

# **Current and Future Directions for the U.S. Industry Accounts**

by

Ann M. Lawson

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Industry Economics Division  
Bureau of Economic Analysis  
U.S. Department of Commerce  
Washington, DC 20230

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## **Introduction**

At the beginning of the new millennium, we in the United States, like industry economic accountants in other countries, find ourselves facing significant challenges. As new technologies are successfully brought to the marketplace and new production processes, as well as whole new industries, are put into place, our data sources are struggling to keep up. As U.S. imports become an increasingly important source of supply to meet our domestic demand, and U.S. exports become more and more important as a catalyst to domestic production, we no longer can assume that our industry models are generally closed. And with the emergence of e-commerce, our concepts of how inter-industry transactions take place and the linkages between producers and consumers are changing by the day. For many of us, the economic landscape is changing more rapidly than what we have seen at any other point during our careers.

This is also a time when policy makers and other users of industry data are asking for guidance about the direction of these changes and about their economic impacts, as well as the inevitable questions of who will be the “winners” and who will be the “losers” over the next few years?

Our goals continue to be to provide our customers with data that are accurate, reliable, and relevant. Accurate in the sense of capturing all production of goods and services within this changing environment without double counting. For example, our measure of gross domestic product (GDP) would be inaccurate to the extent that it did not fully capture the production of a new service such as the “online” services now available to households. The second goal of reliable estimates refers to the size and frequency of revisions. It is indicative of measurement errors that arise because additional information used in preparing an estimate—information that is more complete, more detailed, or otherwise better—is incorporated into the estimate as it becomes available over time. And the third goal of estimates that are relevant has two dimensions. One dimension is timeliness—we are seeking to reduce the length of time between the close of the period to which the estimates refer and the release of the estimates for that period. Estimates that are not available on a timely basis for a particular use are, in fact, irrelevant for that use. The second dimension of relevance refers to the ability of the accounts to provide the analytical frameworks, summary measures, and kinds and amount of detail that answer the questions that are important to our users.

Despite the many challenges before us and our ambitious goals, resources to meet them have not kept pace. After several years of relatively flat budgets and staff levels, this year we have had to reduce our staff by ten percent. Next year’s resources are

uncertain. It is against this background that recent developments and current and future directions for the U.S. industry accounts in general and input-output accounts in particular are being addressed.

The Industry Accounts for the United States are prepared by the Bureau of Economic Analysis in the U.S. Department of Commerce. They include the benchmark input-output (I-O) accounts, which are based on detailed data from the economic censuses that are conducted every 5 years by the Bureau of the Census, a sister agency to the Bureau of Economic Analysis; annual accounts, including annual I-O tables, which provide users with information updated from the most recent benchmark tables, and gross product by industry, or gross product originating (GPO), estimates which provide industry time series data on the contributions of industries to gross domestic product or GDP. In addition, the Industry Accounts include two satellite initiatives, one for travel and tourism and another for transportation, which were developed as extensions of the core accounts. Chart 1 shows the allocation of staff within the Industry Accounts to these three program areas.

