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9

# An Integrated BEA/BLS Production Account
## A First Step and Theoretical Considerations

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### 9.1 Introduction

This paper takes the first steps toward shedding light on similarities and differences between output measures produced by the Bureau of Economic Analysis (BEA) and the Bureau of Labor Statistics (BLS). The BEA, the BLS, and the Census Bureau (the Census) work together as partners in the U.S. statistical system to provide a complete picture of U.S. economic activity. The Census collects data on nominal output measures such as sales, shipments, inventories, and investment. The BLS collects data on prices, employment, wages and salaries, and other compensation components. The BEA uses the data collected by the BLS, the Census, and others to construct nominal and real output measures for the economy as a whole (gross domestic product [GDP]), by sector, by industry, and by state, as well as to construct measures of investment, capital stock and income components. The BLS uses its own data, as well as data provided by the BEA, the Census, and others, to estimate productivity.

The BLS productivity statistics, the BEA National Income and Product Accounts (NIPAs), and the BEA industry accounts have evolved over time to meet particular needs. The BLS primarily seeks to achieve maximum reliability in its various measures of productivity and can focus on those in-

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dustries for which measures are quite robust. The BEA strives to provide complete and consistent coverage of the entire economy in the NIPAs. Each agency thus publishes a variety of measures, and each follows procedures that balance a variety of customer requirements. These include the need for timely release of detailed information, for long historical time series, to use the best data sources, and to use assumptions that are consistent with economic theory. In addition, each agency's programs have unique needs, such as the need for national accounting measures that aggregate consistently and the need for productivity statistics that match the coverage of input and output data.

The growth and improvement in each agency's programs, coupled with differences in purpose, have led to cases of overlapping and sometimes different measures for the same industry or sector, both between and within the BEA and BLS.[1] In theory, consistency is possible, but source data fall far short of what would be required. This deficiency is bridged by different assumptions in different measurement programs, leading to inconsistencies. While the agencies have worked hard to avoid duplicative efforts and differences in measures, the competing customer requirements have tended to frustrate efforts to eradicate differences. The differing purposes sometimes lead to differences in definition (such as value added or gross output), coverage (government is omitted from featured aggregate productivity data because output is based on inputs), or methodology (index number formulas used in each program have evolved progressively but sporadically[2]). Differences also arise from choices among alternative and inconsistent sources of underlying data, especially at detailed industry lev-

1. Differences between the BEA and BLS data have led some researchers to construct their own sets of measures, particularly for studying the "new economy" of the late 1990s. For example, Jorgenson (2003) uses a hybrid of BEA and BLS data to construct estimates of productivity. Results of these studies have sometimes differed significantly, depending partly on data sources and the level of detail provided, leading to differing interpretations of the sources of productivity growth. This is even true at the business-sector level. Since 1996, following consultation with the BEA, the BLS has used the product side of the NIPAs rather than the income side for measuring business and nonfarm business-sector productivity. Use of income instead of product-side measures can lead to a different attribution of productivity to industries, as Nordhaus (2002) showed. Triplett and Bosworth have documented how productivity estimates may differ significantly for broad sectors (Triplett and Bosworth 2004) and for individual industries (Bosworth 2003a, 2003b) depending upon whether BEA or BLS data are used. These differences can hinder integrated analysis of the sources of productivity growth, and leave researchers to either choose one set of estimates over the other, or to develop their own estimates.

2. In 1983, the BLS introduced use of a superlative index formula, the Tornqvist index to aggregate components of its multifactor productivity accounts. This choice was made because analysts of production functions and productivity typically used that measure. In 1996, the BEA introduced a Fisher index-number formula to aggregate components of the NIPAs. This choice was made because Fisher price and quantity indexes consistently decompose the nominal change in GDP. Research has consistently shown that the choice between these two superlative price and quantity index formulations makes little difference in practice. We do not discuss this difference further in this chapter.

els. Until the recent NIPA comprehensive revision, moreover, the BEA and BLS defined the business sector differently to suit their particular needs.

The goal of this chapter is to make progress toward improving the accuracy and usefulness of both the BEA and BLS data by taking advantage of the best features of both data sets and to increase the consistency and integration of these data sets. Ultimate success will require continuing efforts aimed at identifying differences, understanding their nature, documenting them, and eliminating them where possible. This goal is part of a broader objective of the BEA to better integrate data sets. For example, the Lawson et al. chapter and the Teplin et al. chapter (chaps. 6 and 11, respectively, in this volume) are other contributions toward this objective.

The chapter begins in section 9.2 by examining the theoretical foundation for a production account that can be used to analyze productivity. It goes on to present an illustrative production account at the major sector level, detailing the relationship between GDP and the major sector estimates to help clarify how the BEA and BLS data relate to each other. While the 1993 System of National Accounts (SNA) includes a production account in its recommendations for economic accounts, it is not one that can be used to construct multifactor productivity (MFP) estimates, primarily because of the absence of a capital services measure.[3] A production account suitable for MFP analysis, however, was constructed by Jorgenson, Gollop, and Fraumeni (1987; hereafter JGF), and it provides the framework for the account presented here.

Next, section 9.3 uses the production account framework to reveal the relationship between GDP and the major-sector estimates. Aggregate production account tables are presented that illustrate how existing BEA and BLS accounts could be better harmonized, thereby providing a crosswalk between the two that could facilitate comprehensive, integrated analysis of growth and productivity. The illustrative set of integrated production accounts, which are presented in nominal and real (1996) dollars, are based on aggregate BEA and BLS data and detailed data underlying the BLS estimates of major-sector MFP. Estimates for private business and for private nonfarm business are the published BLS series.

After presenting the illustrative aggregate integrated production account, in section 9.4 the chapter begins the task of developing a crosswalk between BEA and BLS data by documenting the types of industry output measures produced by each agency, describing the major source data and conceptual and methodological differences, and comparing output measures for both broad and detailed industries. All analysis is undertaken using information that was available in early 2003 before the NIPA comprehensive revision, and that was classified according to the Standard Industrial Classification (SIC) system. Documentation of the existing differ-

3. See Hulten (1995).

ences is the most challenging task undertaken. This analysis does not fully reconcile the differences, but it is a first step toward explaining differences in output measures and in productivity estimates constructed from BEA and BLS data. The final section summarizes and looks to possible future efforts.

## 9.2 A General Formulation of Production Accounts

Production accounts that are suitable for studies of economic growth, productivity, and structural change match outputs with the inputs used to produce them, typically at both the aggregate and the industry levels and frequently for large-sector subaggregates. These accounts must consist of both nominal and real accounts. Aggregation over the cells of the real account is performed using index number formulas with weights from the nominal account. The general formulation, which is presented in matrix form, is an elaboration and refinement of the type of production account proposed by JGF. It is general enough to examine issues related to the scope of the accounts, such as which inputs and outputs to exclude in moving from the aggregate level to a large-sector subaggregate. None of the production accounts that underlie the BLS productivity measures use this general formulation because the large database needed to implement it is unavailable and constructing that database would require many assumptions and additional resources. Accordingly, the following discussion indicates where current practice significantly departs from the general formulation.

### 9.2.1 The Nominal Production Account

*Valuing Intermediate Input: Flows of Commodities between Industries*

Assume that there are *m* "commodities" made in an economy or a large sector of an economy. Each "commodity" represents some category of goods or service that is sold for some value. In this model, the categories would ideally be "fine enough" that each represents a homogeneous commodity. Of course, due to data limitations, real-world accounts must settle for "as fine as possible." Suppose further that there are *n* industries and that each industry uses labor, capital, and purchased commodities (both domestically and foreign produced) to create one or more commodities of its own. Each establishment is assumed to be classified to an industry by its "primary" product—the commodity accounting for the largest share of its sales. Other commodities produced by establishments in an industry are considered "secondary" products. Let

$\mathbf{VM}_{i,j}$ = the value of the *i*th commodity made by the *j*th industry, and

$\mathbf{VU}_{i,k}$ = the value of the *i*th domestically produced commodity used by the *k*th industry.

In the context of the total economy, the matrix **VU** is the core of an input-output "use" table. Each row describes the disposition of a commodity type, while each column describes commodities used by an industry. The matrix **VM** corresponds to a complete "make" table. In the United States, benchmark "make and use" tables are created once every five years by the BEA, when data from the economic censuses are collected. In these years, fairly extensive data are collected on the values of commodities by type that are made and used by each establishment, particularly in manufacturing. These tables, supplemented with other data, are used by the BEA to benchmark GDP and other important series.

In this general formulation, a key matrix of the nominal production account, which is similar to the "use" table but has a separate row for each commodity produced by each given industry, is

$\mathbf{VN}_{i,j,k}$ = value of the $i$th type of commodity made by the $j$th industry and used by the $k$th industry.

**VN** is depicted in figure 9.1. A row is reserved for each $i, j$ combination that is nonzero at any point in time. In the example shown the first industry ($j = 1$) produces two commodities: commodities 1 ($i = 1$) and 2 ($i = 2$), and the second industry ($j = 2$) produces three commodities: commodities 2 ($i = 2$), 4 ($i = 4$), and 5 ($i = 5$). **VN** records the values of the commodities used by each industry both by the industry source and by the type of commodity. **VN** resembles a "use" table, but contains the additional information on secondary products needed to rearrange the rows and to group inputs by producing industry instead of by commodity.[4] While doing that, **VN** also represents all of the information on the commodity mix of inputs obtained from each industry, which ideally would be available for creating the real production account in order to define deflation of industry inputs in terms of commodity price indexes.[5]

Like the use table, the new table, **VN**, excludes capital goods, produced in one industry and sold to a second industry, as inputs to the second. As in national accounting, production accounts treat capital goods as final outputs of the economy that enter the "capital stock" and provide input "services" in subsequent periods.

**VN** is a matrix that allows the accounting structure to be readily adapted to construction of different aggregate sectors, such as the "total economy" or the "private business" sector (section 9.2.3). **VN** is a matrix of intrasec-

4. Currently the type of data needed to track commodities in this kind of detail is not available. However, the BEA has developed alternative tables showing commodities used by each industry, on the one hand, and the industry origins of commodities on the other. The assumptions involved in moving secondary products to get from one type of table to the other are explored by Guo, Lawson, and Planting (2002).

5. The detailed information to measure each cell of **VN** is not available, but existing BEA and BLS real industry output measures make assumptions that effectively estimate this information. For example, the single price index available for a commodity group is applied to all commodities of that type, regardless of industry source.

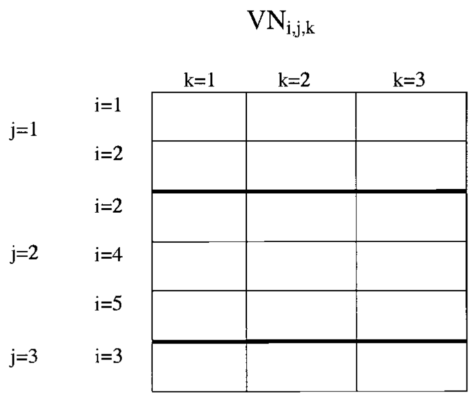


**Fig. 9.1 Matrix of flows of intermediate inputs between industries**
*Note:* This is a schematic of the matrix (**VN**) of intrasectoral sales (from *j* to *k*) of commodities (*i*).

toral transactions; that is, it includes only transactions in intermediate inputs that are traded among industries in the sector being analyzed. For example, purchases from businesses by governments or nonprofit institutions, which are intrasectoral transactions for the total economy, would move outside of **VN** when private business is analyzed.

*Value of Sector Output and Costs of Factor Input*

Assume that each commodity made is sold either to another industry within the sector for use as an intermediate input or is sold outside of the sector, including to industries and sectors outside the sector and to final uses such as personal consumption or investment. As with a "use" table, we can append a column, **VS**, just to the right of **VN** (see figure 9.2), indicating the value of outputs that are sold outside of the sector being analyzed:

$\mathbf{VS}_{i,j}$ = value of sales outside the sector of the *i*th commodity made in the *j*th industry.

In addition, "sectoral output" will be defined as the total output sold outside of the sector being analyzed,[6] and defined as $\mathbf{VS}_T = \Sigma_{i=1}^{m} \Sigma_{j=1}^{n} \mathbf{VS}_{i,j}$, where $m$ is the number of commodities and $n$ is the number of industries. ($\mathbf{VS}_T$ is not depicted in figure 9.2, but it would be the sum of all cells of $\mathbf{VS}_{i,j}$.) The sum of $\mathbf{VN}_{i,j,k}$ and $\mathbf{VS}_{i,j}$ is depicted in figure 9.2 as a vector of length $i \times j$ totaling the value of each commodity type made by each industry:

6. Section 9.4 of this chapter will present industry "gross output" $\mathbf{VY}^{G}_{i,j}$ and "sectoral output" $\mathbf{VY}^{S}_{i,j}$ measures. The BEA and BLS refer to output as gross output and sectoral output, respectively, to distinguish these constructs from value added, a convention adopted in this chapter. Gross output includes intrasectoral sales; sectoral output excludes intrasectoral sales.

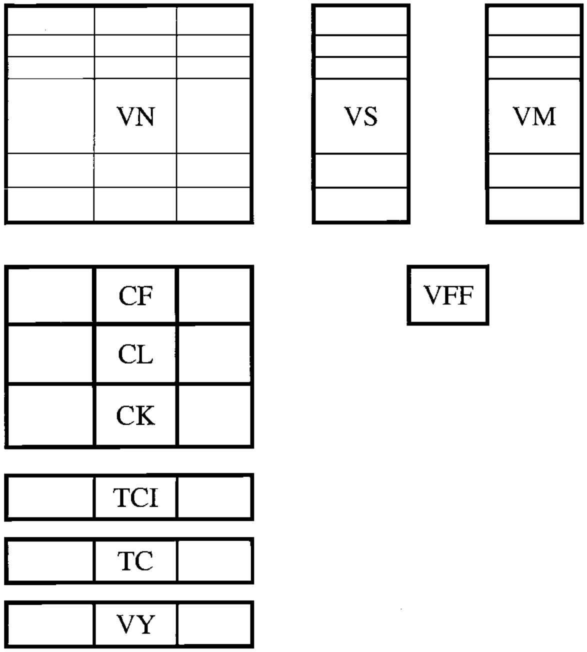


**Fig. 9.2 The nominal production account**

$$\sum_{k=1}^{n} \mathbf{VN}_{i,j,k} + \mathbf{VS}_{i,j} = \mathbf{VM}_{i,j}.$$

This matrix, $\mathbf{VM}_{i,j}$, corresponds to the total industry output column of a typical make table, with more detail added as there is a separate entry for how much of each commodity is made in each industry.

This matrix is appended to the far right of figure 9.2. Next, the total value of industry output, $\mathbf{VY}_j$, for each industry, $j$, is the total value of all of the commodities it makes:

$$\mathbf{VY}_j = \sum_{i=1}^{m} \mathbf{VM}_{i,j} = \sum_{i=1}^{m} \left( \sum_{k=1}^{n} \mathbf{VN}_{i,j,k} + \mathbf{VS}_{i,j} \right).$$

Note that **VY** is grouped by making industry, $j$, not by using industry, $k$. The vector **VY** is too small to be appended as a column. However, it does have the right dimension to be appended as a row. It is placed at the far bottom, below **VN**, where its usefulness will become apparent shortly.

