data that do not have coefficients of variation are consistent with that used in the reconciliation of value added for the revised 1997 benchmark I-O accounts. For more information, see Brian C. Moyer, Mark A. Planting, Mahnaz Fahim-Nader, and Sherlene K. S. Lum, "Preview of the Comprehensive Revision of the Annual Industry Accounts: Integrating the Annual Input-Output Accounts and Gross-Domestic-Product-by-Industry Accounts," SURVEY 84 (March 2004): 50–51.

Table B. Principal Source Data for Value-Added Extrapolators

Component of gross domestic income	Major source data	Industrial distribution	
		Distribution available in source data	Data or assumption used if distribution by establishment is unavailable in source data
Compensation of employees, paid			
Wage and salary accruals [1]	For most private industries and state and local government, BLS tabulations from the Quarterly Census of Employment and Wages (QCEW). For other private industries, a variety of sources. For military wages, OPM.	Establishment.	
Supplements to wages and salaries			
Employer contributions for employee pension and insurance funds	For health insurance, HHS Medical Expenditure Panel Survey; for pension plans, DOL tabulations of IRS Form 5500; for other types, trade associations.	For pension plans, company; for the others, none.	BLS employer cost index; BLS QCEW.
Employer contributions for government social insurance	Tabulations from the SSA and other agencies administering social insurance programs.	None.	SSA and BLS tabulations.
Taxes on production and imports less subsidies			
Taxes on production and imports	For state and local government, Census Bureau. For federal government excise taxes, Alcohol and Tobacco Tax and Trade Bureau collections from the OTA and IRS. For customs duties, Treasury Department *Monthly Treasury Statement.*	Establishment.	Property taxes are based on BEA capital stock distributions.
Subsidies	For federal government, USDA Commodity Credit Corporation subsidy payments and OMB *Budget of the United States.* For state and local government, Census Bureau and California administrative records.	None.	Payments are assigned to the industries being supported.
Gross operating surplus			
Private enterprises			
Net interest and miscellaneous payments, domestic industries			
Corporate	IRS tabulations from corporate tax returns (Form 1120), adjusted for misreporting on tax returns and for conceptual differences, FFIEC call report data on commercial banks, and trade association data.	Company.	Census Bureau company-establishment employment matrix.
Noncorporate	IRS tabulations of tax return data from sole proprietorships (Form 1040 Schedule C) and partnerships (Form 1065), adjusted for misreporting on tax returns and for conceptual differences, FFIEC call report data on commercial banks, FRB mortgage debt times BEA interest rate for residential mortgage interest.	Company.	Assumed to be equivalent to an establishment distribution.
Business current transfer payments (net)	IRS tabulations from business tax returns; OMB Budget of the United States; Census Bureau Census of Governments and annual surveys; other government agency reports; trade sources.	Company.	Industry-specific payments are assigned to those industries; others are based on IRS company industry distribution.
Proprietors' income with inventory valuation adjustment (IVA) and without capital consumption adjustment (CCAdj)			
Farm	USDA farm income data.	Establishment.	
Nonfarm			
Proprietors' income without IVA and CCAdj	IRS tabulations of tax returns from sole proprietorships (Form 1040 Schedule C) and partnerships (Form 1065), adjusted for misreporting on tax returns and for conceptual differences.	Company.	Assumed to be equivalent to an establishment distribution.
Inventory valuation adjustment	BLS PPI prices and IRS inventory data.	Establishment/company.	
Rental income of persons without CCAdj	Census Bureau data on housing units and rents from the American Housing Survey, FRB mortgage debt data, BEA interest rate data, USDA data, and IRS tabulations from individual tax returns (Form 1040).	Establishment.	
Corporate profits before tax with IVA and without CCAdj, domestic industries			
Corporate profits before tax without IVA and CCAdj	IRS tabulations from corporate tax returns (Form 1120 series) and regulatory agencies and public financial reports.	Company.	Census Bureau company-establishment employment matrix.
Inventory valuation adjustment	BLS PPI prices and IRS inventory data.	Establishment/company.	
Capital consumption allowances			
Corporate	IRS tabulations from corporate tax returns (Form 1120 series), adjusted for misreporting on tax returns and for conceptual differences.	Company.	Census Bureau company-establishment employment matrix.
Noncorporate	IRS tabulations from sole proprietorships (Form 1040 Schedule C) and partnerships (Form 1065).	Company.	Assumed to be equivalent to an establishment distribution.
Current surplus of government enterprises	For federal government, reports from various agencies and BEA consumption of fixed capital. For state and local governments, Census Bureau surveys of government finances.	Establishment.	
Consumption of fixed capital			
Households and institutions [2]	BEA capital stock data.	Establishment.	
Government	BEA capital stock data.	Type of agency.	