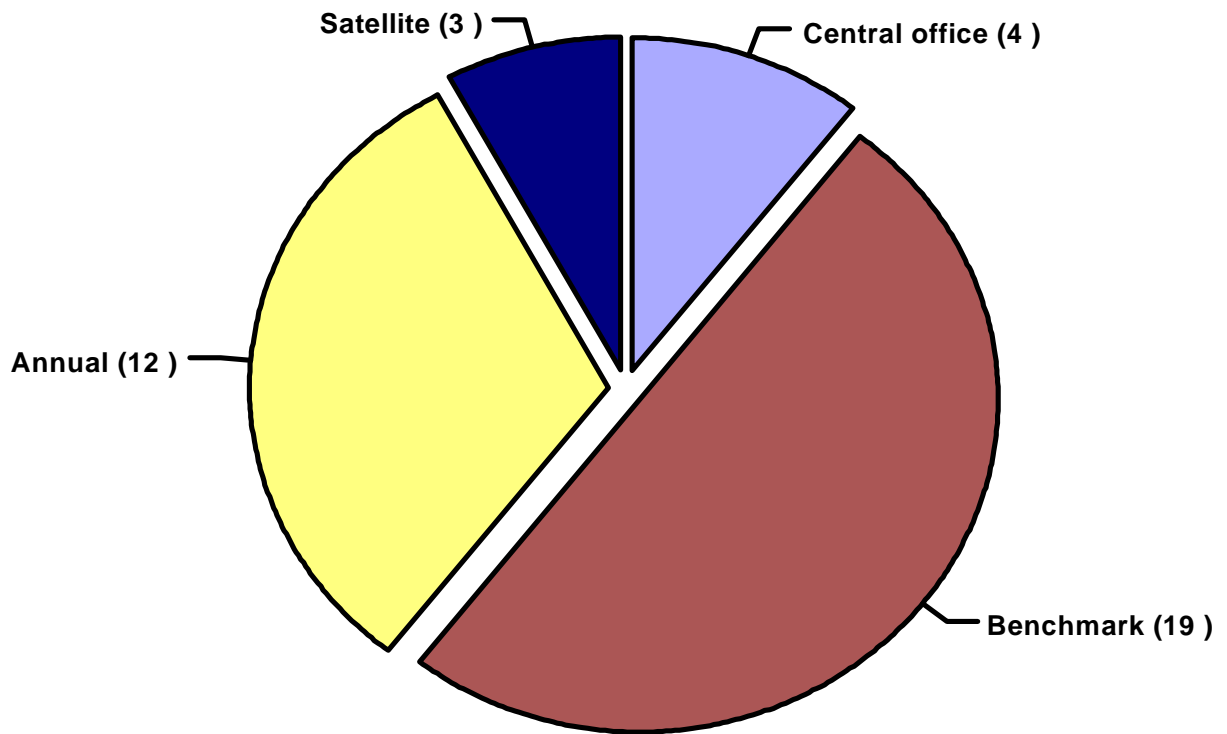
### **Benchmark Input-Output Accounts**

The Bureau prepares the benchmark I-O accounts for the United States. Since the program was transferred from the Department of Labor in the late 1950's, the Bureau has prepared eight sets of benchmark accounts. The first set was for 1958, and the most recent was for 1992; (benchmark I-O accounts for 1997 are currently underway and are planned for release in late 2002).

A primary objective of the benchmark I-O accounts is to identify the composition and level for each final demand component of the national income and product accounts (or NIPA's). This process, which is referred to as "benchmarking the NIPA's," depends upon the discipline of the accounting framework provided by the I-O accounts to identify and to correct statistical inconsistencies in the national accounts. Each set of benchmark I-O accounts has given this objective a high priority.

The benchmark accounts are presented in five tables—a make table, a use table, a direct requirements table, and two total requirements tables. The make table—which is similar in purpose to the supply table in the 1993 System of National Accounts

# Chart 1.--Industry Accounts Programs and Staffing



(SNA)—shows the commodities that are produced by each industry. The use table—which is similar to the 1993 SNA use table—shows the inputs to industry production and the commodities that are consumed by final users. Both the make and use tables provide extensive information on the production and distribution of goods and services in the United States. For example, the 1992 benchmark accounts provide published data, showing how 498 industries provide input to, and use output from, each other to produce gross domestic product; at the unpublished workfile level, more detailed information is available for nearly 800 industries and 5,000 products.

The three requirements tables are derived from the make and the use tables. The direct requirements table shows the amount of a commodity that is required by an industry to produce a dollar of the industry's output. All valuations are again in terms of producers' prices. The two total requirements tables show the production that is required, directly and indirectly, to deliver a dollar of a commodity to final users; one is in a commodity-by-commodity format and the other is in an industry-by-commodity format. The total requirements tables do not distinguish between domestic production and imports as sources of supply.

### **Recent improvements to the benchmark accounts**

Beginning in the early 1990's, the Bureau initiated an ambitious program to improve the accuracy, reliability, and relevancy of the benchmark I-O accounts. Even earlier, substantial investments had been made by the Bureau of the Census, in consultation with the Bureau and other data users, to improve the accuracy of data collected for the quinquennial economic censuses. The three most significant developments flowing from these initiatives, which greatly enhanced the accuracy, reliability, and relevance of the accounts, are cited below.

**Improvements in accuracy.**—The benchmark accounts are based on information from the comprehensive economic censuses that are conducted every 5 years by the Bureau of the Census. The 1992 I-O accounts incorporated newly expanded data from the 1992 economic censuses, which covered about 95 new industries and marked the most significant expansion in scope of the census in the past 50 years. These data were collected primarily in the two new economic censuses—one for finance, insurance and real estate industries and the other for transportation, communication, and utility industries. The 1992 I-O accounts also incorporated newly expanded data for the expenses of auxiliary establishments and for the expenses of manufacturing, wholesale trade, retail trade, and service industries. These data, together with data from new annual surveys for transportation and for communications, were used to estimate inputs for these industries.

**Improvements in relevance and reliability.**—Benchmark I-O accounts are now

*released within 5 years of the reference economic census year.* The lag between an economic census year and publication of the benchmark I-O accounts for that same year was 6-7 years for the first five sets of benchmark accounts prepared by the Bureau. However, the sixth set of benchmark accounts, those for 1982, were not released until 1991—or 9 years after the economic census year. This delay was viewed as being unsatisfactory by data users.<sup>1</sup> To improve their timeliness (or relevance), the Bureau initiated an ambitious production schedule, first for the 1987 benchmark I-O accounts, which were delivered in 1994 or 7 years after the reference year, and then for the 1992 accounts, which were delivered in 1997 or 5 years after the reference year. As mentioned above, the 1997 benchmark accounts, which are now underway, are scheduled for release in 2002.

Greater relevance of the benchmark I-O accounts was also achieved by the addition of an *alternative set of make and use tables*, beginning with the 1992 benchmark I-O accounts. The new tables generally define industries based on the classification system used to collect data. The new tables allow users to more easily integrate information from them with industry information from other data sources, such as gross product by industry, also prepared by the Industry Accounts, and employment data from the Bureau of Labor Statistics, both of which generally follow the industry classification system used for collecting data.