In figure 9.2 rows are appended immediately below the intrasectoral transactions table, **VN**, indicating costs of primary factors used by industry $k$:[7]

7. In table 9.1 these are called labor compensation and costs of capital services, respectively.

$$\mathbf{CL}_k = \text{labor costs of the } k\text{th industry}$$

$$\mathbf{CK}_k = \text{capital costs of the } k\text{th industry.}$$

Capital costs, **CK**, are the implicit costs of using the capital stock in the current period, and not the costs for purchasing capital goods; that is, they are not investments. Capital stock itself is not represented in this matrix model. Industries add to the capital stock (investments, a part of final uses) and derive services from the existing capital stock. Investment as a delivery to outside of the sector is part of **VS**, and capital input rentals are treated as coming from outside of the sector.[8]

Next we define the total cost of all inputs, $\mathbf{TCI}_k$, to include the intrasectoral purchases of materials and services and also the expenses for the "primary" factors of capital and labor,

$$\mathbf{TCI}_k = \sum_{i=1}^{m}\sum_{j=1}^{n}\mathbf{VN}_{i,j,k} + \mathbf{CL}_k + \mathbf{CK}_k.$$

Then **TCI** is appended to **VN** as a row, just below **CL** and **CK**, but just above the final row, **VY** (see figure 9.2). Factor costs include some indirect business taxes assigned to a specific factor cost, such as business property taxes and business motor vehicle licenses. Total costs, $\mathbf{TC}_k$, is defined to include any other indirect business taxes less subsidies, $\mathbf{SUB}_k$, less subsidies that are not assigned to any specific factor of production, $\mathbf{OIBT}_k$; that is,

$$\mathbf{TC}_k = \mathbf{TCI}_k + -(\mathbf{SUB}_k - \mathbf{OIBT}_k).$$

A fundamental of cost accounting is that profits are the difference between revenues and costs. Similarly, national accounts fully account for revenues in terms of costs and profits. The nominal production account will adopt this treatment, imposing an identity between the value of each industry $k$'s output, $\mathbf{VY}_k$, and total costs, $\mathbf{TC}_k$. In practice, the assumption is imposed either by identifying capital costs with "residual property income":

$$\mathbf{CK}_k = \mathbf{VY}_k - \mathbf{CL}_k - \sum_{i=1}^{m}\sum_{j=1}^{n}\mathbf{VN}_{i,j,k} - \mathbf{OIBT}_k + \mathbf{SUB}_k,$$

or by measuring the value of output in terms of total factor outlays and indirect taxes:

$$\mathbf{VY}_k = \mathbf{CK}_k + \mathbf{CL}_k + \sum_{i=1}^{m}\sum_{j=1}^{n}\mathbf{VN}_{i,j,k} + \mathbf{OIBT}_k - \mathbf{SUB}_k.$$

8. A firm usually owns its own capital, in which case capital services are treated as flowing in from outside the sector (from the capital stock) similar to labor services. For cases where a firm in one industry leases an asset to another firm with an operating lease, capital services are treated as an input (**CK**) to the leasing industry and then are recorded in **VN** or **VS** as a flow of intermediate services from the leasing industry to the using industry. The BEA classifies an asset as being in the possession of the lessee (user) for capital leases and in the possession of the lessor for operating leases.

The residual property income method is used by national accountants for industries that sell products in markets, allowing **VY** to be measured in terms of revenues. This method was introduced into productivity work by Jorgenson and Griliches (1967; hereafter JG), who identified this residual measure of capital costs with the implicit rents of capital. In long-run competitive equilibrium, firms presumably earn a fair return to investments. Under these conditions, profits can be regarded as part of the cost of capital, along with interest, depreciation, and taxes.

Output is valued in terms of factor costs by national accountants for industries and sectors, such as governments and nonprofit institutions, that do not sell in markets. This requires an explicit estimate of capital costs. The accounting procedures prescribed in the 1993 System of National Accounts (United Nations et al. 1993; hereafter SNA93) for government "product" reflect only labor costs, omitting capital costs. The U.S. BEA and others in the international community have recently included estimates of capital consumption (depreciation), along with labor costs, in government product estimates. JG showed that the rental cost for capital will include both depreciation and returns to the initial investment. While we cannot directly measure returns to government capital, government investments do compete for funds with private investments. Moulton (2004) has suggested the further step of including some empirical estimate of real returns to government capital in government product.

*Imports in the Nominal Production Account*

Each row of an input-output "use" table records the disposition of a given type of commodity. In addition to the intermediate transactions table, **VU**, there are appended columns indicating specific "final uses." Among the final use columns, one column, $\mathbf{VF}_i$, records imports of each type of commodity, with negative entries. With this negative import entry, total commodity output, the sum across a row, is equal to domestic output, and the sum of all final uses is equal to GDP. The single-column treatment of imports does not distinguish how much of the imports went to intermediate uses and how much went to final uses. It is unnecessary to distinguish this when computing GDP because GDP is a measure of domestic product and excludes all intermediates inputs.

In a production account used for productivity measurement it is desirable to match outputs with all inputs, regardless of their source, at each level of aggregation. An architecture that is ideal for productivity measurement would keep inputs and outputs separate, and would not adopt the treatment of imported intermediates as an offset to output, even though this simplification is suitable for measuring product. Imported final commodities should be excluded from sector output, since they are not made inside the sector, but ideally imported intermediate inputs would be included in sector output.

The production account specifications being developed here follow the treatment of imported intermediates proposed by Gollop (1981). First, the intermediate transactions matrix, **VN**, which includes only transactions that are internal to the sector, includes only intermediate inputs obtained from domestic sources. The nominal production account treats the value of imported intermediate inputs as input costs (**CF**) rather than as offsets to the value of output (**VF**). In the production account, each type of imported commodity has its own row, indicating the disposition of the imported portion of that commodity:

$\mathbf{CF}_{i,k}$ = cost of imported commodities of the $i$th type used by the $k$th industry.

These rows are not a part of **VN** but are appended below **VN** in figure 9.2, similar to the rows for labor costs (**CL**) and capital costs (**CK**), which are also inputs purchased from outside the sector. The block of commodity rows for imports, **CF**, is very similar to the blocks of commodity rows for each industry inside the sector, which describe the uses of each type of commodity coming from a given industry source.[9] Imported final products are, of course, excluded from **VS**. In figure 9.2 a small "import" box, $\mathbf{VFF}_i$, is appended that records deliveries of final imported products of type $i$ to domestic final consumption. The entries of **VFF** would be positive but would be omitted in the calculation of sector output by adding up **VS**. For an economy open to trade, sector output includes exports and excludes imported final products. GDP excludes intermediate inputs whether the economy is open or closed, so GDP = $\mathbf{VS}_T - \Sigma_{i=1}^{m} \Sigma_{k=1}^{n} \mathbf{CF}_{i,k}$.[10] Industry gross output, however, includes imported intermediate inputs.

Finally, to inject this treatment into the full model, the formula equating the value of industry output with the cost of factor outlays, presented earlier, needs to be modified to reflect the cost of imported intermediate inputs:

$$\mathbf{TCL}_k = \sum_{i=1}^{m} \sum_{j=1}^{n} \mathbf{VN}_{i,j,k} + \mathbf{CF}_k + \mathbf{CL}_k + \mathbf{CK}_k, \text{ in order to preserve the identity,}$$

$$\mathbf{TC}_k = \mathbf{VY}_k.$$

9. It should be noted that the data currently being collected are insufficient to estimate these new rows.

10. The BLS business, nonfarm business, private business, and private nonfarm business output measures are net of all intermediates including imported intermediates, so, strictly speaking, they are product measures. Gullickson and Harper (1999) pointed out the difference between the BLS MFP measures, and measures based on the sector output concept, as are specified in section 9.2.2, would be tiny. If imported intermediates were included in outputs, they would also need to be included in inputs. They would enter output and input with the same weight, and would approximately offset each other.

### 9.2.2 The Real Production Account

*Real Industry Outputs and Inputs and Their Prices*

In this section, vectors and arrays of growth rate functions are described that parallel the elements of the nominal production account. Each element of the account ($\mathbf{VN}_{i,j,k}$, $\mathbf{VS}_{i,j}$, $\mathbf{CL}_k$, $\mathbf{CF}_k$, and $\mathbf{CK}_k$) is considered to be a function of time rather than an observation for a single period. These functions would be continuous and differentiable in the context of a continuous model, while, for application to discrete data, these are time series. Bold italics are used to refer to the growth rate of a variable: for example, $\boldsymbol{Z} = d \ln z/dt = (dz/dt)/z$ in continuous time, while, for example with a discrete Tornqvist index formulation, $\boldsymbol{Z}$ would refer to $\ln(Z_t) - \ln(Z_{t-1})$. Next, for any element $Z$ it is assumed that either the value of $Z$, VZ, or the cost of $Z$, CZ, is equal to the product of a real quantity ($Z$ without prefix) and a price (PZ). VZ or CZ = $Z \cdot$ PZ. In growth rates, the decomposition is $\boldsymbol{VZ} = \boldsymbol{Z} + \boldsymbol{PZ}$ or $\boldsymbol{CZ} = \boldsymbol{Z} + \boldsymbol{PZ}$.

Price and quantity are defined in line with normal conventions in national accounting and productivity measurement. Time series information on value or cost usually are available for some level of cell detail. Typically we have price indexes for commodities and quantity information for hours worked and capital stock.[11] Prices and quantities may both exist for some cells, but in order to ensure the value-price-quantity relationship price or quantity must be chosen, and the other (price or quantity) is then implicitly determined to ensure that price times quantity equals value. This can also be thought of in terms of growth rates. We define the following terms:

$\boldsymbol{PN}_{i,j,k}$ = the growth rate of the price of the $i$th commodity made in industry $j$ and used by the $k$th industry,

$\boldsymbol{PS}_{i,j}$ = the growth rate of price for sales of the $i$th commodity sold outside the sector,

$\boldsymbol{QL}_k$ = the growth rate of labor hours in the $k$th industry,

$\boldsymbol{PF}_{i,k}$ = the growth rate of the price for the $i$th imported commodity paid by the $k$th industry, and

$\boldsymbol{QK}_k$ = the growth rate of the stock of capital inputs to the $k$th industry.

11. We will just note that, in the productivity work of Jorgenson, Gollop, and Fraumeni (1987) and of BLS (2002), labor and capital inputs, for each industry, are constructed from detailed "types," such as workers with different amounts of education and stocks of high tech assets, other equipment, and buildings. Prices and quantities are estimated for each component and then superlative aggregation procedures are used. This is entirely symmetric with the approach that will be spelled out shortly (in the second subsection of 9.2.2) for aggregating heterogeneous intermediate inputs and heterogeneous outputs.

The growth rate of the other component is determined either by deflating the value with the commodity price or by determining the unit cost of the input; that is,

$\boldsymbol{N}_{i,j,k} = \boldsymbol{VN}_{i,j,k} - \boldsymbol{PN}_{i,j,k}$ (intermediate outputs/inputs),

$\boldsymbol{S}_{i,j} = \boldsymbol{VS}_{i,j} - \boldsymbol{PS}_{i,j}$ (industry outputs of the commodity delivered outside the sector),

$\boldsymbol{PL}_{k} = \boldsymbol{CL}_{k} - \boldsymbol{L}_{k}$ (average compensation per hour),

$\boldsymbol{F}_{i,k} = \boldsymbol{CF}_{i,k} - \boldsymbol{PF}_{i,k}$ (imported intermediate input), and

$\boldsymbol{PK}_{k} = \boldsymbol{CK}_{k} - \boldsymbol{K}_{k}$ (capital rental price).

*Industry Accounting: Aggregation of Real Inputs and Real Outputs, and MFP*

The solution to the standard economic index number problem is to use values to add up heterogeneous quantities, such as apples and oranges. Having estimated the values and the quantity and price trends for numerous detailed cells representing heterogeneous outputs and inputs, it is now easy to spell out the various real aggregations needed to complete the real production account.

The growth rate of total input, $I_k$, for industry $k$ is derived using weights from column $k$ of the nominal production account together with corresponding quantity growth rate functions:

$$\boldsymbol{I}_k = \left(\frac{\mathbf{CL}_k}{\mathbf{TCI}_k}\right)\boldsymbol{L}_k + \sum_{i=1}^{m}\left(\frac{\mathbf{CF}_{i,k}}{\mathbf{TCI}_k}\right)\boldsymbol{F}_{i,k} + \left(\frac{\mathbf{CK}_k}{\mathbf{TCI}_k}\right)\boldsymbol{K}_k + \sum_{i=1}^{m}\sum_{j=1}^{n}\left(\frac{\mathbf{VN}_{i,j,k}}{\mathbf{TCI}_k}\right)\mathbf{N}_{i,j,k}.$$

This formula defines the growth rate of the input function at a specific point in time.[12] Similarly, the industry's real output is aggregated in conformity with a model of joint production. Aggregation is in growth rate form in terms of the commodities the industry makes, aggregated using revenue share weights:

$$\boldsymbol{Y}_j = \sum_{i=1}^{m}\left\{\left[\sum_{k=1}^{n}\left(\frac{\mathbf{VN}_{i,j,k}}{\mathbf{VY}_j}\right)\boldsymbol{N}_{i,j,k}\right] + \left(\frac{\mathbf{VS}_{i,j}}{\mathbf{VY}_j}\right)\boldsymbol{S}_{i,j}\right\}.$$

It is worth emphasizing that, for implementation with discrete data, it is very important to have consistent categories of industries at successive observations. The growth rate of MFP in industry $k$ ($\mathrm{MFP}_k$) is defined in terms of its inputs and its output (matched with itself, industry $k$, not industry $j$):

12. The line integral of this function over time is a Divisia index. A discrete Tornqvist index can be formulated using weights that are arithmetic averages of shares in the two periods being compared. While the formula is a bit harder to describe, it is easy to compute a Fisher ideal index from the same information.

$$\boldsymbol{MFP}_k = \boldsymbol{Y}_k - \boldsymbol{I}_k.$$

*Sectoral Accounting: Aggregation across Industries*

The macroeconomics literature of the 1950s and 1960s emphasized aggregate production models that described the generation of GDP from a few aggregate factors of production. Such a model can provide a formal framework[13] within which we can consider how best to define inputs and outputs to measure a sector's productivity. Real sectoral output for an economy or sector is the total of outputs, delivered by each industry, that are sold outside of the economy or sector. When the joint production model is applied to the sector, the sector is viewed as if it were a firm choosing an output mix, and then it can be shown that aggregation should be done using revenue share weights:

$$\boldsymbol{S}_T = \sum_{k=1}^{m}\left(\frac{\mathbf{VS}_k}{\mathbf{VS}_T}\right)\boldsymbol{S}_k.$$