1. Includes wage and salary disbursements to the rest of the world and excludes wages and salaries received from the rest of the world.
2. Consists of owner-occupied housing and nonprofit institutions primarily serving households.

BEA	Bureau of Economic Analysis	HHS	Department of Health and Human Services
BLS	Bureau of Labor Statistics	IRS	Internal Revenue Service
DOL	Department of Labor	PPI	Producer Price Index
FFIEC	Federal Financial Institutions Examination Council	OPM	Office of Personnel Management
FRB	Federal Reserve Board	OTA	Office of Tax Analysis, Treasury Department
		SSA	Social Security Administration
		USDA	U.S. Department of Agriculture

investment expenditures, and (5) balancing the use table.

Industry and commodity gross output. A time series of industry and commodity gross output is prepared by interpolating between the revised 1997 and 2002 benchmark make tables and by extrapolating forward the revised 2002 make table to 2008. A wide array of source data is used to prepare annual estimates of industry and commodity gross output. For manufacturing, trade, and most service industries, the annual source data are based on surveys from the Census Bureau. For agriculture, insurance, and government enterprises, and for parts of transportation, utilities, finance, and real estate, the annual source data are based on other government and private sources. For the industries and commodities for which annual source data at the benchmark I-O level of detail are not available, aggregate source data are used to extrapolate the industry and commodity gross output. Table C shows the source data used to prepare annual statistics on industry and commodity gross output.

Commodity composition of intermediate inputs. The estimates of the composition of intermediate inputs by industry are based on the revised benchmark I-O relationships and are adjusted for changes in relative prices and other factors.

First, each industry's current-year output is valued in the prices for the previous year and is estimated using an industry price index that is calculated—in a Fisher index-number formula—based on the commodity price indexes for that industry's output. Generally, the number of price indexes available for commodities is fewer than the number of commodities; for commodities for which a price index is unavailable, an aggregate price index is applied to multiple commodities.

Second, each industry's output for the current year, valued in the prices for the previous year, is multiplied by the previous year's direct requirements coefficient for the industry to yield current-year intermediate inputs valued in the prices of the previous year.[23] This procedure assumes that in the current year, the composition of an industry's intermediate inputs per dollar of output (valued in the prices of the previous year) is unchanged from the previous year. The results are then reflated to current-year prices using the commodity price indexes.

Finally, commodity taxes, transportation costs, and trade margins for each intermediate input are estimated. Commodity taxes are added to raise the intermediate inputs from a basic price valuation to a

producers' price valuation.[24] Transportation costs and trade margins are estimated to provide a purchasers' price valuation of intermediate inputs.

Domestic supply. Domestic supply is the total value of goods and services available for consumption as intermediate inputs by industries or as PCE, private fixed investment, and government consumption and investment expenditures; it is calculated as domestic commodity gross output, plus imports, less exports, less the change in private inventories. The estimates of imports and exports are based on foreign trade statistics from the Census Bureau and from BEA's international transactions accounts. For the current year, the change in private inventories by industry are from the NIPAs, and the commodity composition of inventories held by industries are based on the revised benchmark I-O relationships.

Commodity composition of final uses excluding trade and changes in private inventories. The annual estimates of the major expenditure components of final uses for PCE, private fixed investment, and government consumption and investment are obtained from the NIPAs. Initial commodity compositions for these expenditure components are estimated using commodity-flow relationships from the revised benchmark I-O accounts.

Balancing the use table. The use table is balanced with a biproportional adjustment procedure—that is, with a procedure that sequentially adjusts rows and columns to equal a set of predetermined control totals. In a series of iterations, the adjustments are made (1) until the use of commodities by industries, PCE, private investment, and government consumption and investment equaled the domestic supply of commodities, (2) until the sum of value added by industry and intermediate inputs by industry equals gross output by industry, and (3) until the sum of the commodity composition of PCE, private fixed investment, and government consumption and investment equals that for expenditures in the NIPAs.