Reliability of the benchmark I-O accounts was also enhanced as a result of the introduction of the new alternative accounts. This was an outcome of the change in procedures required to develop the two set of accounts. The current procedure is to first estimate output and inputs for the alternative I-O industries based on data that have been collected using a consistent classification system; a balancing procedure is included to assure that the outputs of commodities are consistent with the outputs of industries. This is followed by estimating the outputs and inputs for the traditional I-O industries based on less readily available information for redefined outputs and inputs. The traditional tables are viewed as being more reliable—and more easily verifiable—by creating a balanced set of alternative tables prior to their estimation. This was not the case for benchmark accounts prior to those for 1992.

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<sup>1</sup> For example, on February 14, 1992, the Chairman of the Council of Economic Advisers, Michael Boskin, released a statement “FY 1992 Economic Statistics Initiative: Improving the Quality of Economic Statistics.” The statement set forth a multi-year plan to implement recommendations of the President’s Working Group on improving economic statistics. A major recommendation made to the Bureau of Economic Analysis for improving the national economic accounts was to reduce the time required to prepare the I-O tables to 5 years for benchmark tables and 3 years for annual tables.

The alternative make and use tables are provided in addition to—and not as a substitute for—the traditional tables, which are used to derive the total requirements, or “multiplier,” table.) Industries in the 1992 alternative make and use tables are based on the 1987 Standard Industrial Classification (SIC); those in the future 1997 alternative make and use tables will be based on the new North American Industry Classification System (NAICS). The major difference between the alternative tables and the traditional or Leontief-type tables is in the treatment of subsidiary secondary products produced by industries.<sup>2</sup> Estimating and maintaining the accounts in these two alternative formats is made possible because of the expanded capabilities of our data processing system.

### **Future directions for the benchmark I-O accounts**

In the future, we plan to build upon the progress cited above and to continue working towards additional improvements to the accuracy and relevancy of the benchmark I-O accounts. Three areas for improvement are discussed below.

**Increased accuracy and relevance with NAICS.**—The 1997 benchmark I-O accounts will be based upon the new *North American Industry Classification System* or *NAICS*. The NAICS is unique among industry classifications in that it is constructed within a single conceptual framework. Economic units that have similar production processes are classified in the same industry, and the lines drawn between industries demarcate, to the extent practicable, differences in production processes. The new classification system is more compatible with the homogeneity requirements of an I-O framework than the previous SIC system and we believe will accordingly enhance the accuracy of the benchmark I-O accounts for 1997.

In addition, industry data collected under the new NAICS will allow the 1997 benchmark I-O accounts to identify a larger number of service-producing industries compared to goods-producing industries than for previous benchmarks, although the industry and commodity detail for publication is still being determined. This is made possible largely because of the new NAICS and the detailed information collected from the 1997 economic censuses by the Census Bureau. Compared to the old SIC system, the new NAICS better reflects today’s economy; for example, NAICS added 358 new industries, of which 250 are service-type industries. This should improve the relevance of the benchmark accounts to users who increasingly are asking questions about how our

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<sup>2</sup> For industries in the traditional tables, some secondary production is redefined to other industries; the purpose of these redefinitions is to attain a greater degree of homogeneity in the inputs required by an I-O industry to produce its commodities. These redefinitions are not made to industries in the alternative tables.

economy is evolving from being primarily goods-producing to being primarily services-producing.

**Increased relevance by providing domestic total requirements tables** .–Import matrices, which are necessary for building domestic total requirements tables, have been prepared for past benchmarks for internal use. Lacking detailed information on the consumption of goods and services by source of supply, these matrices have been based on the simplistic assumption that imports are distributed the same as total supply. For the 1997 benchmark, we are considering the preparation of domestic total requirements tables. These tables show impacts on domestic industry and commodity production rather than impacts and would make the tables more relevant to users. For example, this would allow users of the U.S. I-O accounts to estimate the impacts from changes in personal consumption expenditures on the production of all U.S. commodities in addition to the impacts on the production of all commodities whatever the source.

**Relevance gained from other classification changes** .–Plans are to treat both own-account construction and own-account software—that is, construction and software produced by businesses for their own use—in the originating industries for the alternative I-O accounts. The purpose of this change is to increase the comparability of data from the benchmark I-O accounts with other industry-based data that are generally collected on this basis. This is an extension of the work already accomplished for the 1992 benchmark accounts, where two sets of tables—a traditional, Leontief-type set and an alternative set were prepared, and should enhance the consistency of the I-O accounts with other industry-based data sets.

For the traditional benchmark tables, own-account software will be shown as being produced by a new industry where the activity is primary. This is an extension of the new treatment for all software acquired by businesses as investment, which was introduced in the 1999 comprehensive revision of the U.S. national income and product accounts.<sup>3</sup>

The change being introduced to the 1997 benchmark accounts for own-account construction is not as big a change as that for own-account software. In the case of own-account construction, these activities by business have been included in the construction

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<sup>3</sup> For more information on the new treatment of software and other changes introduced by the 1999 comprehensive revision see Brent R. Moulton, Robert P. Parker, and Eugene P. Seskin, “A Preview of the 1999 Comprehensive Revision of the National Income and Product Accounts: Definitional and Classificational Changes,”Survey of Current Business 79 (August 1999): 7-20.



industry for past benchmark accounts and will continue to be included there for the 1997 traditional make and use tables. The change being considered is to show own-account construction in the originating industries and follow how the data are collected for the 1997 alternative make and use tables.