An aggregate production model can also be used to rationalize aggregation of each type of input across industries, again using industry shares in total cost:

$$\boldsymbol{L}_T = \sum_{k=1}^{n}\left(\frac{\mathbf{CL}_k}{\mathbf{CL}_T}\right)\boldsymbol{L}_k \qquad \text{where } \mathbf{CL}_T = \sum_{k=1}^{n}\mathbf{CL}_k,$$

$$\boldsymbol{F}_T = \sum_{i=1}^{m}\sum_{k=1}^{n}\left(\frac{\mathbf{CF}_{i,k}}{\mathbf{CF}_T}\right)\boldsymbol{F}_j \quad \text{where } \mathbf{CF}_T = \sum_{i=1}^{m}\sum_{k=1}^{n}\mathbf{CF}_{i,k}, \text{ and}$$

$$\boldsymbol{K}_T = \sum_{k=1}^{n}\left(\frac{\mathbf{CK}_k}{\mathbf{CK}_T}\right)\boldsymbol{K}_k \qquad \text{where } \mathbf{CK}_T = \sum_{k=1}^{n}\mathbf{CK}_k.$$

We then aggregate these inputs across types of input to get a measure of the "sectoral input"—that is, the input to the economy or sector from outside sources:

$$\boldsymbol{I}_T = \left(\frac{\mathbf{CL}_T}{\mathbf{TCI}_T}\right)\boldsymbol{L}_T + \left(\frac{\mathbf{CF}_T}{\mathbf{TCI}_T}\right)\boldsymbol{F}_T + \left(\frac{\mathbf{CK}_T}{\mathbf{TCI}_T}\right)\boldsymbol{K}_T,$$

$$\text{where } \mathbf{TCI}_T = \mathbf{CL}_T + \mathbf{CF}_T + \mathbf{CK}_T.$$

Based on these we obtain a measure of aggregate MFP:

13. A central element of these models is an aggregate production function. This function describes the production of the economy as if it were operated as a single giant firm. To measure productivity in this tradition, one applies the joint production model to the final outputs and primary inputs of the economy while assuming their prices are exogenously determined. The optimum flows of intermediates are not explicitly modeled, but rather presumed to be efficiently determined inside the economy. (Gullickson and Harper [1999] described this as treating the intermediates as if they were inside the firm's "black box.")

$$\boldsymbol{MFP}_T = \boldsymbol{S}_T - \boldsymbol{I}_T.$$

Note that GDP differs from sectoral output in that it excludes imported intermediate inputs. $\boldsymbol{MFP}_T$ treats imported intermediate inputs as an additional input rather than an exclusion from output.[14]

*The Relationship of Industry and Aggregate Productivity Measures*

Evsey Domar's (1961) key result was to show the relationship of this measure to the industry MFP trends:

$$\boldsymbol{MFP}_T = \sum_{j=1}^{n}\left(\frac{\mathbf{VY}_j}{\mathbf{VS}_T}\right)\boldsymbol{MFP}_j.$$

The individual terms in this sum represent individual industry contributions to aggregate MFP. Now the sum of these weights exceeds 1.00:

$$\sum_{j=1}^{n}\left(\frac{\mathbf{VY}_j}{\mathbf{VS}_T}\right) = 1.00 + \sum_{j=1}^{n}\sum_{i=1}^{m}\frac{\mathbf{VN}_{i,j,k}}{\mathbf{VS}_T}.$$

This may seem counterintuitive, but intermediate transactions contribute to aggregate productivity by allowing productivity gains in successive industries to augment one another.[15]

However, Domar effectively assumed that the value of output equals the total cost of factor inputs. In the BLS aggregate MFP work and in section 9.3.1 of this chapter, business, property taxes, and business motor vehicle fees are assigned to capital costs, but other indirect business taxes are not assigned to any specific factor of production. Subsidies are also unassigned to input factors, and are included in TC with a negative sign. Production theory would recommend this treatment for taxes and subsidies that do not affect firms' costs for specific factors. The treatment parallels that of the BLS MFP work. In this context,

$$\begin{aligned}\boldsymbol{MFP}_T &= \sum_{j=1}^{n}\left(\frac{\mathbf{VY}_j}{\mathbf{VS}_T}\right)\boldsymbol{MFP}_j - \sum_{j=1}^{n}\left(\frac{\mathbf{OIBT}_j - \mathbf{SUB}_j}{\mathbf{VS}_T}\right)\boldsymbol{I}_j \\ &= \sum_{j=1}^{n}\left(\frac{\mathbf{VY}_j}{\mathbf{VS}_T}\right)\boldsymbol{S}_j - \sum_{j=1}^{n}\left(\frac{\mathbf{VY}_j + \mathbf{OIBT}_j - \mathbf{SUB}_j}{\mathbf{VS}_T}\right)\boldsymbol{I}_j\end{aligned}$$

14. For its business and nonfarm business-sector MFP measures, BLS output is derived from GDP without restoring $F$, and, in calculating MFP, this is compared to inputs of capital and labor. While the BLS does not employ the sectoral treatment of imported intermediates ($F$), the MFP measures are almost the same as if it did. For the sectoral treatment, $F$ would need to be restored to output and included with inputs using the same weight, and as a consequence it would lower the MFP trend just slightly.

15. For example, suppose there is a 1 percent MFP increase in the leather industry and a 1 percent MFP increase in the shoe industry. Further suppose that shoes are the only final good in an economy and that leather represents half the cost of making shoes. Then the economy experiences a 1.5 percent productivity gain as the result of productivity advances in both industries.

Note that if all $\mathbf{OIBT}_j - \mathbf{SUB}_j = 0$, then Domar's equation holds. While perhaps inappropriate, this could be ensured by assigning all of **OIBT** and **SUB** to specific factors' costs. However, if the sum $\text{IBT}_j - \mathbf{SUB}_j$ is positive, and if inputs are growing, then the aggregate MFP trend will be slightly lower than the Domar-weighted average of industry MFP trends.[16] Also note that any other circumstance causing measured factor input costs to differ from the measured value of output in this model, such as a statistical discrepancy, will act like **OIBT** – **SUB** in affecting the relationship between industry and aggregate.[17]

### 9.2.3 Adapting the Account to Different Large Sectors: Total Economy and Business

As indicated in section 9.1, the BEA measures GDP for the "total" economy, while the largest subset of the economy for which the BLS measures MFP is the private business sector.[18] Private business output excludes the following activities from GDP: general government, government enterprises, private households, nonprofit institutions, and the rental value of owner occupied dwellings. The BLS excludes these activities from productivity measures because in most cases inadequate data exists to construct output estimates independently of input costs.[19] The BEA includes these activities in GDP because its goal is to measure all current production in the United States.

The alterations to the nominal production account for the total economy needed to convert the account to one for one of its subsectors, such as business, are described next. The alterations described can be applied to the problem of how to remove an industry or activity from any larger sector's production account. The technique could be applied to removal of a sequence of industries or activities, such as governments and nonprofit institutions, or it could be reversed to understand how to enlarge the sector, perhaps to include selected household activities. The alterations are de-

16. If **OIBT** – **SUB** is typically 7 percent pro rata on the value of industry output, then for each additional percent of input growth, the industry must produce 1.07 percent more output to pay for it. The BLS aggregate MFP measures would exclude the extra .07 percent. In terms of production theory, the .07 is treated as a scale effect that is excluded from the measure of the production function shift, MFP.

17. Note that the BLS has not used the Domar equation to attribute productivity to industries in its publications. However, Gullickson and Harper (2002) did use the Domar equation, in its original form, to compare their exploratory nonmanufacturing industry multifactor productivity estimates to the published BLS aggregate measures.

18. In a later section the relationship between BEA GDP and BEA/BLS private business-sector output is discussed. The BLS's quarterly labor productivity measures refer to the business sector that includes government enterprises.

19. The output values for general government, nonprofit institutions, and rental housing are estimated by identifying them with factor costs. The value of government enterprise output is measured in terms of revenues, but revenues scarcely account for labor costs because capital is heavily subsidized. The prices used to deflate all five types of product are formulated, at least partly, in terms of input costs.

signed to create a complete production account for both sector and subsector, that is, to use the same general equations for measuring real inputs, outputs, and productivity that were developed in sections 9.2.1 and 9.2.2.

The alterations treat the industry, $M$, being removed from the sector as exogenous to the remaining subsector. First the row and column associated with industry $M$ are removed from the matrix **VN**. When the column (industry $M$'s costs) is removed from **VN**, the labor and capital inputs purchased by $M$ will vanish from the account altogether, as depicted in figure 9.3. However, the intermediate inputs purchased by industry $M$ ($\mathbf{VN}_{i,j,M}$) become sector outputs of the remaining subsector. The column of the larger sector's outputs, **VS**, is replaced with a column of the subsector's outputs, **VSX**, where $\mathbf{VSX}_{i,j} = \mathbf{VS}_{i,j} + \mathbf{VN}_{i,j,M}$ (for all $j \neq m$). The output rows associated with industry $M$, $\mathbf{VN}_{i,M,k}$, are removed from **VN** but are appended below as rows of commodity costs, similar to the treatment of imports. A block of exogenous cost rows, $C_{i,M,k}$, one for each commodity $i$

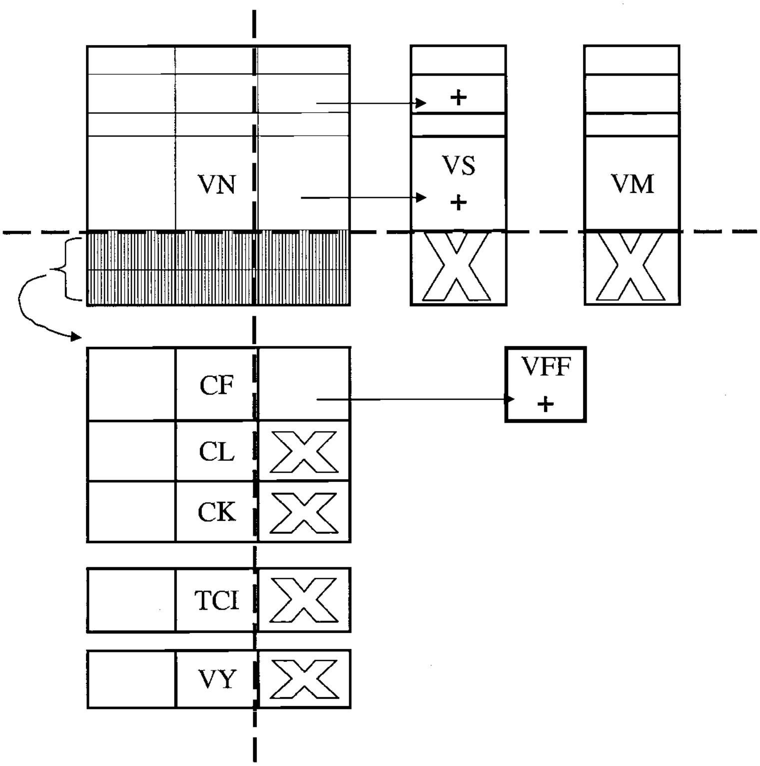


**Fig. 9.3 Modifications of the nominal production account to address a subsector, such as the business sector of the total economy**

that industry $M$ produces, is created to show which industries $k$ are buying the commodities. The flexible scope of this formulation of production accounts will facilitate determining how to treat various outputs and inputs as emphasis shifts from the total economy to a major subsector, such as private nonfarm business or manufacturing.

## 9.3 Illustrative Integrated Production Account

The U.S. statistical system is largely decentralized. Production data come from three statistical agencies—the BEA, the BLS, and the Census—as well as from other sources. Accordingly, constructing an integrated aggregate production account requires an interagency joint effort, which the BEA and BLS have undertaken. Most of the aggregate production data are either compiled by the BLS or are compiled by BEA and then used by BLS for its MFP estimates. This section first discusses the productivity-related estimates produced by the BEA and BLS, and the source data underlying those estimates. It then presents the illustrative aggregate production account and briefly analyzes the components of this account.

### 9.3.1 An Aggregate Production Account

Table 9.1 presents the illustrative aggregate production account for 1996.[20] This account shows the relationship between GDP and the two major sectors for which the BLS provides estimates of MFP: the private business sector and the private nonfarm business sector. Estimates are in billions of dollars; since 1996 is the base year the nominal dollar value is equal to the real value for that year.

The historical data presented in this section and in the rest of the chapter were considered current by both the BEA and the BLS between April 8, 2003, and September 17, 2003. They predate the BEA comprehensive revision to the NIPAs of December 2003 and the corresponding revision to the BLS Productivity and Cost series. The industry data presented in section 9.4 are all on an SIC basis and predate the switching of any of the BEA or BLS industry output and productivity series to the North American Industrial Classification System (NAICS). Some of the detailed industry data have become available on a NAICS basis since the cutoff for this chapter.[21]

The data time series for all entries in the table, with the exception of two

20. Note: In table 9.1, MFP refers to BLS Private Business and Private Nonfarm Business MFP. The BLS MFP data, the BEA NIPA data, and the BEA GDP-by-industry data are no longer on the web because more recent versions have become available; however, the data are listed in the appendix.

21. BEA's GDP-by-industry estimates classified on a NAICS basis are available back to 1987 at http://www.bea.gov/bea/dn2/gdpbyind_data.htm. The BLS's industry output and labor productivity estimates classified on a NAICS basis are available back to 1987 at http://www.bls.gov/lpc/iprdata1.htm.

Table 9.1 **Aggregate production account, 1996 (billions of dollars)**

| | |
|---|---|
| 1. *Gross domestic product (NIPA table 1.7, line 1)* | 7813.2 |
| 2. −Households and institutions (NIPA table 1.7, line 7) | 348.6 |
| 2a. Private households (NIPA table 1.7, line 8) | 12.0 |
| 2b. +Nonprofit institutions serving individuals (NIPA table 1.7, line 9) | 336.5 |
| 3. −General government (NIPA table 1.7, line 10) | 908.7 |
| 4. =*Gross domestic business product (NIPA table 1.7, line 2)* | 6556.0 |
| 5. −Owner-occupied housing (NIPA table 8.21, line 172) | 487.1 |
| 6. −Rental value of nonresidential assets owned and used by nonprofit institutions serving individuals (NIPA table 8.21, line 173) | 49.8 |
| 7. =*BEA/BLS business sector output* | 6019.0 |
| 8. −Government enterprises | 111.8 |
| 8a. Federal (BEA GDP by Industry table, line 80) | 54.9 |
| 8b. State and local (BEA GDP by Industry table, line 83) | 56.9 |
| 9. =*BEA/BLS private business sector output* | 5907.2 |
| 9a. Statistical and other discrepancies | 32.7 |
| 9b. +BLS total factor costs plus taxes (MFP table PB1a, current dollar output) | 5874.5 |
| 9b-ii. BLS cost of capital services (MFP table PB1a, capital income) | 1839.8 |
| 9b-ii. BLS labor compensation (MFP table PB1a) | 3600.7 |
| 9b-iii. Indirect business taxes, less portion assigned to capital services, plus subsidies | 434.0 |
| 10. −Farms (NIPA table 1.7, line 6) | 92.2 |
| 11. +Farm space rent for owner-occupied housing (NIPA table 8.21, line 114) | 5.8 |
| 12. Farm intermediate inputs for owner-occupied housing (NIPA table 8.21, line 114) | 1.0 |
| 13. =*BEA/BLS private nonfarm business sector output* | 5819.8 |
| 13a. Statistical and other discrepancies | 32.7 |
| 13b. +BLS total factor costs plus taxes (MFP table NFB1a, current dollar output) | 5787.1 |
| 13b-i. BLS cost of capital services (MFP table NFB1a, capital income) | 1776.1 |
| 13b-ii. BLS labor compensation (MFP table NFB1a, labor compensation) | 3570.8 |
| 13b-iii. Indirect business taxes, less portion assigned to capital services, plus subsidies | 440.2 |

repeated entries, are listed in the data appendix.[22] First, there are two entries labeled "Statistical and Other Discrepancies" (lines 9a and 13a). These entries are at most .1 different from the NIPA statistical discrepancy shown in NIPA table 1.9, line 15. The "other" discrepancy results from the fact that the major-sector MFP estimates are calculated from the bottom up (i.e., from more detailed industry data), while the estimates shown in this table are calculated from the top down (i.e., starting with GDP). As a result, rounding differences between these two approaches are included. Second, there are two entries labeled "Indirect Business Taxes, Less Portion Assigned to Capital Services, Plus Subsidies" (lines 9b-iii and 13b-iii).