After the results are reviewed and verified, the annual I-O accounts for 1998–2008 are finalized. The measures of gross output, intermediate inputs, and value added by industry are then incorporated into the GDP by industry accounts.

Price and quantity indexes for the GDP by industry accounts and KLEMS statistics

The fifth step in updating the annual industry accounts is preparing price and quantity indexes for the GDP by industry accounts and KLEMS statistics for

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23. The direct requirements coefficient is the amount of a commodity required by the industry to produce a dollar of the industry's output.

24. The basic price is the price received by the producer for goods that are sold; it excludes the taxes collected by the producer from purchasers as well as transportation costs and trade margins.

Table C. Principal Sources of Data for Industry and Commodity Output and Prices—Continues

Industry and commodity	Source data for extrapolator	Source data for price index
Agriculture, forestry, fishing and hunting		
Farms	U.S. Department of Agriculture (USDA).	USDA prices received by farmers; Bureau of Labor Statistics (BLS) Producer Price Index (PPI).
Forestry, fishing and related activities	For forestry, fishing, hunting, trapping, and support activities, USDA data; for logging, Census Bureau Annual Survey of Manufactures (ASM) and Manufacturers Shipments, Inventories, and Orders Survey (M3).	USDA; BLS PPI; personal consumption expenditures (PCE) price indexes from the national income and product accounts (NIPAs); for fisheries for aquaculture, National Oceanic and Atmospheric Administration.
Mining		
Oil and gas extraction	Energy Information Agency (EIA) data on quantities produced and prices.	BLS PPI; EIA.
Mining, except oil and gas .	For coal mining, EIA *U.S. Coal Supply and Demand in Review;* for uranium, EIA *Uranium Marketing Annual Report;* for all others, U.S. Geological Survey (USGS) *Mineral Commodity Summaries.*	EIA; USGS; BLS PPI.
Support activities for mining	For mining exploration, trade source data on drilling costs and footage drilled; for all other support activities, USGS *Mineral Commodity Summaries.*	EIA; USGS; BLS PPI; trade sources.
Utilities	For electric power generation, transmission, and distribution, EIA forms 861 and 826; for natural gas distribution, EIA *Natural Gas Monthly;* for water and sewage and other systems, NIPA PCE water and sanitary services and water and sewage maintenance.	BLS Consumer Price Index (CPI) and PPI; EIA.
Construction		
Residential	Census Bureau construction spending (value put in place) survey.	Census Bureau price deflator for new single-family houses under construction; NIPA price index for multifamily home construction.
Nonresidential	Census Bureau construction spending survey; Department of Defense (DOD) expenditures; USDA expenditures.	NIPA composite price indexes based on cost per square foot; cost indexes from trade source data; for single-family houses under construction, Census Bureau price deflator; BLS PPI.
Manufacturing	Census Bureau ASM, M3 survey, and Economic Census.	BLS PPI; NIPA price indexes based on DOD prices paid for military equipment; NIPA hedonic price indexes.
Wholesale trade	Census Bureau *Annual Wholesale Trade Report* (*AWTR*), *Monthly Wholesale Trade Report* (*MWTR*), and Wholesale Trade Economic Census.	Census Bureau AWTR and MWTR data to derive margin rates; IRS Statistics of Income (SOI); NIPA sales prices and import prices; IRS SOI commodity taxes.
Retail trade	Census Bureau Annual Retail Trade Survey (ARTS) and Monthly Retail Trade Survey (MRTS); IRS SOI.	BLS PPI; NIPA retails sales prices; Census Bureau ARTS and MRTS; IRS SOI.
Transportation and warehousing		
Air transportation	Bureau of Transportation Statistics (BTS) Air Carrier Financial Statistics (ACFS) and Air Carrier Traffic Statistics (ACTS); foreign trade statistics.	BLS PPI; BTS prices.
Rail transportation	For rail passenger, *Amtrak Annual Report;* for rail freight, trade sources.	For rail passengers, BLS CPI; for freight, BLS PPI.
Water transportation	For freight, U.S. Army Corps of Engineers *Waterborne Commerce of the United States;* for inland passenger travel on ferry boats and cruise ships, NIPA PCE; trade source data on receipts.	BLS PPI and BLS CPI; trade source data.
Truck transportation	Census Bureau Services Annual Survey (SAS).	BLS PPI.
Transit and ground passenger transportation	BTS National Transportation Statistics; BLS Quarterly Census of Employment and Wages (QCEW) data; for ground passenger transportation, NIPA PCE.	NIPA PCE price indexes; BLS QCEW.
Pipeline transportation	Trade source data on receipts; Federal Energy Regulation Commission Form 6.	BLS PPI.
Other transportation and support activities	NIPA PCE; trade source data on receipts; BTS ACFS and ACTS.	NIPA PCE price index; BLS PPI.
Warehousing and storage	Census Bureau SAS.	BLS PPI.
Information		
Publishing industries (includes software)	Census Bureau SAS.	BLS PPI.
Motion picture and sound recording industries	Census Bureau SAS.	BLS CPI; NIPA PCE price indexes.
Broadcasting and telecommunications	Census Bureau SAS.	BLS PPI; for radio and TV broadcasting, NIPA PCE price index based on BLS PPI.
Information and data processing services	Census Bureau SAS.	BLS CPI and PPI; for publishing and broadcasting content on the Internet, NIPA PCE price indexes.
Finance and insurance		
Federal Reserve banks, credit intermediation, and related activities	Federal Deposit Insurance Corporation commercial bank call report data; Federal Reserve Board data; Office of Thrift Supervision data; NIPA financial services indirectly measured; private trade source data.	For financial services, NIPA PCE price index based on BLS quantity output indexes for commercial banks and employee hours for other depository institutions; BLS PPI and CPI.
Securities, commodity contracts, investments	Securities and Exchange Commission Focus Report; Census Bureau SAS.	BLS PPI and CPI; NIPA PCE price indexes.
Insurance carriers and related activities	For reinsurance carriers, life insurance, and property and casualty insurance, private trade source data; for all other insurance carriers and related activities, BLS QCEW.	For life insurance, NIPA PCE data on input prices; for health insurance, quantity extrapolations of premiums and benefits deflated with BLS PPI; for all other property and casualty insurance, BLS PPI; for agents, brokers, and services, composite indexes based on trade source data and NIPA PCE price indexes.
Funds, trusts, and other financial vehicles	For imputed service charges for other financial institutions, NIPA PCE.	BLS CPI; NIPA PCE price indexes.