### **Annual Industry Accounts**

The annual industry accounts currently include an annual I-O program, which provides updates from the benchmark I-O accounts, and a separate gross product originating (or GPO) by industry program, which provides time series data of industry distributions of income that are consistent with the national income and product accounts.<sup>4</sup> Both programs provide estimates of industry gross output and intermediate inputs. A current goal of the Industry Accounts is to further integrate the two programs by achieving greater consistency between their estimates of these measures. By improving the consistency between gross output and intermediate inputs from the annual I-O program with those from the GPO program, we hope to improve the accuracy and reliability of estimates from both areas, as well as to increase their relevance to users. This section provides a brief overview of each program, including a thumbnail description of the accounts and recent developments, followed by a description of some of the key issues that must be addressed in the future in order to bring the annual I-O and GPO programs in closer alignment.

#### **Annual I-O tables**

In December 1999, the Bureau released the 1996 annual I-O tables for the U.S. economy. This release marked the resumption of the regular preparation of annual I-O tables and the refocusing of the resources that had been used to put the benchmark I-O accounts on a more timely schedule. The 1996 annual I-O tables are based on an update of the 1992 benchmark I-O accounts. The presentation of the annual I-O tables is generally the same as that of the benchmark tables, but the information is less detailed—that is, the 1996 annual I-O tables present estimates for 97 industries, while the 1992 benchmark I-O tables present more detailed estimates for 498 industries.

**More relevant set of I-O analytical tools for studying recent economic changes.**—A major reason for resuming the annual I-O program was to provide users with a set of I-O analytical tools that reference a year that is more recent than the one

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<sup>4</sup> The Bureau also has a regional accounts program, which provides state distributions of national aggregates from the GPO by industry accounts, and a regional I-O modeling system (referred to as RIMS II), based on the benchmark I-O accounts.

referenced by the last set of benchmark I-O accounts. Even though the annual I-O tables are based on many of the same relationships embedded in the last set of benchmark accounts, the updated annual tables are more relevant to users who are interested in studying recent economic changes.

**Greater reliability possible for other economic statistics** .—The framework upon which the annual I-O estimates are based imposes a discipline that requires all commodity and industry estimates to be consistent—that is to say, that they are internally in balance. As a result, a higher quality, more reliable set of annual I-O estimates are developed than would otherwise be possible. To the extent that other economic statistics being prepared concurrently incorporate information from the annual I-O estimates, they can also gain from the discipline of the I-O framework. For example, in the 1999 comprehensive NIPA revision, estimates from the 1996 annual I-O tables were used to estimate the 1996 commodity distribution for most of the components of personal consumption expenditures (PCE) for goods.

### **Gross product by industry**

The Bureau also prepares as part of the Industry Accounts annual estimates of gross product by industry, or gross product originating (GPO), starting in 1947 for nominal estimates and in 1977 for real estimates. GPO is a measure of the contribution of each private industry and of government to the Nation's gross domestic product (GDP). It is defined as an industry's gross output less its purchases of intermediate inputs. (Gross output consists of sales or receipts and other operating income, commodity taxes, and inventory change; intermediate inputs consist of the goods and services that are purchased for use in production from other industries or imported.)

For the June 2000 release, the Bureau prepared estimates of GPO for 62 industries and 4 government classifications (Federal general government and government enterprises and State and local general government and government enterprises). These estimates indicate the industry shares of current-dollar GDP, the composition of current-dollar GPO, and the relative performance of industries in terms of quantity indexes. In addition, the Bureau prepares estimates of the contributions to the change in real GDP by industry groups, because measures based on chained dollars are not additive and because the associated contributions to the change in real GDP can be misleading for years far from the reference year. The integrated set of estimates also includes estimates of current-dollar GPO by detailed income component; estimates of current-dollar and real gross output and intermediate inputs for industries; and price measures for GPO, gross output, and intermediate inputs. Among the improvements that have been made to the GPO estimates in recent years in order to increase their accuracy, reliability, and

relevancy, three are noted below.

**Greater relevance from more timely estimates** .–To increase the relevancy–or timeliness–of the GPO estimates, beginning with the annual update published in November 1997, preliminary estimates for a year are now released within 11 months.<sup>5</sup>

**Greater relevance from enhanced analytical framework** .–Price and quantity chain indexes have been developed for gross output and intermediate inputs of all covered industries. As a result of this work, a consistent framework now is available for analyzing nominal changes in industry GPO. Specifically, nominal GPO changes can now be decomposed into price and quantity components for each industry, and these changes can further be traced to corresponding quantity and/or price changes in gross output and intermediate inputs.<sup>6</sup> This expanded framework makes the GPO estimates more relevant to users by providing a powerful new set of tools to evaluate industry performance and structural change over time.