Before the December 2003 NIPA comprehensive revision, the BEA defined business product differently than the BLS. This chapter—including table 9.1—uses pre-2003 NIPA comprehensive revision data and defini-

22. All table entries labeled "NIPA" are available from the BEA web site.

tions for MFP estimates. Incorporation of the 2003 comprehensive revision data will not be completed until late 2005. The BLS excludes from business product (line 7) all production by households, nonprofit institutions serving individuals, and general government.[23] Before the comprehensive revision, the BEA included owner-occupied housing (line 5) and the rental value of nonresidential assets owned and used by nonprofit institutions serving persons (line 6) in business product (line 4).[24] Adopting the BLS definition of business product was a strategic decision by the BEA to harmonize the BEA and BLS accounts to facilitate their use.

The most highly aggregated sector for which the BLS estimates MFP is the private business sector, because of the previously noted difficulty of estimating output independently of inputs for the household, nonprofit institutions, and government sectors. Government enterprise product (line 8) from BEA's GDP-by-industry accounts program is deducted from business-sector output to arrive at private business-sector output (line 9). The details under lines 9 and 13 are the input side of the production account for the two major sectors for which the BLS prepares estimates of MFP on an annual basis. Lines 10 through 12 deduct farms from the private business sector to arrive at private nonfarm business-sector output. Farm owner-occupied housing in line 5 excludes intermediate inputs; farms in line 10 include owner-occupied housing and exclude intermediate inputs; and farm space rent for owner-occupied housing in line 11 includes intermediate inputs. The adjustments in lines 11–12 therefore ensure that nothing is subtracted twice and that intermediate inputs are excluded from output.

For many years the BLS has estimated both capital and labor inputs (lines 9b-i and 9b-ii, and lines 13b-i and 13b-ii, respectively) within a production account. The possibility of constructing capital services as a measure of capital input for inclusion in a revised SNA is being discussed for inclusion in international guidelines.[25] The BLS already estimates capital services and was one of the first statistical agencies in the world to do so. The GDP-by-industry accounts program of the BEA provides nominal estimates of labor compensation, property-type income, and indirect business tax and nontax liability by industry. From these estimates, the BLS determines the allocation of proprietor's income between capital and labor income in order to derive nominal capital services using the methodology described above in section 9.2.1. In addition, the BLS determines the amount of indirect business taxes (e.g., business property taxes and business motor vehicle licenses) to be allocated to capital services as shown in table 9.1.

23. Nonprofit institutions serving business are included in business product by both the BEA and BLS; this is a small number.

24. See Moulton and Seskin (2003), p. 29.

25. Discussions are taking place at the meetings of Canberra II, which is a continuation of Canberra I. The latter worked to produce a capital manual as a companion piece to SNA 1993. See OECD (2001) and United Nations et al. (1993).

### 9.3.2 Major Components of the Illustrative Aggregate Production Account

Table 9.2 shows the nominal shares of GDP and the real growth rates for selected components and major sectors (shown in italic) of the illustrative aggregate production account. Although the identifying labels such as "BEA/BLS" are continued from table 9.1, the BEA and BLS estimates may differ. In addition, not all of the components are available for all years 1948–2001, and in some cases 1996 dollar estimates are not directly available for any year on the BEA or BLS web site.[26] Between 1948–73 and 1973–90, the nominal shares of the major sectors (shown in italic) in GDP decreased. This reflects the fact that the nominal share of the GDP components that are excluded from the private business sector increased during 1973–90. For nonprofit institutions serving individuals and owner-occupied housing, the shares continued to rise between 1973–90 and 1990–95, but then are nearly constant. For general government, the share decreased over each of the last three subperiods shown. The government enterprise share varies little over time.

The share of the private nonfarm business sector in GDP declined less than the shares of the other major sectors during 1973–90 and was larger in 2000–2001 than in 1948–73. This is because the farm share of GDP decreased from 6.1 percent in 1948–73 to 0.8 percent in 2000–2001, which offset the increases in the other excluded components. The drop in the farms share is very significant from 1948–73 to 1973–90. While the farms share continued to decline at a rapid rate between 1990–95, 1995–2000, and 2000–2001, the share had become so small that it no longer had much impact on the private nonfarm business share. The share of the private business sector in GDP continued to decline between 1973–90 and 1990–95, but it then returned to the 1973–90 level.

The real growth rates of the major sectors are very similar, differing by at most .2. For the period as a whole and the middle subperiods—1973–90, 1990–95, and 1995–2000—the real rates of growth of the major sectors are higher than the real growth rate of GDP. This is largely because of the lower real growth rates of the two government components. The real growth rates for these components are always below that of GDP with the exception of general government for 2000–2001. In 1948–73, the real growth rates of the major sectors are very similar to that for GDP; in 2000–2001 they are negative while real GDP grew slightly. Nonprofit institutions serving individuals, general government, and owner-occupied housing all grew significantly faster than the major sectors in 2000–2001; these sectors bolstered the growth of real GDP relative to the major sectors. The real growth rate of nonprofit institutions serving individuals is consistently strong compared

26. Implicit deflators were calculated in several cases from figures available on the BEA or BLS web sites.

**Table 9.2** **Major components of the aggregate production account nominal shares and real growth rates**

| | 1948–2001 | | 1948–1973 | | 1973–1990 | | 1990–1995 | | 1995–2000 | | 2000–2001 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Share of GDP | Growth rate (%) | Share of GDP | Growth rate (%) | Share of GDP | Growth rate (%) | Share of GDP | Growth rate (%) | Share of GDP | Growth rate (%) | Share of GDP | Growth rate (%) |
| *BEA gross domestic product* | 1.000 | 3.4 | 1.000 | 4.0 | 1.000 | 2.9 | 1.000 | 2.4 | 1.000 | 4.0 | 1.000 | 0.3 |
| Nonprofit institutions serving individuals | 0.028 | 3.9 | 0.020 | 4.6 | 0.033 | 3.6 | 0.041 | 3.3 | 0.043 | 2.7 | 0.043 | 3.1 |
| General government | 0.107 | 2.1 | 0.118 | 3.0 | 0.129 | 1.6 | 0.122 | 0.3 | 0.115 | 1.1 | 0.112 | 2.1 |
| *BEA gross domestic business product* | 0.859 | 3.6 | 0.856 | 4.1 | 0.835Â | 3.1 | 0.835 | 2.7 | 0.841 | 4.5 | 0.844 | –0.1 |
| Owner-occupied housing | 0.048 | 3.9 | 0.042 | 2.8 | 0.057 | 6.3 | 0.063 | 2.8 | 0.063 | 3.1 | 0.064 | 1.7 |
| *BEA/BLS business-sector output* | 0.807 | 3.6 | 0.811 | 4.0 | 0.772 | 3.1 | 0.766 | 2.8 | 0.772 | 4.7 | 0.774 | –0.2 |
| Government enterprises | 0.012 | 2.2 | 0.012 | 3.2 | 0.014 | 1.3 | 0.015 | –0.05 | 0.014 | 3.4 | 0.014 | –0.9 |
| *BEA/BLS private business-sector output* | 0.795 | 3.6 | 0.799 | 4.0 | 0.758 | 3.1 | 0.752 | 2.8 | 0.758 | 4.7 | 0.760 | –0.2 |
| Farms | 0.047 | 2.2 | 0.061 | 1.1 | 0.025 | 3.3 | 0.012 | 0.3 | 0.009 | 7.1 | 0.008 | –5.1 |
| *BEA/BLS private nonfarm business-sector output* | 0.750 | 3.6 | 0.741 | 4.2 | 0.734 | 3.1 | 0.741 | 2.8 | 0.749 | 4.6 | 0.753 | –0.1 |

*Note:* Shares of GDP are computed as the average of the shares for the first and last years of the period.

to that for GDP, except in 1995–2000. Owner-occupied housing real growth rates show no consistent pattern. The real growth rate for farms is the highest of any sector in 1995–2000, but the lowest of any sector in 2000–2001.

### 9.3.3 BLS Major-Sector MFP Accounts

Table 9.3 focuses on nominal shares and real growth rates for the detailed components of the BLS major-sector MFP accounts. The rates of MFP change are also given.

As expected, the capital services share of nominal output is always about one-third and that of labor input is about two-thirds, but there is some variation in the shares across major sectors and across time. The capital services share is always slightly lower for the private nonfarm business sector than for the private business sector. The trends are similar for the major sectors including and excluding farms. Between 1948–73 and 1973–90 the shares are essentially stable; they increase significantly between 1973–90 and 1990–95, then drop into the second half of the nineties, followed by a more significant drop between 1995–2000 and 2000–2001. The labor input shares are simply a reflection of the capital services shares as the nominal shares always sum to 1.0.

The capital services and labor input real growth rates for private nonfarm business are always equal to or above those for private business. The subperiod differences between the capital services real growth rates of private business and private nonfarm business are equal to or greater than the difference between the labor input real growth rates of these major sectors except in 1948–73. The labor input growth rate difference of .5 in 1948–73 is a very significant difference as it represents a 50 percent increase of the private nonfarm business rate over that for private business. Aside from this subperiod, the difference is no greater than .1 percentage point. Finally, the capital services real growth rate for the periods shown is always greater than the labor input real growth rate for both major sectors.

The rate of MFP change shows trends and relationships documented elsewhere by the BLS and others.[27] The drop between 1948–73 and 1973–90 is often called the "productivity slowdown." The resurgence in 1995–2000 occurs in the subperiod associated with the new economy and is often called the "productivity revival." The negative MFP change in 2000–2001 may be a reflection of the recession dated as beginning in March 2001. In every subperiod, MFP change for the private business sector is equal to, or greater than, that for the private nonfarm business sector, reflecting ongoing strong productivity growth in the farm sector.

27. The rate of MFP change is equal to the growth rate of output minus a weighted growth rate of inputs. The weights are computed from the BLS Factor Cost of Capital Services and BLS Labor Compensation time series (e.g., in table 9.1 lines 9b-i and 9b-ii, and 13b-i and 13b-ii). Accordingly, the statistical and other discrepancies (e.g., lines 9a and 13a in table 9.1) and Indirect Business Taxes, Less Portion Assigned to Capital Services, Plus Subsidies (e.g., lines 9b-iii and 13b-iii) do not enter into the calculation.

**Table 9.3** **BLS private business and private nonfarm business sectors (inputs and rates of multifactor productivity change nominal shares and real growth rates)**

| | 1948–2001 | | 1948–1973 | | 1973–1990 | | 1990–1995 | | 1995–2000 | | 2000–2001 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Share of sector | Growth rate (%) | Share of sector | Growth rate (%) | Share of sector | Growth rate (%) | Share of sector | Growth rate (%) | Share of sector | Growth rate (%) | Share of sector | Growth rate (%) |
| *BEA/BLS private business-sector output* | n.a. | 3.6 | n.a. | 4.0 | n.a. | 3.1 | n.a. | 2.8 | n.a. | 4.7 | n.a. | –0.2 |
| BLS private business-sector input | n.a. | 2.2 | n.a. | 1.8 | n.a. | 2.6 | n.a. | 2.1 | n.a. | 3.3 | n.a. | 0.9 |
| BLS capital services | 0.320 | 3.9 | 0.319 | 3.7 | 0.318 | 4.1 | 0.328 | 2.8 | 0.324 | 5.3 | 0.315 | 4.1 |
| BLS labor input | 0.680 | 1.4 | 0.681 | 1.0 | 0.682 | 1.9 | 0.672 | 1.9 | 0.676 | 2.4 | 0.685 | –0.5 |
| BLS rate of multifactor Productivity change | n.a. | 1.3 | | 2.1 | | 0.5 | | 0.6 | | 1.3 | | –1.0 |
| *BEA/BLS private nonfarm business-sector output* | n.a. | 3.6 | n.a. | 4.2 | n.a. | 3.1 | n.a. | 2.8 | n.a. | 4.6 | n.a. | –0.1 |
| BLS private nonfarm business-sector output | n.a. | 2.5 | n.a. | 2.2 | n.a. | 2.7 | n.a. | 2.2 | n.a. | 3.5 | n.a. | 1.0 |
| BLS capital services | 0.315 | 4.1 | 0.306 | 4.0 | 0.305 | 4.4 | 0.321 | 2.9 | 0.319 | 5.5 | 0.311 | 4.1 |
| BLS labor input | 0.685 | 1.7 | 0.694 | 1.5 | 0.695 | 2.0 | 0.679 | 1.9 | 0.681 | 2.5 | 0.689 | –0.5 |
| BLS rate of multifactor productivity change | n.a. | 1.1 | n.a. | 1.9 | n.a. | 0.3 | n.a. | 0.6 | n.a. | 1.1 | n.a. | –1.0 |

| | 1990–1995 | 1995–2000 | 1995–2000 less 1990–1995 |
|---|---|---|---|
| BEA industry accounts | 2.61 | 5.27 | 2.67 |
| BLS nonfarm business | 2.71 | 4.63 | 1.92 |
| Industry accounts less BLS | –0.11 | 0.64 | 0.75 |
| Statistical discrepancy | 0.05 | 0.46 | 0.41 |
| Definition and coverage | 0.09 | 0.04 | –0.05 |
| Deflation procedures | –0.25 | 0.14 | 0.39 |

*Note:* n.a. = not available.

## 9.4 Comparison of BEA and BLS Output Measures for Sectors and Industries

The BEA and BLS both provide output measures for broad sectors of the economy and for industries that are widely used to study economic growth, productivity, and structural change. Although these output measures are fairly consistent with one another and usually tell similar stories about trends in economic growth, there are some differences. The BEA and BLS have worked closely to achieve consistency. For example, when the BEA introduced annually chained indexes to the NIPAs in 1996, the BLS—after close consultation between the agencies—began to base its productivity measures for the business and nonfarm business sectors on estimates from the product side of the NIPAs.[28] Also around the same time the BEA and BLS worked closely to develop a common set of output price indexes for all manufacturing industries.[29] Each year, the BLS sends the BEA a table of price deflator series for every five-digit product class in manufacturing. While progress has been made, differences remain, especially outside of manufacturing.

Differences in output measures reflect differences in definition, coverage, and methodology that are primarily due to different purposes for the measures. For example, the BEA strives to provide complete and consistent coverage of the entire economy in the NIPAs, whereas the BLS primarily seeks maximum reliability in its various measures of productivity. These differing goals are not necessarily inconsistent with one another, since both require reliable output measures, but they can lead to differences in definition and coverage as well as in methodology. A part of the differences, especially at detailed industry levels, reflects different choices for underlying source data and aggregation techniques. This section describes the key sources of difference among the output measures for major sectors, for broad manufacturing industry groups, and for selected detailed industries in both manufacturing and nonmanufacturing.