Table C. Principal Sources of Data for Industry and Commodity Output and Prices—Table Ends

Industry and commodity	Source data for extrapolator	Source data for price index
Real estate and rental and leasing		
Real estate	For residential dwellings, Census Bureau's biannual American Housing Survey and monthly Current Population Survey data on housing stock and rental prices and USDA data on farm housing; for nonresidential dwellings, IRS SOI tabulations of business tax returns and NIPA rental value of buildings owned by nonprofit institutions.	For residential dwellings, BLS CPI; for nonresidential dwellings, BLS PPI; for real estate managers and agents, BLS PPI and trade source data.
Rental and leasing services and lessors of intangible assets	For rental and leasing services, Census Bureau SAS; for royalties, IRS SOI tabulations of business tax returns.	BLS PPI.
Professional, scientific, and technical services		
Legal services	Census Bureau SAS.	BLS PPI.
Computer systems design and related services	Census Bureau SAS.	NIPA price indexes for prepackaged, custom, and own-account software.
Miscellaneous professional, scientific and technical services	Census Bureau SAS.	BLS PPI and QCEW.
Management of companies and enterprises	BLS QCEW.	BLS QCEW.
Administrative and waste management services		
Administrative and support services	Census Bureau SAS; BLS QCEW.	NIPA PCE price index based on BLS CPI data; BLS QCEW; BLS PPI.
Waste management and remediation services	Census Bureau SAS; BLS QCEW.	NIPA PCE price index based on BLS CPI data; BLS QCEW and PPI.
Educational Services	Department of Education; BLS Consumer Expenditure Survey.	NIPA PCE price index based on trade source data for input costs.
Health care and social assistance		
Ambulatory health care services	Census Bureau SAS.	NIPA PCE price index based on BLS CPI; BLS PPI.
Hospital and nursing and residential care facilities	Census Bureau SAS.	NIPA PCE price index based on BLS CPI and Centers for Medicare and Medicaid Services.
Social assistance	Census Bureau SAS.	NIPA PCE price index based on trade source data on input costs.
Arts, entertainment, and recreation		
Performing arts, spectator sports, museums and related industries	Census Bureau SAS.	NIPA PCE price index based on BLS CPI.
Amusement, gambling, and recreation industries	Census Bureau SAS.	NIPA PCE price index based on BLS CPI.
Accommodation and food services		
Accommodations	For hotels and motels, NIPA PCE; for recreational vehicle parks and for bed and breakfasts, BLS QCEW.	BLS PPI; NIPA PCE price index based on BLS CPI.
Food services and drinking places	Census Bureau ARTS.	Census Bureau ARTS; BLS PPI composite price index.
Other services except government	For religious, grant making, civic, and other nonprofit services, personal services, and dry cleaning services, Census Bureau SAS and National Center for Charitable Statistics; for repair and maintenance, BLS QCEW; for private household services, NIPA PCE.	BLS CPI; NIPA PCE price indexes based on BLS CPI.
Federal		
General government	NIPA government expenditure statistics; for federal structures, DOD investment expenditures.	NIPA price index based on BLS PPI and CPI; for military facilities, DOD data on employment, prices for military construction; construction cost indexes from trade sources.
Government enterprises	U.S. Postal Service receipts; for electric utilities, EIA; for specific enterprises, Overseas Private Investment Corporation, Federal Housing Administration, and other government agencies.	BLS PPI; NIPA PCE price indexes based on BLS PPI and agency data.
State and local		
General	NIPA government expenditure statistics.	BLS PPI; NIPA PCE price index based on CPI.
Enterprises	NIPA statistics on government enterprises based on Census Bureau Annual Survey of Government Finances; for electric utilities, EIA; for state and local government structures, Census Bureau construction spending survey.	BLS PPI.