**Greater accuracy resulting from extension of double-deflation** .–As part of the most recent GPO revision, double-deflation was extended for all industries where it is the preferred method.<sup>7</sup> Because the double-deflation method estimates real GPO as the difference between an industry’s real gross output and real intermediate inputs, it is considered to produce more accurate estimates than alternative GPO estimating methods that rely on assumed relationships between real GPO and employment, real wages and salaries, and similar proxies used to extrapolate GPO from benchmark years. As an added bonus of the extension of the double-deflation method, industry gross output and intermediate inputs–both current dollar and real–are now available for these industries. The availability of these data, in addition to estimates of GPO by industry, greatly expands the types of analyses that can be performed and consequently expands the relevance of these data to users.

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<sup>5</sup> See Sherlene K.S. Lum and Robert E. Yuskavage, “Gross Product by Industry, 1947-96,” Survey 77 (November 1997): 20-34.

<sup>6</sup> See Robert E. Yuskavage, “Gross Product by Industry Price Measures, 1977-96,” Survey 78 (March 1998): 17-25.

<sup>7</sup> Double deflation is not the preferred method for three industries–private households, Federal general government, and State and local general government–for which gross output and GPO are the same.) For more information, see Sherlene K.S. Lum, Brian C. Moyer, and Robert E. Yuskavage, “Improved Estimates of Gross Product by Industry for 1947-98,” Survey 80 (June 2000): 24-54.

## **Future directions for the annual accounts**

Much has been achieved for the annual accounts in recent years, but much else remains to be accomplished.

For both the annual I-O tables and the GPO by industry estimates, we are exploring alternative methods to accelerate their production. Extrapolation techniques based upon more preliminary information are being considered for both areas. Also, we are exploring ways to automate processes, particularly for preparing annual I-O tables. This is particularly important if we move in the future towards maintaining an estimation cycle where advance estimates of I-O tables for a given year are later followed by revised and final versions for the same year.

Additional industry detail for services is also a goal for both the annual I-O and GPO programs. Because services represent the part of the economy that is expanding most, the accounts must reflect this change in order to be relevant to the needs of users. Conversion from the SIC system, which was dominated by goods-producing industries, to the new NAICS, which has greatly expanded detail on service-producing industries, will facilitate the attainment of this goal. This conversion from SIC to NAICS, for both the annual I-O tables and GPO estimates, is planned in 2003-04.

Greater consistency between the annual I-O and GPO estimates is also needed in order to improve the accuracy of both, as well as to provide an expanded, integrated framework that is more relevant to the needs of users. Although the two programs use similar source data, different methodologies and assumptions result in different industry estimates.<sup>8</sup> A comparison of their ratios of intermediate inputs to gross output for