The focus in this section of the chapter is on sources of difference in output measures, as it is a useful starting point for comparisons. Tables 9.4 through 9.11 compare growth rates of the BEA and BLS output measures. Most tables present average annual growth rates for 1990–95 and for 1995–2000, and the annual growth rate for 2001, the latest year for which most of the output measures are available. Because of the interest in the acceleration of productivity growth after 1995, and because of the sharp slowdown in growth in 2001, most tables also present the acceleration in average annual output growth between 1990–95 and 1995–2000.

28. The product side differs from the income side of the NIPAs by the statistical discrepancy.

29. The BEA and BLS also met in 2001 to discuss reducing differences for nonmanufacturing industries.

**Table 9.4 Real output for major sectors (average annual growth rates; %)**

| Program/Measure | 1990–1995 (1) | 1995–2000 (2) | 2000–2001 (3) | 1995–2000 less 1990–1995 (2) – (1) |
|---|---|---|---|---|
| *BEA NIPAs* | | | | |
| GDP | 2.38 | 4.03 | 0.25 | 1.65 |
| GDI (excludes SD) | 2.41 | 4.38 | 0.11 | 1.96 |
| Nonfarm business[a] | 2.68 | 4.47 | –0.06 | 1.79 |
| Nonfarm business less housing | 2.74 | 4.72 | –0.09 | 1.98 |
| *BLS* | | | | |
| Nonfarm business[b] | 2.71 | 4.63 | –0.07 | 1.92 |
| Private nonfarm business[b] | 2.79 | 4.64 | –0.08 | 1.86 |
| *BEA industry accounts* | | | | |
| All industries | 2.22 | 4.20 | 0.55 | 1.97 |
| All industries less SD | 2.26 | 4.55 | 0.41 | 2.29 |
| Nonfarm business[c] | 2.56 | 4.85 | 0.45 | 2.28 |
| Nonfarm business less SD[c] | 2.61 | 5.27 | 0.27 | 2.67 |
| Private nonfarm business[c] | 2.62 | 4.86 | 0.47 | 2.24 |
| Private nonfarm business less SD[c] | 2.67 | 5.31 | 0.29 | 2.64 |

[a]Includes all housing.
[b]Includes tenant-occupied housing only.
[c]Excludes all housing.

### 9.4.1 Major Sectors

Tables 9.4 and 9.5 present real and nominal output measures for the entire economy and for major sectors such as nonfarm business and private nonfarm business. These measures are drawn from the BEA's NIPAs, from the BLS major-sector productivity measurement program, and from the BEA's GDP-by-industry accounts. In the NIPAs, real gross domestic income (GDI) accelerates much faster than real GDP in the 1995–2000 period (1.96 vs. 1.65 percentage points) because GDI excludes the statistical discrepancy, which became increasingly negative during the latter part of the 1990s. In the nonfarm business sector, the BEA's NIPA measure accelerates more slowly than the BLS measure (1.79 vs. 1.92 points) because the BEA includes both owner-occupied and tenant-occupied housing services, whereas the BLS includes only tenant-occupied housing.[30] The BEA's measure for nonfarm business less housing accelerates 1.98 points.

Turning to the BEA industry accounts, it is important to note that the value-added output of "All industries" is conceptually equivalent to GDP measured as the sum of final expenditures, and that nominal value-added for "All industries" equals nominal GDP from the NIPAs. As a result, nominal growth rates and their acceleration (or deceleration) are identical

30. Nonfarm owner-occupied housing accounted for 7.5 percent of BEA nonfarm business output in 1996.

**Table 9.5** **Nominal output for major sectors (average annual growth rates; %)**

| Program/Measure | 1990–1995 (1) | 1995–2000 (2) | 2000–2001 (3) | 1995–2000 less 1990–1995 (2) – (1) |
|---|---|---|---|---|
| *BEA NIPAs* | | | | |
| GDP | 4.98 | 5.83 | 2.62 | 0.85 |
| GDI (excludes SD) | 5.02 | 6.18 | 2.47 | 1.16 |
| Nonfarm business[a] | 5.13 | 6.12 | 2.05 | 0.99 |
| Nonfarm less housing | 5.14 | 6.22 | 1.82 | 1.08 |
| *BLS* | | | | |
| Nonfarm business[b] | 5.13 | 6.13 | 1.86 | 1.00 |
| Private nonfarm business[b] | 5.13 | 6.17 | 1.81 | 1.04 |
| *BEA industry accounts* | | | | |
| All industries | 4.98 | 5.83 | 2.62 | 0.85 |
| All industries less SD | 5.02 | 6.18 | 2.47 | 1.16 |
| Nonfarm business[c] | 5.22 | 6.19 | 2.11 | 0.97 |
| Nonfarm business less SD[c] | 5.26 | 6.63 | 1.93 | 1.37 |
| Private nonfarm business[c] | 5.21 | 6.22 | 2.07 | 1.01 |
| Private nonfarm business less SD[c] | 5.26 | 6.67 | 1.89 | 1.42 |

[a]Includes all housing.
[b]Includes tenant-occupied housing only. Nominal measure derived from BEA data.
[c]Excludes all housing.

for "All industries" and for NIPA GDP. (See table 9.5.) Real growth rates can differ substantially, however, because of differences in the source data and deflation procedures used for the two measures. Real output for "All Industries" accelerates much faster than GDP (1.97 points vs. 1.65 points). The faster acceleration for "All industries" represents the combined effects of slower growth in the 1990–95 period and faster growth in the 1995–2000 period.

A difference of comparable magnitude arises between nonfarm business output computed from the BEA's industry accounts and the BLS measure. Although the industry-based measure of nonfarm business is not published by the BEA, some analysts compute it from the published GDP-by-industry data in order to determine industry contributions to nonfarm business growth. Measures that are computed from the BEA's industry accounts data are not exactly equivalent to the BLS measure, however, because tenant-occupied housing services cannot be separately identified in the BEA data; as a result, most analysts exclude all nonfarm housing services. In addition, the industry accounts measure includes nonprofit institutions serving persons, which are excluded from the NIPA and BLS measures.[31]

31. BLS business-sector output excludes the compensation of employees of nonprofit institutions serving persons (line 2b in table 9.1) and the rental value of nonresidential assets

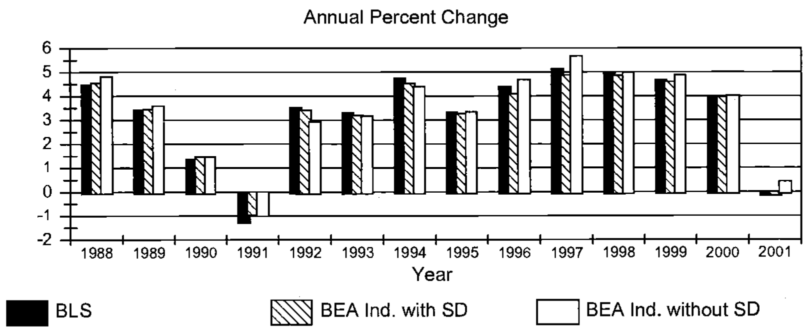


**Fig. 9.4 Real nonfarm business output**

These institutions are embedded in the source data for several industries and cannot be identified separately. Finally, and perhaps most important for recent periods, some analysts exclude the statistical discrepancy from the industry accounts data in order to construct a pure income-side measure, which further widens the gap in real growth rates.

Figure 9.4 shows the annual percent change in selected real output series for nonfarm business output from 1988 to 2001. Annual changes in the BLS series and the BEA industry accounts series with the statistical discrepancy match very closely over the entire period. Changes in the BEA industry accounts series *without* the statistical discrepancy match the other two series closely in some years, but are usually different. Faster growth is most evident in 1997 and 2001.

Acceleration in the BEA industry accounts measure for nonfarm business *excluding* the statistical discrepancy exceeds the BLS nonfarm business measure by 0.75 points (table 9.4: 2.67 vs. 1.92). The exclusion of the statistical discrepancy and differences in deflation procedures contribute roughly equal amounts (0.4 points) to the difference. Differences in definition and coverage (i.e., nonprofit institutions and tenant-occupied housing) are small and on balance reduce the overall difference. The bottom panel of table 9.3 above summarizes an approximate accounting for the sources of difference in average real growth rates and their acceleration (all in percentage points) during the 1990s.

Most of the difference in the acceleration of real output growth is due to the faster growth in the BEA industry accounts measure during 1995–2000 (0.64 points), which is largely due to the exclusion of the statistical discrepancy (0.46 points). Differences in deflation procedures result in slower growth in the industry accounts deflator, which contribute 0.14 points. In

owned and used by nonprofit institutions serving individuals (line 6 in table 9.1). BEA business-sector output excludes only the compensation of employees of these institutions.

the 1990–95 period, the BEA industry accounts measure grows slower than the BLS measure. This slower growth is more than accounted for by the differences in deflation procedures, which contributed –0.25 points because of faster growth in the industry accounts deflator.

Differences in deflation procedures between the measures reflect differences in source data, deflation level of detail, and aggregation methods. Real GDP and NIPA/BLS nonfarm business output are quantity indexes derived by Fisher aggregation over the detailed types of deflated final expenditures. The value-added quantity indexes from BEA's industry accounts are computed using the double-deflation method and Fisher aggregation over the relevant group of industries. The statistical discrepancy is deflated with the BEA's business-sector price index. Compared with the NIPA price indexes, implicit price deflators for "All Industries" and for nonfarm business from the industry accounts increase faster in the 1990–95 period and slower in the 1995–2000 period.

### 9.4.2 Manufacturing Sectors

Tables 9.6 and 9.7 compare real and nominal output growth rates for all manufacturing, durable goods, and nondurable goods. Both tables include the BLS sectoral output measures and the BEA measures for gross output and value added. Table 9.6 also includes the Federal Reserve Board's Industrial Production Index (IPI), which is used in the BLS labor productivity program for quarterly and recent period output estimates. For all of manufacturing, both the BLS sectoral output measure, which excludes intrasectoral transactions, and the BEA gross output measure, which includes intrasectoral transactions and other adjustments, accelerate much less than BLS private nonfarm business. Acceleration is slightly less in the BLS measure than in the BEA measure (1.00 vs. 1.15).

Comparable results also are obtained for the durable goods and nondurable goods subaggregates, with durable goods accelerating more than 2 percentage points and nondurable goods decelerating slightly, according to both measures. Acceleration in the BEA value added measure for manufacturing, which excludes intermediate inputs such as energy, materials, and purchased services, is quite similar to the other measures, but the differences are larger for the subgroups. Durable goods accelerates faster and nondurable goods decelerates faster than in the other output measures. Acceleration in the IPI is much higher (2.67 points on the SIC basis) for manufacturing, primarily because of a much faster acceleration for durable goods.[32] Deceleration for nondurable goods in the IPI is similar to that in the BLS and BEA measures.

Figure 9.5 presents selected series for real manufacturing output from 1987 to 2001. The BLS sectoral output series and the BEA gross output

32. The IPI is provided on both the SIC basis and the NAICS basis for total manufacturing. Durable goods and nondurable goods are provided only on the NAICS basis.

**Table 9.6 Real output for manufacturing (average annual growth rates; %)**

| Program/Measure | 1990–1995 (1) | 1995–2000 (2) | 2000–2001 (3) | 1995–2000 less 1990–1995 (2) – (1) |
|---|---|---|---|---|
| *BLS* | | | | |
| Sectoral output, all manufacturing | 3.11 | 4.11 | –4.83 | 1.00 |
| Durable goods | 3.89 | 6.37 | –6.29 | 2.48 |
| Nondurable goods | 2.28 | 1.51 | –3.13 | –0.78 |
| *BEA* | | | | |
| Gross output, all manufacturing | 3.09 | 4.24 | –6.71 | 1.15 |
| Durable goods | 4.47 | 6.72 | –8.93 | 2.25 |
| Nondurable goods | 1.57 | 1.31 | –4.07 | –0.26 |
| Value added, all manufacturing | 3.11 | 4.30 | –6.00 | 1.18 |
| Durable goods | 4.09 | 7.87 | –5.19 | 3.79 |
| Nondurable goods | 1.86 | –0.44 | –7.12 | –2.29 |
| *FRB IPI* | | | | |
| Manufacturing (SIC) | 3.25 | 5.92 | –4.07 | 2.67 |
| Manufacturing (NAICS) | 3.49 | 6.04 | –4.14 | 2.55 |
| Durable goods (NAICS) | 4.88 | 9.55 | –4.98 | 4.67 |
| Nondurable goods (NAICS) | 1.76 | 1.36 | –3.01 | –0.40 |

**Table 9.7 Nominal output for manufacturing (average annual growth rates; %)**

| Program/Measure | 1990–1995 (1) | 1995–2000 (2) | 2000–2001[a] (3) | 1995–2000 less 1990–1995 (2) – (1) |
|---|---|---|---|---|
| *BLS* | | | | |
| Sectoral output, all manufacturing | 4.10 | 3.99 | n.a. | –0.11 |
| Durable goods | 4.79 | 4.23 | n.a. | –0.56 |
| Nondurable goods | 3.52 | 3.60 | n.a. | 0.08 |
| *BEA* | | | | |
| Gross output, all manufacturing | 4.30 | 3.75 | –7.62 | –0.55 |
| Durable goods | 5.31 | 4.19 | –11.21 | –1.12 |
| Nondurable goods | 3.21 | 3.23 | –3.28 | 0.02 |
| Value added, all manufacturing | 4.38 | 3.35 | –6.40 | –1.02 |
| Durable goods | 4.47 | 3.96 | –8.30 | –0.50 |
| Nondurable goods | 4.26 | 2.54 | –3.74 | –1.72 |

*Note:* Nominal estimates are not available for the FRB IPI.

[a]BLS estimates for 2001 are not available.

(GO) series track one another very closely over the entire period. The IPI series follows the BLS and BEA series very closely through 1997, but then begins to grow faster than the other series after 1997. This divergence is primarily due to much faster growth for durable goods in the FRB series.

Table 9.7 provides some insight into the impact of the definitional and coverage differences between the BEA and BLS output measures, because

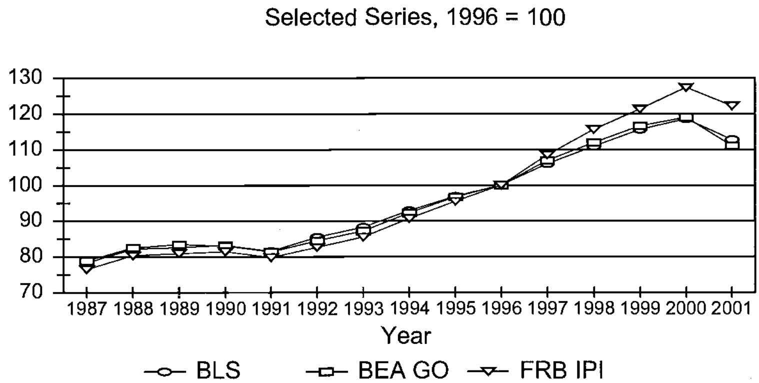


**Fig. 9.5 Real manufacturing output**

nominal estimates are not affected by differences in deflation and aggregation procedures. While differences in levels are not shown here, it is important to note that the nominal value of manufacturing BLS sectoral production, BEA gross output, and BEA value added differ significantly. This is not surprising, given the difference in the sectoral, gross, and value-added output concepts and their respective treatments of intermediates. In recent years, the BLS value of manufacturing sectoral production has averaged about 64 percent of BEA gross output and about 177 percent of BEA value added. Despite these important differences in the definition of output that affect levels, nominal growth rates and their acceleration are quite consistent, especially between BLS sectoral output and BEA gross output. The small differences in nominal growth rates sometimes lead to small differences in real growth rates. The BEA and BLS have minimized the impact of differences in deflation procedures in the manufacturing sector by the use of a common database of product prices and by sharing some of the detailed components of nominal gross output.