1998–2008. That requires completing two steps. First, price and quantity indexes for gross output and intermediate inputs by industry are prepared. Second, information on gross output and intermediate inputs by industry are combined using the double-deflation procedure to derive price and quantity indexes for value added by industry.

Indexes for gross output and intermediate inputs by industry. Price and quantity indexes for gross output by industry are derived by separately deflating each commodity produced by an industry and included as part of its gross output. This information is obtained from the annual I-O make tables. Price and quantity indexes for intermediate inputs are derived by deflating the commodities that compose an industry's intermediate inputs in the annual I-O use tables. The domestic and imported portions of intermediate inputs are deflated separately in order to account for the goods and services purchased as inputs from domestic and foreign sources separately. For each detailed commodity used by an industry, the portion attributable to imports is calculated as a percentage of the total purchase value using the economy-wide ratio of imports to the total domestic supply of the commodity. The primary data sources used to prepare the commodity price indexes for deflation are shown in table C. When a commodity price index is based on more than one detailed price index, a Fisher index-number formula is used to prepare the composite index.

Indexes for value added by industry. Price and quantity indexes for value added by industry are calculated using the double-deflation method. In the double-deflation method, the separate estimates of gross output and intermediate inputs by industry are combined in a Fisher index-number formula in order to generate price and quantity indexes for value added by industry.[25] This method is preferred for computing price and quantity indexes for value added by industry because it requires the fewest assumptions about the relationships among gross output by industry and intermediate inputs by industry.

KLEMS statistics. Intermediate inputs are disaggregated into the cost categories of energy, materials, and purchased services by assigning each detailed product that is used as an intermediate input according to the consuming industry's production process.[26] The assignment of cost categories is generally based on business expense data from economic censuses and annual surveys by the Census Bureau. For most industries, a detailed product is consumed as an energy input, materials input, or purchased-service input. However, in a few cases, detailed products may be assigned to different cost categories, depending on the using industry.[27] The computation of chain-type price and quantity indexes for energy, materials and purchased services uses the same procedures as that for total intermediate inputs, but with the additional step of aggregating by cost category within the Fisher index-number formula.

25. See Moyer, Planting, Fahim-Nader, and Lum, 50–51.

26. For information on the BEA KLEMS statistics, see Erich H. Strassner, Gabriel W. Medeiros, and George M. Smith, "Annual Industry Accounts: Introducing KLEMS Input Estimates for 1997–2003," SURVEY 85 (September 2005): 31–65.

27. For example, the assignment of petroleum-derived inputs depends on the consuming industry: When a petroleum-derived product is consumed by most industries, it is categorized as an energy input, but when consumed by the petroleum refining industry and the chemical manufacturing industry, it is categorized as a material input.