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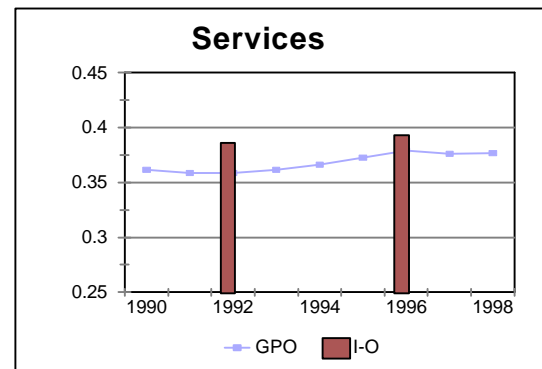
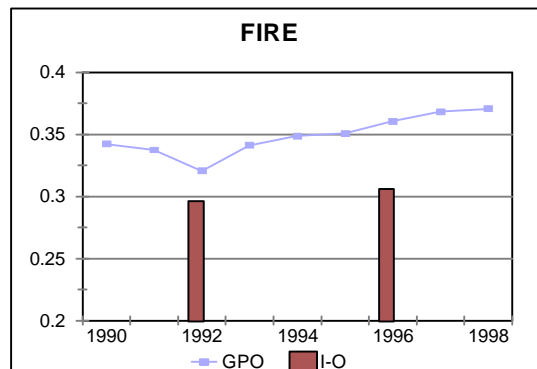
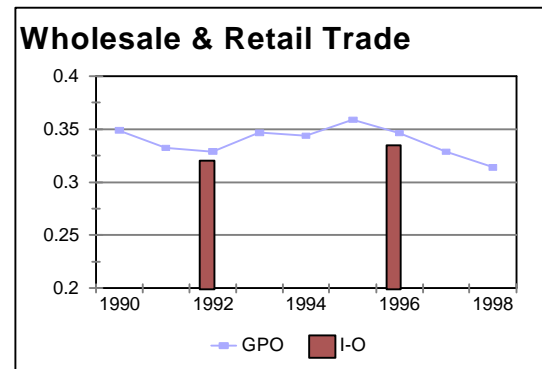
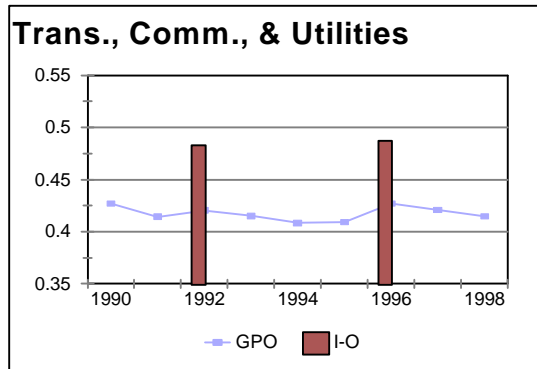
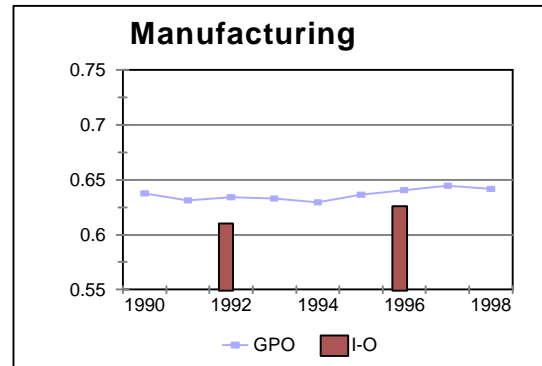
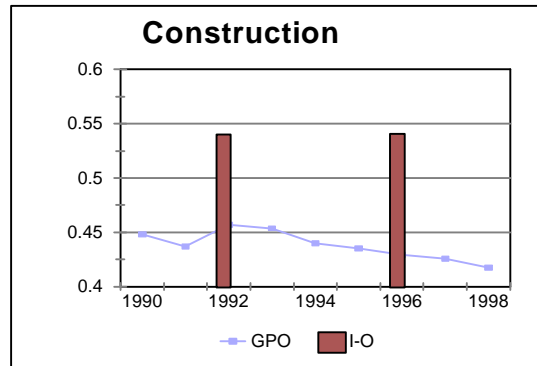
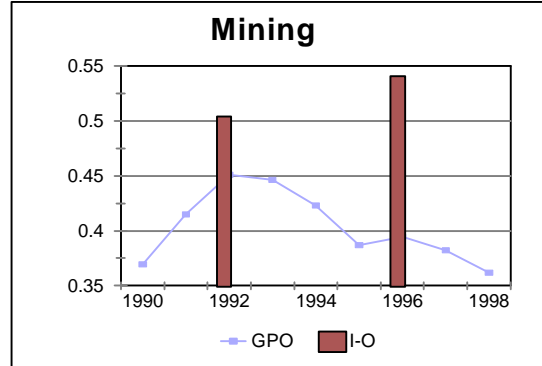
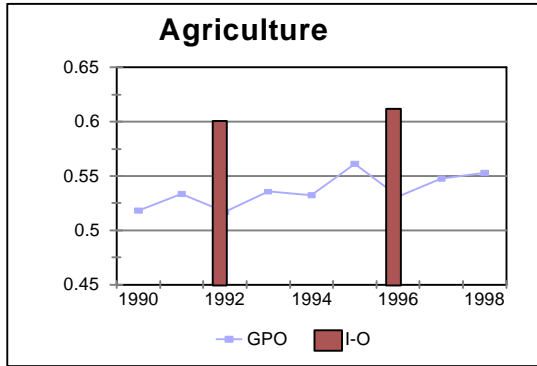
<sup>8</sup> The methodologies are based upon different assumptions about industry production functions. The result is very different estimating methods and treatments of residual estimating errors. Specifically, the annual I-O estimates are based upon the assumption that industries operate in such a way that relatively constant relationships are maintained between their gross output levels and their consumption of intermediate and value added inputs. Because information to build annual I-O tables is sparse, an industry's gross output is estimated first, followed by estimates of the industry's intermediate inputs, which are based upon relatively fixed relationships, and then the industry's value added is estimated as the difference. In contrast, the method used to prepare the GPO by industry estimates assumes that the relationship between an industry's gross output and intermediate inputs can vary from year to year. Specifically, gross output and value added (or GPO) are first estimated for an industry, and then the

industries over time highlights some of the biggest differences. (See charts 3A-F for a comparison of intermediate inputs to gross output ratios for eight major industry groups from the 1992 benchmark I-O accounts and the 1996 annual I-O tables with similar ratios for the 1990-98 period from the GPO by industry estimates; more detailed information on the range of ratio values for individual GPO industries over the same period is provided in table 1). Some differences are accounted for by the different treatment of own-account construction and inventory valuation adjustments. In the case of own-account construction, differences will be eliminated following changes that are being introduced into the 1997 benchmark I-O accounts described above. However, additional research is needed to determine the relative strengths and limitations of the alternative methodologies, and the implications for statistical adjustments. For example, the annual I-O estimates of intermediate inputs by industry and the GPO estimates of property-type income by industry both have limitations that affect the reliability of the estimates. A comparison of each may provide clues about where adjustments are needed.

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industry's total intermediate inputs is calculated as the difference.