### 9.4.3 Detailed Industry Comparisons

To further understand the magnitude and sources of differences among the output measures, the BEA and BLS detailed industry output series were compared and the sources of their differences were explored in some depth. As noted above, differences may arise among output measures either because of differences in the choice of output concept or because of differences in measurement techniques. Empirical implementation of an output measure requires numerous decisions, including choices of source data, extrapolation techniques, aggregation methods, deflation procedures, and possible adjustments to match concepts and correct for data limitations.[33]

33. See appendix table 9B.1 for a description of differences among the output series.

The selection of the output concept and the decisions regarding empirical measurement are driven both by the purpose for the output measure and by underlying data limitations.

For the detailed industry comparisons, output measures from the BEA industry accounts GDP-by-industry program, the BLS Office of Productivity and Technology industry productivity program, and the BLS Office of Productivity and Technology major-sector productivity program (Gullickson-Harper output measures) were compared for those SIC two-digit industries where more than one output measure is available.[34] In those industries with large differences, BEA and BLS output measures were further examined to assess whether the disparity results from differences in data sources, deflation methods, agency-specific adjustments, or the output concept. For selected industry groups, sufficient data are available to relate differences in output measures at the SIC two-digit level to differences in output measures for the underlying three- and four-digit level industries.

*Overview of Comparisons*

Comparisons were made among the real and nominal output growth rates of various BEA and BLS output measures for selected industries. These measures include published and unpublished BEA gross output measures $Y^{G}_{\text{BEA-P}}$ and $Y^{G}_{\text{BEA-U}}$, published BLS sectoral output measures $Y^{S}_{\text{BLS-M-P}}$, unpublished BLS gross output measures $Y^{G}_{\text{BLS-M-U}}$, and published and unpublished BLS sectoral output measures $Y^{S}_{\text{BLS-I-P}}$ and $Y^{S}_{\text{BLS-I-U}}$.[35]

34. The BEA gross output measures in this comparison are drawn from the BEA industry accounts GDP-by-industry program rather than the BEA input-output program. The BLS Office of Productivity and Technology industry productivity program produces sectoral output measures for SIC three- and four-digit industries for use in production of industry productivity measures. The SIC-based industry productivity program sectoral output measures were published or unpublished, depending on the quality of the measure, although all were available upon request. Starting with the 2003 data, all NAICS-based four-digit and above data from the industry productivity program are published. The BLS Office of Productivity and Technology major-sector productivity program produces published sectoral output measures for SIC two-digit manufacturing industries and unpublished gross output measures for selected SIC two-digit nonmanufacturing industries. These measures are presented and discussed in Gullickson (1995) and Gullickson and Harper (1999, 2002). The BEA and BLS output measures used in this paper were considered current by both BEA and BLS between April 8 and September 17, 2003.

35. In this chapter, a variety of output measures produced by the BEA and BLS are compared. For comparison purposes, these data sets may in some cases be aggregated or disaggregated to levels that the agencies do not publish. The following notation has been developed in order to be clear at all times about which data set is being discussed, which type of output concept is involved, and whether the data are published:

$$Y^{\text{Output concept, Aggregation Level}}_{\text{Agency, Program, Status}}$$

where Output Concept indicates gross (G) or sectoral (S) output concepts; Aggregation Level indicates the SIC level of aggregation (two, three, or four-digit); Agency indicates BEA or BLS; Program indicates the BLS major-sector productivity program (M) or the BLS industry productivity program (I); and Status indicates whether the measure is published (P) or unpublished (U).

Value added measures were not included among the comparisons because BLS does not prepare such measures, and BEA prepares value added measures only at the SIC two-digit level.

For any two output measures, differences in the real and nominal output growth rates were assessed using two different approaches. The first approach calculated the difference in the acceleration of the average annual growth rate in the 1995–2000 period compared to the 1990–95 period. This difference in acceleration reflects differences in the change in the growth rate trends of the output measures between these two time periods. The second approach examined how closely the average annual growth rates of any two output series are correlated. The correlation coefficient, computed for the annual growth rates of the output series from 1988 to 2000, reflects the degree of consistency in the annual movements of the output measures over this time period.

To identify the sources of the differences among the output series, a series of comparisons were made. Current-dollar output series were compared to determine the role of differences in underlying data sources; constant and current-dollar output series were compared to determine the role of differences in price indexes and deflation methods; adjusted and unadjusted constant-dollar output estimates were compared to determine the impact of agency-specific adjustments; and related gross and sectoral output series were compared to determine the role of differences in output concept. In addition, an effort was made to document the raw data sources, adjustments, price indexes, deflation methods, aggregation methods, and other procedures used to prepare each series. Differences found among output series at the more aggregate two-digit level were further explored where data permit by examining differences in the underlying three- and four-digit industry output data. This case-study approach allows differences among output measures for SIC two-digit industries to be traced to the underlying three- and four-digit industry levels, where data permit. Appendix table 9B.2 summarizes the availability of the BEA and BLS output series by SIC two-, three-, and four-digit industry.[36]

### *SIC Two-Digit Manufacturing Industry Differences*

Detailed manufacturing industry measures produced by both the BEA and the BLS are generally based on Census current-dollar data for the value of shipments, inventory change, and value of resales. Constant-dollar output series are developed by each agency using similar price indexes and

36. For example, SIC two-digit industries where comparisons among two or more of the BEA and BLS output series are possible include SICs 10, 12, 13, 14, 20–39, 40, 41, 42, 44, 45, 46, 47, 48, 49, 62, 63, 64, 67, 70, 72, 75, 78, 79, 80, and 82. SIC three-digit industries where comparisons are possible include all three-digit industries in the manufacturing industry groups 20–39 and in 43, 50, and 51; and selected three-digit industries in industry groups 10, 14, 48, 52, 53, 54, 55, 56, 58, 72, 75, and 78. SIC four-digit industry comparisons are possible for all four-digit industries in the manufacturing industry groups 20–39 and in 43 and 58; and for selected four-digit industries in industry groups 10, 57, 59, and 72.

deflation procedures, according to a 1997 memorandum of agreement between the BEA and the BLS. Although the published BEA SIC two-digit measures reflect a gross output concept, and the published BLS measures are based on a sectoral output concept, the measures are quite similar as a result of the common data source and price index agreement.

Three output measures as described below were compared for the SIC two-digit manufacturing industries. $Y^{G\text{-}2}_{BEA\text{-}P}$ is a gross output measure for SIC two-digit industries that includes adjustments to correspond to NIPA definitions.[37] $Y^{S\text{-}2}_{BLS\text{-}M\text{-}P}$ is a sectoral output measure for SIC two-digit industries that was developed by the BLS for use in measuring MFP in manufacturing industries. The sectoral output concept excludes sales of intermediate products and services between establishments within a particular sector (intrasectoral transactions). $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ is a measure constructed for this chapter. It is a sectoral output measure for SIC two-digit industries, constructed by Tornqvist aggregation of BLS SIC three-digit sectoral output measures.[38] This output measure, while constructed based on SIC three-digit sectoral output measures, is not adjusted for additional intrasectoral transactions at the SIC two-digit level, and also does not reflect many of the adjustments which are made to the $Y^{G\text{-}2}_{BEA\text{-}P}$ output measure.[39]

Comparisons of real output growth rates were made among these three output measures for selected SIC two-digit manufacturing industries. Eight of the twenty SIC two-digit manufacturing industries, SICs 20, 21, 27, 29, 31, 35, 38, and 39, were selected for further review based on fairly subjective criteria concerning differences in growth rate acceleeration and consistency of annual growth rates. Each of these industries has either an acceleration difference of 0.90 points or more or a correlation coefficient of 0.85 or less, for some combination of two of the three measures.[40] Based on these criteria and the results of the comparisons described in table 9.8, these industries were flagged for further exploration.[41]

37. BEA published gross output is measured as the value of shipments plus inventory changes less the cost of resales, plus misreporting and coverage adjustments, plus adjustments for own-account production of software, own-account construction work, and commodity (sales) taxes. Adjustments for inventory change and cost of resales are made only for goods-producing industries.

38. The sectoral measure for SIC two-digit industries is constructed by Tornqvist aggregation of BLS SIC three-digit sectoral output measures and contains no additional adjustments. The BLS sectoral output measures for SIC three-digit industries are measured as the value of shipments plus inventory changes, less resales and intra-industry shipments.

39. NAICS three-digit sectoral output measures that exclude all intrasectoral transfers are now available from the BLS industry productivity program.

40. The eight industries are SIC 20, Food and Kindred Products; SIC 21, Tobacco Products; SIC 27, Printing, Publishing, and Allied Industries; SIC 29, Petroleum Refining and Related Industries; SIC 31, Leather and Leather Products; SIC 35, Industrial and Commercial Machinery and Computer Equipment; SIC 38, Measuring, Analyzing, and Controlling Instruments; Photographic, Medical, and Optical Goods; Watches and Clocks; and SIC 39, Miscellaneous Manufacturing Industries.

41. It is useful to note that SIC 21, Tobacco Products, and SIC 31, Leather and Leather Products, are particularly small industries as measured by either employment or value added.

**Table 9.8 Comparison of real output measures: Selected SIC 2-digit industries**

| SIC 2-digit industry | Output series | Average annual growth rate: 1990–1995 (1) | Average annual growth rate: 1995–2000 (2) | Acceleration (2) – (1) | Output measure comparisons | Difference in acceleration | Correlation coefficient |
|---|---|---|---|---|---|---|---|
| SIC 20, Food and Kindred Products | $Y^{G-2}_{BEA-P}$ | 1.95 | 1.23 | –0.72 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | –0.03 | 0.979 |
| | $Y^{S-2}_{BLS-I-U}$ | 1.96 | 1.27 | –0.69 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-M-P}$ | 0.94 | 0.640 |
| | $Y^{S-2}_{BLS-M-P}$ | 2.67 | 1.02 | –1.66 | $Y^{S-2}_{BLS-I-U}/Y^{S-2}_{BLS-M-P}$ | 0.96 | 0.687 |
| SIC 21, Tobacco Products | $Y^{G-2}_{BEA-P}$ | 0.33 | –2.62 | –2.95 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | 0.66 | 0.996 |
| | $Y^{S-2}_{BLS-I-U}$ | 0.82 | –2.78 | –3.61 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-M-U}$ | 0.95 | 0.977 |
| | $Y^{S-2}_{BLS-M-U}$ | 0.70 | –3.20 | –3.89 | $Y^{S-2}_{BLS-I-U}/Y^{S-2}_{BLS-M-U}$ | –0.26 | 0.991 |
| SIC 27, Printing, Publishing, and Allied Industries | $Y^{G-2}_{BEA-P}$ | –0.47 | 1.22 | 1.69 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | –1.51 | 0.769 |
| | $Y^{S-2}_{BLS-I-U}$ | –0.42 | 2.77 | 3.20 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-M-P}$ | 0.41 | 0.904 |
| | $Y^{S-2}_{BLS-M-P}$ | –0.10 | 1.18 | 1.28 | $Y^{S-2}_{BLS-I-U}/Y^{S-2}_{BLS-M-P}$ | 1.92 | 0.727 |
| SIC 29, Petroleum Refining and Related Industries | $Y^{G-2}_{BEA-P}$ | 0.81 | 1.08 | 0.27 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | –0.11 | –0.044 |
| | $Y^{S-2}_{BLS-I-U}$ | 1.20 | 1.58 | 0.39 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-M-P}$ | –0.35 | –0.127 |
| | $Y^{S-2}_{BLS-M-P}$ | 0.88 | 1.51 | 0.63 | $Y^{S-2}_{BLS-I-U}/Y^{S-2}_{BLS-M-P}$ | –0.24 | 0.988 |
| SIC 31, Leather and Leather Products | $Y^{G-2}_{BEA-P}$ | –1.97 | –1.59 | 0.38 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | –1.14 | 0.949 |
| | $Y^{S-2}_{BLS-I-U}$ | –2.67 | –1.15 | 1.52 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-M-U}$ | –1.23 | 0.923 |
| | $Y^{S-2}_{BLS-M-U}$ | –3.14 | –1.53 | 1.60 | $Y^{S-2}_{BLS-I-U}/Y^{S-2}_{BLS-M-U}$ | –0.08 | 0.969 |
| SIC 35, Industrial and Commercial Machinery and Computer Equipment | $Y^{G-2}_{BEA-P}$ | 8.44 | 9.38 | 0.94 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | –1.09 | 0.991 |
| | $Y^{S-2}_{BLS-I-U}$ | 8.02 | 10.05 | 2.03 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-M-P}$ | –1.15 | 0.976 |
| | $Y^{S-2}_{BLS-M-P}$ | 7.94 | 10.03 | 2.09 | $Y^{S-2}_{BLS-I-U}/Y^{S-2}_{BLS-M-P}$ | –0.06 | 0.985 |
| SIC 38, Measuring, Analyzing, and Controlling Instruments; Photographic, Medical, and Optical Goods; Watches and Clocks | $Y^{G-2}_{BEA-P}$ | 1.05 | 3.20 | 2.15 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | –0.39 | 0.916 |
| | $Y^{S-2}_{BLS-I-U}$ | 0.87 | 3.41 | 2.54 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-M-P}$ | –0.62 | 0.597 |
| | $Y^{S-2}_{BLS-M-P}$ | 1.27 | 4.04 | 2.77 | $Y^{S-2}_{BLS-I-U}/Y^{S-2}_{BLS-M-P}$ | –0.23 | 0.701 |
| SIC 39, Miscellaneous Manufacturing Industries | $Y^{G-2}_{BEA-P}$ | 1.44 | 3.22 | 1.78 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | 0.96 | 0.954 |
| | $Y^{S-2}_{BLS-I-U}$ | 2.00 | 2.82 | 0.81 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-M-P}$ | 0.94 | 0.867 |
| | $Y^{S-2}_{BLS-M-P}$ | 2.02 | 2.85 | 0.83 | $Y^{S-2}_{BLS-I-U}/Y^{S-2}_{BLS-M-P}$ | –0.02 | 0.842 |

*Note:* For SIC 21, Tobacco Products, and SIC 31, Leather and Leather Products, BLS output measures are unpublished because the output data for these industries is considered unreliable.