**Chart 3.—Comparison of I-O and GPO Ratios of Intermediate Inputs to Gross Output**



Agriculture = Agriculture, forestry, and fishing  
 FIRE = Finance, insurance, and real estate

**Table 1.--GPO Industries Ranked by Magnitude of Change in Ratios of Intermediate Inputs to Gross Output, 1990-98**

<b>Industries</b>	<b>Average Ratio</b>	<b>Minimum Ratio (1990-1998)</b>	<b>Maximum Ratio (1990-1998)</b>	<b>Difference (Max. - Min.)</b>
Pipelines, except natural gas	0.278	0.127	0.423	0.296
Security and commodity brokers	0.400	0.301	0.539	0.238
Nondepository institutions	0.536	0.430	0.645	0.214
Radio and television	0.372	0.283	0.454	0.171
Nonmetallic minerals, except fuels	0.428	0.336	0.486	0.150
Transportation by air	0.424	0.356	0.502	0.146
Local and interurban passenger transit	0.454	0.379	0.523	0.145
Insurance carriers	0.552	0.504	0.643	0.138
Oil and gas extraction	0.340	0.281	0.409	0.128
Leather and leather products	0.474	0.411	0.535	0.123
Electronic and other electric equipment	0.487	0.426	0.541	0.115
Transportation services	0.315	0.258	0.372	0.114
Industrial machinery and equipment	0.594	0.531	0.644	0.113
Government enterprises (Federal)	0.201	0.154	0.265	0.111
Holding and other investment offices	0.681	0.639	0.725	0.086
Depository institutions	0.281	0.236	0.322	0.085
Motor vehicles and equipment	0.727	0.695	0.780	0.084
Amusement and recreation services	0.438	0.390	0.474	0.084
Railroad transportation	0.406	0.359	0.441	0.082
Other transportation equipment	0.625	0.588	0.668	0.080
Legal services	0.225	0.191	0.270	0.079
Telephone and telegraph	0.348	0.315	0.393	0.078
Personal services	0.414	0.375	0.448	0.074
Agricultural services, forestry, and fishing	0.289	0.243	0.314	0.072
Wholesale trade	0.317	0.282	0.349	0.067
Instruments and related products	0.637	0.606	0.672	0.066
Other real estate	0.567	0.534	0.600	0.066
Auto repair, services, and parking	0.430	0.384	0.450	0.065
Social services	0.494	0.468	0.533	0.065
Miscellaneous repair services	0.522	0.488	0.552	0.064
Apparel and other textile products	0.632	0.611	0.673	0.062
Farms	0.598	0.570	0.630	0.060
Metal mining	0.531	0.497	0.556	0.059
Textile mill products	0.669	0.636	0.693	0.057
Lumber and wood products	0.602	0.567	0.622	0.055
Motion pictures	0.571	0.548	0.603	0.055
Insurance agents, brokers, and service	0.354	0.337	0.389	0.051
Miscellaneous manufacturing industries	0.512	0.493	0.542	0.049
Tobacco products	0.632	0.606	0.654	0.048
Electric, gas, and sanitary services	0.380	0.352	0.400	0.048
Water transportation	0.643	0.621	0.665	0.044
Chemicals and allied products	0.590	0.572	0.616	0.044
Stone, clay, and glass products	0.576	0.552	0.596	0.044
Other services	0.381	0.360	0.404	0.044
Printing and publishing	0.550	0.532	0.575	0.043
Membership organizations	0.466	0.447	0.489	0.042

<b>Industries</b>	<b>Average Ratio</b>	<b>Minimum Ratio (1990-1998)</b>	<b>Maximum Ratio (1990-1998)</b>	<b>Difference (Max. - Min.)</b>
Petroleum and coal products	0.806	0.783	0.823	0.040
Hotels and other lodging places	0.388	0.367	0.407	0.040
Construction	0.438	0.417	0.457	0.040
Government enterprises (State and Local)	0.516	0.494	0.529	0.035
Rubber and miscellaneous plastics products	0.662	0.647	0.679	0.032
Coal mining	0.593	0.574	0.607	0.032
Trucking and warehousing	0.555	0.540	0.569	0.029
Retail trade	0.354	0.337	0.367	0.029
Business services	0.317	0.301	0.329	0.028
Primary metal industries	0.708	0.698	0.725	0.027
Educational services	0.432	0.423	0.450	0.026
Food and kindred products	0.737	0.723	0.746	0.023
Fabricated metal products	0.564	0.552	0.575	0.023
Paper and allied products	0.655	0.645	0.666	0.022
Furniture and fixtures	0.616	0.605	0.627	0.022
Health services	0.335	0.327	0.344	0.017
Nonfarm housing services	0.129	0.122	0.138	0.017
Private households	0.000	0.000	0.000	0.000
General government (Federal)	0.000	0.000	0.000	0.000
General government (State and Local)	0.000	0.000	0.000	0.000



Greater consistency between the annual I-O and GPO estimates also requires that the statistical discrepancy from the national income and product accounts, which is now explicitly included with private industries in the GPO estimates but not in the annual I-O tables, be addressed. In recent years, on average, the statistical discrepancy has been the equivalent of about one-half percent of GDP. A major strength of the I-O framework as noted above is the discipline that it imposes on the statistical system by forcing industries and commodities—or columns and rows—to balance. Within such a framework (and assuming system stability), an imbalance such as that implied by the GPO statistical discrepancy, indicates that the statistical system has not been allowed to converge to a final solution.

The Bureau has prepared only current dollar annual I-O tables in the past. In the future, preparing chain-dollar annual tables for years close to the base year is something that is a natural extension. To prepare such tables, however, we will need to address the additivity factor created by chained-dollar estimates based on Fisher indexes for years other than the base year. This refers to the fact that the sum of the components, valued in chain dollars, does not necessarily equal the aggregate, also measured in chain dollars, but instead results in the creation of a residual additivity factor.

### **Industry-Based Satellite Accounts**

To provide greater relevancy of the Industry Accounts to our users, a satellite account program was launched in the mid-1990's to supplement the core benchmark and annual programs.<sup>9</sup> The System of National Accounts describes satellite accounts as generally stressing “the need to expand the analytical capacity of national accounting for selected areas of social concern in a flexible manner, without overburdening or disrupting the central system.”<sup>10</sup> Indeed, our experience has shown that in many areas satellite accounts can address questions about activities that the main economic accounts cannot—particularly for activities that occur outside of the traditional marketplace, such as the value of household production, or that do not correspond to accepted accounting conventions for the classification of production and consumption activities, such as travel and tourism.

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<sup>9</sup> The Bureau of Economic Analysis has prepared other satellite accounts as well; for example, see “Integrated Economic and Environmental Satellite Accounts” and “Accounting for Mineral Resources: Issues and BEA’s Initial Estimates,” Survey 74 (April 1994): 33-72; and see “A Satellite Account for Research and Development,” Survey 74 (November 1994): 37-71.

<sup>10</sup> System of National Accounts, 1993, prepared under the auspices of the Inter-Secretariat Working Group on National Accounts, 1993, paragraph 21.4.

Two recent satellite initiatives, both of which are based on the 1992 benchmark input-output accounts, include a transportation satellite account (or TSA) and a travel and tourism satellite account (or TTSA). Both were initially released in 1998 and have been subsequently updated.<sup>11</sup>

**Transportation satellite accounts.**—The U.S. transportation satellite accounts show a detailed picture of transportation services and their role in the U.S. economy for two years, including 1992 and 1996. These accounts were jointly developed by the Bureau of Economic Analysis and the Bureau of Transportation Statistics in the U.S. Department of Transportation in order to more accurately measure the contribution of transportation activities to the U.S. economy. These accounts present estimates of both transportation services that are hired and transportation services that a firm provides for its own use (own account). For many analytical and policy-related purposes, these accounts provide a more relevant picture of the supply and use of transportation services by businesses than the main economic accounts.

The transportation satellite accounts consist of four tables—a make table, a use table, a direct requirements table, and a total requirements table, which are all modeled after the main I-O tables.

**Travel and tourism satellite accounts.**—The U.S. travel and tourism satellite accounts show a detailed picture of the travel and tourism industries and their role in the U.S. economy for years 1992, 1996 and 1997. These accounts were developed by the Bureau, with the support of the Tourism Industries Office of the International Trade Administration, in order to more accurately measure the contribution of travel and tourism to the economy. As in the case of transportation, the travel and tourism satellite accounts were developed for the purpose of providing information that is directly relevant, but not otherwise available, to users.

These accounts present estimates of the expenditures by tourists, or visitors, for 20 types of commodities and estimates of the output of 20 travel and tourism industries. The accounts also present estimates of the income generated by travel and tourism and estimates of employment in the travel and tourism industries.

The travel and tourism satellite accounts show: The total expenditures for travel

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<sup>11</sup> For more information on the transportation satellite account, see “U.S. Transportation Satellite Accounts for 1992,” *Survey* 78 (April 1998): 16-27; and “U.S. Transportation Satellite Accounts for 1996,” *Survey* 80 (May 2000): 14-22. For more information on the travel and tourism satellite accounts, see “U.S. Travel and Tourism Satellite Accounts for 1992,” *Survey* 78 (July 1998): 8-22; and “U.S. Travel and Tourism Satellite Accounts for 1996 and 1997,” *Survey* 80 (July 2000): 8-27.

and tourism by type of traveler; the expenditures for tourism as a share of GDP; the value added by tourism industries; the employment and employee compensation accounted for by the travel and tourism industries; and the demand for tourism (measured by tourists' spending).

### **Future directions for the satellite accounts**

Several proposals have been made for the development of other satellite accounts. Among others, these include satellites for research and development, nonprofit institutions, and e-commerce. For these and many other potential areas, satellite accounts would greatly enhance the relevance of the Industry Accounts by providing important, new information to both public and private decision-makers. The issue is not that we are limited by potential areas for additional satellite development, but rather that we are limited by the availability of resources for such work. Only if we receive additional resources or reduce the size of our commitments to our other two main program areas—the benchmark I-O accounts and the annual accounts—can we reasonably expand in the area of satellite development.

In the area of e-commerce, the Bureau has a proposed budget initiative, yet unfunded, to significantly expand the treatment of e-commerce in all of its accounts, including the Industry Accounts. Unanswered questions that would be addressed include how important is e-business to the rest of the economy? How does e-commerce compare to more traditional business-to-business (B2B) or business-to-consumer (B2C) transactions? How does it affect participating businesses, in particular, their production processes? How is e-commerce affecting the inter-industry or structural relationships within the economy? And how is e-commerce affecting the distribution trade industries? These are questions that the I-O accounts are particularly well suited to answer, and that we hope we will be studying in the future.