As seen in table 9.8, comparing the $Y^{G\text{-}2}_{BEA\text{-}P}$ and the $Y^{S\text{-}2}_{BLS\text{-}M\text{-}P}$ output measures, acceleration rate differences for SICs 20, 21, 31, 35, and 39 ranged from .94 points to –1.23 points.[42] Annual movements in these two output measures also differ for SICs 20, 29, 38, and 39. For the $Y^{G\text{-}2}_{BEA\text{-}P}$ and the $Y^{S\text{-}2}_{BLS\text{-}IU}$ output measures, acceleration rate differences for SICs 27, 31, 35, and 39 range from .96 points to –1.51 points, and the correlation coefficients for SICs 27 and 29 are low. For the two BLS measures, $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ and $Y^{S\text{-}2}_{BLS\text{-}M\text{-}P}$, acceleration rates differ for SICs 20 and 27 by .96 points and 1.92 points, respectively, and correlation coefficients are low for SICs 20, 27, 38, and 39.

*SIC Two-Digit Nonmanufacturing Industry Differences*

Although the nonmanufacturing sector accounts for about 80 percent of nonfarm business output excluding housing, data quality and industry detail are generally much less than for the manufacturing sector, and the BEA and BLS output measures accordingly are not as comparable as in manufacturing. The nonmanufacturing sector is a broad collection of diverse industries that includes goods-producing industries such as mining and construction and all of the services-producing industries. The BEA provides complete coverage of the nonmanufacturing sector at approximately the two-digit SIC level, whereas the BLS industry productivity program provides output and labor productivity measures for a wide variety of selected industries for which data quality is high and reliable labor productivity estimates can be prepared.[43] As a result of the differences in objectives and priorities, coverage by the BLS varies considerably across the nonmanufacturing sector.

Table 9.9 provides insight into the extent of coverage by the BLS industry productivity program by comparing the 1996 receipts of industries for which the BLS provides productivity measures to the BEA's published 1996 gross output. For each nonmanufacturing industry group, column (1) shows the sum of the BEA-derived receipts for those detailed industries for which BLS currently provides labor productivity measures. Column (2) shows the published BEA gross output measure for the industry group, and the third column shows column (1) as a percentage of column (2).[44] Farms,

42. BLS output and productivity measures for SIC 21, Tobacco Products, and SIC 31, Leather and Leather products, are unpublished because the output data for these industries are considered unreliable.

43. The BLS also provides SIC two-digit output and productivity measures for a broad range of industries for selected years in Gullickson and Harper (2002). These measures are prepared by the BLS major-sector productivity program. For SIC two-digit industries in the nonmanufacturing sector, these measures are considered unpublished and unofficial.

44. BEA gross output includes commodity taxes, own-account production, and adjustments for misreporting and coverage that are included at the publication level, but that are not included in the detailed industry receipts measures. As a result, the percentage in column (3) will always be less than 100 percent, even when all of the detailed industries in a group are covered by the BLS.

**Table 9.9** **Receipts of industries covered by BLS compared with BEA gross output for nonmanufacturing industry groups, 1996 (billions of dollars)**

| Industry group | Receipts of BLS industries in industry group[a] (1) | Published BEA industry gross output (2) | Receipts as percent of BEA gross output (1)/(2) |
|---|---|---|---|
| Nonmanufacturing, total | 3622.1 | 7826.9 | 46.3 |
| Agriculture excl. farms | 0.0 | 55.8 | 0.0 |
| Mining | 178.1 | 186.6 | 95.4 |
| Metal mining | 8.7 | 12.6 | 68.7 |
| Coal mining | 25.3 | 27.1 | 93.3 |
| Oil and gas extraction | 127.6 | 129.8 | 98.2 |
| Nonmetallic minerals | 16.5 | 17.0 | 97.1 |
| Construction | 0.0 | 554.5 | 0.0 |
| Transportation | 351.5 | 477.9 | 73.6 |
| Railroad transportation | 39.2 | 40.7 | 96.3 |
| Local passenger transit | 0.0 | 24.2 | 0.0 |
| Trucking and warehousing | 189.6 | 213.8 | 88.7 |
| Water transportation | 0.0 | 36.4 | 0.0 |
| Transportation by air | 115.3 | 117.3 | 98.3 |
| Pipelines, excl. natural gas | 7.4 | 7.8 | 94.5 |
| Transportation services | 0.0 | 37.7 | 0.0 |
| Communications | 318.0 | 348.7 | 91.2 |
| Telephone and telegraph | 240.5 | 270.0 | 89.1 |
| Radio and television | 77.5 | 78.8 | 98.4 |
| Electricity, gas, and sanitary services | 308.0 | 336.2 | 91.6 |
| Wholesale trade | 672.9 | 789.8 | 85.2 |
| Retail trade | 951.8 | 1070.9 | 88.9 |
| FIRE less nonfarm housing | 339.4 | 1499.3 | 22.6 |
| Depository institutions | 339.4 | 342.7 | 99.1 |
| Nondepository Institutions | 0.0 | 108.4 | 0.0 |
| Security and communication brokers | 0.0 | 169.3 | 0.0 |
| Insurance carriers | 0.0 | 261.5 | 0.0 |
| Insurance agents and brokers | 0.0 | 74.0 | 0.0 |
| Real estate excl. housing | 0.0 | 520.4 | 0.0 |
| Holding and investment offices | 0.0 | 23.1 | 0.0 |
| Services less households | 502.4 | 2507.3 | 20.0 |
| Hotels and lodging | 95.6 | 106.5 | 89.8 |
| Personal services | 83.3 | 84.6 | 98.5 |
| Business services | 214.8 | 510.6 | 42.1 |
| Auto repair and services | 101.6 | 124.3 | 81.7 |
| Miscellaneous repair services | 0.0 | 46.4 | 0.0 |
| Motion pictures | 7.1 | 56.8 | 12.6 |
| Amusement and recreation services | 0.0 | 110.7 | 0.0 |
| Health services | 0.0 | 688.0 | 0.0 |
| Legal services | 0.0 | 134.1 | 0.0 |
| Educational services | 0.0 | 103.8 | 0.0 |
| Social services | 0.0 | 98.7 | 0.0 |
| Membership organizations | 0.0 | 96.2 | 0.0 |
| Other services | 0.0 | 346.6 | 0.0 |

[a]Sum of BEA detailed receipts estimates for those industries covered by BLS.

nonfarm housing services, private households, and government are excluded for comparability with the nonfarm business sector.

For all of nonmanufacturing, receipts of industries covered by the BLS industry productivity program accounted for nearly one-half of gross output in 1996. Industry groups with complete or nearly complete coverage by the BLS include mining, communications, wholesale trade, retail trade, and electric, gas, and sanitary services. Industry groups with partial coverage include transportation and services. The BLS does not provide any output measures for agriculture and construction, and provides a measure only for commercial banks (part of depository institutions) in the finance, insurance, and real estate (FIRE) group. Within the services group, the BLS provides complete or nearly complete coverage for hotels and lodging places, personal services, and auto repair and services. No output measures are provided for industries with a large nonprofit component, such as health services, educational services, social services, and membership organizations.

BEA and BLS real output measures were compared for SIC two-digit nonmanufacturing industries when two or more output measures were available.[45] These measures include a published BEA gross output measure, $Y^{\text{G-2}}_{\text{BEA-P}}$, an unpublished BLS gross output measure, $Y^{\text{G-2}}_{\text{BLS-M-U}}$, and an unpublished BLS sectoral output measure, $Y^{\text{S-2}}_{\text{BLS-I-U}}$. As with manufacturing, trend growth rates by industry for 1990–95 and 1995–2000 were compared and differences in acceleration between these two time periods were calculated. Correlation coefficients were are also calculated among the output series.

Given the greater differences in data sources and methods for the BEA and BLS output measures for SIC two-digit nonmanufacturing industries, it is unsurprising that these measures differ from one another to a much greater extent and for a higher proportion of the industries than in manufacturing. Of the twenty-two SIC two-digit nonmanufacturing industries examined, sixteen display acceleration differences that exceed 0.90 points for some combination of two of the three measures. As seen in table 9.10, for the $Y^{\text{G-2}}_{\text{BEA-P}}$ and the $Y^{\text{G-2}}_{\text{BLS-M-U}}$ output measures, differences in acceleration rates exceed the cutoff for SICs 10, 13, 41, 42, 44, 45, 46, 48, 49, 62, 63, 64, 72, 78, 79, and 82. Among these sixteen industries, acceleration differences

45. These industries include SIC 10, Metal Mining; SIC 12, Coal Mining; SIC 13, Oil and Gas Extraction; SIC 14, Mining and Quarrying of Nonmetallic Minerals, Except Fuels; SIC 40, Railroad Transportation; SIC 41, Local and Suburban Transit and Interurban Highway Passenger Transportation; SIC 42, Motor Freight Transportation and Warehousing; SIC 44, Water Transportation; SIC 45, Transportation by Air; SIC 46, Pipelines, Except Natural Gas; SIC 47, Transportation Services; SIC 48, Communications; SIC 49, Electric, Gas, and Sanitary Services; SIC 62, Security and Commodity Brokers, Dealers, Exchanges, and Services; SIC 63, Insurance Carriers; SIC 64, Insured Agents, Brokers, and Service; SIC 70, Hotels, Rooming Houses, Camps, and Other Lodging Places; SIC 72, Personal Services; SIC 75, Automotive Repair, Services, and Parking; SIC 78, Motion Pictures; SIC 79, Amusement and Recreation Services; SIC 80, Health Services; and SIC 82, Educational Services.

**Table 9.10 Comparison of real output measures: SIC 2-digit nonmanufacturing industries**

| SIC 2-digit industry | Output measures | Average annual growth rate (1990–1995) (1) | (1995–2000) (2) | Acceleration (2) – (1) | Output measure comparisons | Difference in acceleration | Correlation coefficient |
|---|---|---|---|---|---|---|---|
| SIC 10, Metal Mining | $Y^{G-2}_{BEA-P}$ | 2.08 | –0.48 | –2.57 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | –1.52 | 0.93 |
| | $Y^{G-2}_{BLS-M-U}$ | 1.69 | 0.65 | –1.04 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 12, Coal Mining | $Y^{G-2}_{BEA-P}$ | 0.50 | 0.58 | 0.08 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | –0.37 | 0.98 |
| | $Y^{S-2}_{BLS-I-U}$ | –0.91 | –0.45 | 0.46 | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| | $Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. | n.a. | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 13, Oil and Gas Extraction | $Y^{G-2}_{BEA-P}$ | –0.40 | 0.74 | 1.14 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | 1.15 | 0.68 |
| | $Y^{S-2}_{BLS-I-U}$ | –0.75 | –0.75 | –0.01 | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | –1.09 | 0.92 |
| | $Y^{G-2}_{BLS-M-U}$ | –1.12 | 1.12 | 2.24 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | –2.24 | 0.70 |
| SIC 14, Mining and Quarrying of Nonmetallic Minerals, Except Fuels | $Y^{G-2}_{BEA-P}$ | 1.14 | 2.10 | 0.96 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | –0.05 | 0.97 |
| | $Y^{S-2}_{BLS-I-U}$ | 0.14 | 1.15 | 1.01 | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | –0.10 | 0.83 |
| | $Y^{G-2}_{BLS-M-U}$ | 1.61 | 2.67 | 1.06 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | –0.05 | 0.82 |
| SIC 40, Railroad Transportation | $Y^{G-2}_{BEA-P}$ | 3.39 | 0.67 | –2.72 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | –0.47 | 0.64 |
| | $Y^{G-2}_{BLS-M-U}$ | 1.63 | –0.62 | –2.25 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 41, Local and Suburban Transit and Interurban Highway Passenger Transportation | $Y^{G-2}_{BEA-P}$ | 0.54 | 2.36 | 1.82 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | 2.18 | 0.75 |
| | $Y^{G-2}_{BLS-M-U}$ | 1.59 | 1.22 | –0.36 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 42, Motor Freight Transportation and Warehousing | $Y^{G-2}_{BEA-P}$ | 4.89 | 4.06 | –0.82 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | –0.97 | 0.54 |
| | $Y^{G-2}_{BLS-M-U}$ | 4.48 | 4.63 | 0.15 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SIC 43, United States Postal Service | $Y^{G-2}_{BEA-P}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | 1.45 | 2.37 | 0.93 | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| | $Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. | n.a. | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 44, Water Transportation | $Y^{G-2}_{BEA-P}$ | 2.39 | 4.72 | 2.33 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | 5.25 | 0.54 |
| | $Y^{G-2}_{BLS-M-U}$ | 2.40 | –0.52 | –2.92 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 45, Transportation by Air | $Y^{G-2}_{BEA-P}$ | 3.14 | 5.39 | 2.25 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | 4.61 | 0.40 |
| | $Y^{G-2}_{BLS-M-U}$ | 3.84 | 1.48 | –2.36 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 46, Pipelines, Except Natural Gas | $Y^{G-2}_{BEA-P}$ | –5.39 | 0.14 | 5.52 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | 7.17 | 0.62 |
| | $Y^{G-2}_{BLS-M-U}$ | –1.39 | –3.04 | –1.65 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 47, Transportation Services | $Y^{G-2}_{BEA-P}$ | 4.78 | 6.21 | 1.43 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | 0.16 | 0.56 |
| | $Y^{G-2}_{BLS-M-U}$ | 4.48 | 5.75 | 1.26 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 48, Communications | $Y^{G-2}_{BEA-P}$ | 5.55 | 11.38 | 5.83 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | 3.53 | 0.70 |
| | $Y^{G-2}_{BLS-M-U}$ | 4.38 | 6.67 | 2.30 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 49, Electric, Gas, and Sanitary Services | $Y^{G-2}_{BEA-P}$ | 1.96 | 1.48 | –0.48 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | –1.97 | 0.11 |
| | $Y^{G-2}_{BLS-M-U}$ | 0.14 | 1.63 | 1.49 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 50, Wholesale Trade: Durable Goods | $Y^{G-2}_{BEA-P}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | 5.56 | 8.57 | 3.01 | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| | $Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. | n.a. | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 51, Wholesale Trade: Nondurable Goods | $Y^{G-2}_{BEA-P}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | 1.05 | 2.29 | 1.24 | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| | $Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. | n.a. | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |

*(continued)*

**Table 9.10** (continued)

| SIC 2-digit industry | Output measures | Average annual growth rate (1990–1995) (1) | Average annual growth rate (1995–2000) (2) | Acceleration (2) – (1) | Output measure comparisons | Difference in acceleration | Correlation coefficient |
|---|---|---|---|---|---|---|---|
| SIC 60, Depository Institutions | $Y^{G-2}_{BEA-P}$ | 1.31 | 2.93 | 1.63 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| | $Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. | n.a. | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 61, Nondepository Credit Institutions | $Y^{G-2}_{BEA-P}$ | 9.49 | 12.27 | 2.78 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| | $Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. | n.a. | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 62, Security and Commodity Brokers, Dealers, Exchanges, and Services | $Y^{G-2}_{BEA-P}$ | 16.11 | 23.35 | 7.24 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | –1.24 | 0.80 |
| | $Y^{G-2}_{BLS-M-U}$ | 13.54 | 22.02 | 8.48 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 63, Insurance Carriers | $Y^{G-2}_{BEA-P}$ | –0.15 | –1.53 | –1.38 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | –1.15 | 0.72 |
| | $Y^{G-2}_{BLS-M-U}$ | 0.87 | 0.64 | –0.23 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 64, Insurance Agents, Brokers, and Service | $Y^{G-2}_{BEA-P}$ | –2.67 | 4.07 | 6.74 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | 2.30 | –0.11 |
| | $Y^{G-2}_{BLS-M-U}$ | –0.41 | 4.03 | 4.44 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 65, Real Estate | $Y^{G-2}_{BEA-P}$ | 2.28 | 3.18 | 0.90 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| | $Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. | n.a. | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 67, Holding and Other Investment Offices | $Y^{G-2}_{BEA-P}$ | 1.35 | 7.85 | 6.50 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| | $Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. | n.a. | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SIC 70, Hotels, Rooming Houses, Camps, and Other Lodging Places | $Y^{G\text{-}2}_{BEA\text{-}P}$ | 2.62 | 3.19 | 0.57 | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. |
| | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. | n.a. | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | 0.08 | 0.93 |
| | $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | 2.27 | 2.76 | 0.49 | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. |
| SIC 72, Personal Services | $Y^{G\text{-}2}_{BEA\text{-}P}$ | 2.45 | 2.71 | 0.26 | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | –1.20 | 0.95 |
| | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | 1.44 | 2.89 | 1.45 | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | –1.97 | 0.90 |
| | $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | 1.33 | 3.56 | 2.23 | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | –0.78 | 0.97 |
| SIC 73, Business Services | $Y^{G\text{-}2}_{BEA\text{-}P}$ | 6.76 | 11.10 | 4.34 | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. |
| | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. | n.a. | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. |
| | $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. | n.a. | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. |
| SIC 75, Automotive Repair, Services, and Parking | $Y^{G\text{-}2}_{BEA\text{-}P}$ | 2.98 | 4.09 | 1.12 | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. |
| | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. | n.a. | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | 0.33 | 0.84 |
| | $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | 4.40 | 5.18 | 0.79 | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. |
| SIC 76, Miscellaneous Repair Services | $Y^{G\text{-}2}_{BEA\text{-}P}$ | 2.11 | 0.96 | –1.15 | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. |
| | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. | n.a. | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. |
| | $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. | n.a. | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. |
| SIC 78, Motion Pictures | $Y^{G\text{-}2}_{BEA\text{-}P}$ | 3.89 | 2.95 | –0.94 | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. |
| | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. | n.a. | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | –2.78 | 0.46 |
| | $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | 4.74 | 6.58 | 1.83 | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. |
| SIC 79, Amusement and Recreation Services | $Y^{G\text{-}2}_{BEA\text{-}P}$ | 6.74 | 3.87 | –2.86 | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. |
| | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. | n.a. | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | –3.80 | 0.34 |
| | $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | 5.85 | 6.79 | 0.94 | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. |
| SIC 80, Health Services | $Y^{G\text{-}2}_{BEA\text{-}P}$ | 2.32 | 2.57 | 0.25 | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. |
| | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. | n.a. | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | –0.27 | 0.91 |
| | $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | 2.66 | 3.18 | 0.52 | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. |
| SIC 81, Legal Services | $Y^{G\text{-}2}_{BEA\text{-}P}$ | –0.66 | 2.86 | 3.52 | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. |
| | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | n.a. | n.a. | n.a. | $Y^{G\text{-}2}_{BEA\text{-}P}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. |
| | $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. | n.a. | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}/Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | n.a. | n.a. |

*(continued)*

**Table 9.10** (continued)

| SIC 2-digit industry | Output measures | Average annual growth rate (1990–1995) (1) | (1995–2000) (2) | Acceleration (2) – (1) | Output measure comparisons | Difference in acceleration | Correlation coefficient |
|---|---|---|---|---|---|---|---|
| SIC 82, Educational Services | $Y^{G-2}_{BEA-P}$ | 2.86 | 2.75 | –0.11 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | –3.44 | 0.58 |
| | $Y^{G-2}_{BLS-M-U}$ | 0.35 | 3.68 | 3.33 | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 83, Social Services | $Y^{G-2}_{BEA-P}$ | 4.15 | 5.01 | 0.87 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| | $Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. | n.a. | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 86, Membership Organizations | $Y^{G-2}_{BEA-P}$ | 3.21 | 1.05 | –2.15 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| | $Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. | n.a. | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| SIC 88, Private Households | $Y^{G-2}_{BEA-P}$ | 1.43 | –0.42 | –1.84 | $Y^{G-2}_{BEA-P}/Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. |
| | $Y^{S-2}_{BLS-I-U}$ | n.a. | n.a. | n.a. | $Y^{G-2}_{BEA-P}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |
| | $Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. | n.a. | $Y^{S-2}_{BLS-I-U}/Y^{G-2}_{BLS-M-U}$ | n.a. | n.a. |

*Notes:* n.a. = not available. Output data are not available for the following: SIC 01, Agricultural Production Crops; SIC 02, Agricultural Production, Livestock, and Animal Specialties; SIC 07, Agricultural Services; SIC 08, Forestry; SIC 09, Fishing, Hunting and Trapping; SIC 15, Building Construction, General Contractors, and Operative Builders; SIC 16, Heavy Construction Other Than Building Construction; SIC 17, Construction, Special Trade Contractors; SIC 84, Museums, Art Galleries, and Botanical and Zoological Gardens; SIC 87, Engineering, Accounting, Research, Management, and Related Services; SIC 91, Executive, Legislative, and General Government, Except Finance; SIC 92, Justice, Public Order, and Safety; SIC 93, Public Finance, Taxation, and Monetary Policy; SIC 94, Administration of Human Resource Programs; SIC 95, Administration of Environmental Quality and Housing; SIC 96, Administration of Economic Programs; SIC 97, National Security and International Affairs; SIC 99, Nonclassifiable Establishments.

range from .9 points to 2.0 points for seven industries; from 2.0 points to 3.0 points for three industries; from 3.0 points to 4.0 points for three industries; and from 4.0 points to more than 7.0 points for three industries. The largest differences in acceleration rates were found in the transportation industries and in the pipelines except natural gas industry.

Based on the correlation coefficient criteria for consistency in annual changes, the $Y^{G\text{-}2}_{BEA\text{-}P}$ and $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ nonmanufacturing output measures differ in annual movements for SICs 14, 40, 41, 42, 44, 45, 46, 47, 48, 49, 62, 63, 64, 75, 78, 79, and 82. The $Y^{G\text{-}2}_{BEA\text{-}P}$ measure and the $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ measure were compared only for SICs 12, 13, 14, and 72 at the SIC two-digit level, with acceleration differences greater than .90 in SIC 13 and 72 as well as differences in annual movements in SIC 13. The $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ and the $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ measures were compared for SICs 13, 14, and 72 as well, indicating differences in acceleration and annual movements for SIC 13. Based on these results, BEA and BLS output measures for SICs 10, 13, 41, 42, 44, 45, 46, 48, 49, 62, 63, 64, 72, 78, 79, and 82 were flagged for further examination.

*Sources of Differences*

BEA and BLS real output measures for SIC two-digit industries 12, 14, 22, 23, 24, 25, 26, 28, 30, 32, 33, 34, 36, 37, 70, 75, and 80 have very similar trend growth rates and annual movements in growth rates.[46] However, according to these criteria, BEA and BLS output measures for SICs 10, 13, 20, 21, 27, 29, 31, 35, 38, 39, 40, 41, 42, 44, 45, 46, 47, 48, 49, 62, 63, 64, 72, 78, 79, and 82 differ significantly. Possible explanations for differences among these output measures include differences in source data, deflation methods, adjustments to the source data, and differences in output concept.

*Source data.* Source data differences were examined by comparing trend growth rates and correlations for available current-dollar measures. Source data are most likely fundamentally different when current-dollar trend growth rates differ across output measures and the correlation of current-dollar annual growth rates is low. Among the twenty-six industries identified above with significant differences in real output growth rates, nineteen exhibit similar differences in their current-dollar growth rates. As shown in appendix table 9B.3, these nineteen industries are SICs 10, 13, 20, 21, 27, 38, 41, 44, 45, 46, 47, 48, 49, 62, 63, 64, 78, 79, and 82. Of these industries, SICs 20, 38, 63, and 64 have acceleration differences less than .90 points, but two or more of the output measures have correlation coefficients less than .85. Of the remaining industries, acceleration differences range from .90 points to 2.0 points in SICs 27, 48, and 49; from 2.0 points to 3.0 points in SICs 41 and 82; from 3.0 points to 4.0 points in SICs 21, 45, 78, and 79;

46. The more detailed three- and four-digit industries in each of these industry groups have not been compared.

and from 4.0 points to more than 12.0 points in SICs 10, 13, 44, 46, 47, and 62. For each of these industries, correlation coefficients between two or more output measures are, in most instances, considerably less than .85. Current-dollar output series for SICs 29, 31, 35, 39, 40, 42, and 72 appear to be similar across available output measures.

*Price indexes and deflation methods.* Differences in price indexes and deflation methods were examined by comparing differences between constant and current-dollar trend growth rates across output series. Differences in price indexes or deflation methods are suspected when the difference between the constant and current-dollar trend growth rates varies widely across output measures. As shown in table 9B.3, fifteen industries (SICs 10, 13, 21, 40, 42, 44, 46, 47, 48, 49, 62, 63, 64, 78, and 82) exhibit differences of more than .90 points in the acceleration rates of the constant dollar and current-dollar output series, which suggests differences due to price index choice or deflation methods. Among these industries, differences in constant-dollar and current-dollar acceleration rates range from .9 points to 2.0 points for SICs 40, 42, 44, 46, 48, 63, and 82; from 2.0 points to 3.0 points for SIC 64; from 3.0 points to 4.0 points for SICs 13, 21, 49, and 62; and from 4.0 points to 7.0 points for SICs 10, 47, and 78. Output series for SICs 20, 27, 29, 31, 35, 38, 39, 41, 45, 72, and 79 appear to use similar price indexes and deflation methods.

*Data adjustments.* The impact of BEA adjustments to underlying source data was examined by comparing trend growth rates and their acceleration using both the published BEA output measures and the unadjusted BEA output measures for those SIC two-digit industries where both are available.[47] As shown in table 9.11, industries for which BEA adjustments appear to have an important effect on the trend growth rates for 1990–95 and 1995–2000 include SIC 21, Tobacco Products; SIC 31, Leather and Leather Products; SIC 35, Industrial and Commercial Machinery and Computer Equipment; SIC 39, Miscellaneous Manufacturing Industries; and SIC 46, Pipelines, Except Natural Gas. For SIC 21, the BEA adjustment results in a small but increased difference in acceleration between the $Y^{\text{G-2}}_{\text{BEA-P}}$ measure and the $Y^{\text{S-2}}_{\text{BLS-I-U}}$. For SICs 31, 35, 39, and 46, the BEA adjustments appear to widen the difference in acceleration rate between the $Y^{\text{G-2}}_{\text{BEA-P}}$ measure and the $Y^{\text{S-2}}_{\text{BLS-I-U}}$ and $Y^{\text{G-2}}_{\text{BLS-M-U}}$ measures.

*Output concept.* The impact of using a sectoral output concept rather than a gross output concept was examined by computing the correlation of the $Y^{\text{S-2}}_{\text{BLS-M-P}}$ output measure with the underlying gross (value of production) output series for the each of the SIC two-digit manufacturing industries.

47. SICs 20–39, 46, and 64.

**Table 9.11 Comparisons of BEA adjusted ($Y^{G-2}_{BEA-P}$) and unadjusted ($Y^{G-2}_{BEA-U}$) output measures (constant-dollar annual percent change in output series)**

| | Acceleration rate (1990–1995, 1995–2000) | | $Y^{G-2}_{BEA-P}$ (adjusted) vs. $Y^{S-2}_{BLS-I-U}$ | | $Y^{G-2}_{BEA-U}$ (unadjusted) vs. $Y^{S-2}_{BLS-I-U}$ | | $Y^{G-2}_{BEA-P}$ (adjusted) vs. $Y^{S-2}_{BLS-M-P}$ (or, for SIC 46, $Y^{G-2}_{BLS-M-U}$) | | $Y^{G-2}_{BEA-U}$ (unadjusted) vs. $Y^{S-2}_{BLS-M-P}$ (or, for SIC 46, $Y^{G-2}_{BLS-M-U}$) | |
|---|---|---|---|---|---|---|---|---|---|---|
| SIC 2-digit industry | $Y^{G-2}_{BEA-P}$ (adjusted) | $Y^{G-2}_{BEA-U}$ (unadjusted) | Difference in acceleration rates | Correlation coefficient | Difference in acceleration rates | Correlation coefficient | Difference in acceleration rates | Correlation coefficient | Difference in acceleration rates | Correlation coefficient |
| SIC 21, Tobacco products | –2.95 | –3.84 | 0.66 | 0.996 | –0.23 | 1.000 | 0.95 | 0.977 | 0.06 | 0.988 |
| SIC 31, Leather and leather products | 0.38 | 1.1 | –1.14 | 0.949 | –0.42 | 0.995 | –1.23 | 0.923 | –0.50 | 0.959 |
| SIC 35, Industrial and commercial machinery and computer equipment | 0.94 | 1.91 | –1.09 | 0.991 | –0.12 | 0.993 | –1.15 | 0.976 | –0.18 | 0.985 |
| SIC 39, Miscellaneous manufacturing industries | 1.78 | 0.96 | 0.96 | 0.954 | 0.15 | 0.957 | 0.94 | 0.867 | 0.13 | 0.831 |
| SIC 46, Pipelines, except natural gas | 5.52 | 2.93 | n.a. | n.a. | n.a. | n.a. | 7.17 | 0.617 | 4.58 | 0.151 |

*Note:* Data required for comparisons is unavailable in SICs 02, 07, 08, 09, 10, 12, 13, 14, 15, 16, 17, 37, 40, 41, 42, 43, 44, 45, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 61, 61, 62, 63, 65, 70, 72, 73, 75, 76, 78, 79, 80, 82, 83, 84, 86, 87, 88, 91, 92, 93, 94, 95, 96, 97, and 99.

Only SICs 21 and 23 had correlation coefficients below .97, with $R = .85$ and .64 respectively. This particular difference in output concept thus appears to have only a minimal role in explaining differences in real growth rates among output series for any given industry group.

*Case Studies*

For some of the SIC two-digit industries with significant differences in output measures, the differences at the two-digit level could be traced to the more detailed three- and four-digit industries.[48] Sufficient detailed industry output data are available for industry group 10, Metal Mining; 20, Food and Kindred Products; 21, Tobacco Products; 27, Printing, Publishing, and Allied Industries; 29, Petroleum Refining; 31, Leather and Leather Products; 35, Industrial and Commercial Machinery and Computer Equipment; 38, Measuring, Analyzing, and Controlling Instruments; Photographic, Medical, and Optical Goods; and Watches and Clocks; 39, Miscellaneous Manufacturing; 48, Communications; 72, Personal Services; and 78, Motion Pictures. Among these industry groups, case studies were conducted for SICs 10, 27, 29, 31, 35, 38, 48, and 72. Data for these industry groups are summarized in table 9B.3. By comparing the underlying BEA and BLS SIC three- or four-digit industry data in each of these two-digit industries, we can determine if differences in output measurement at the three- and four-digit level are contributing to the higher-level differences.

*Metal Mining (SIC 10).* In this industry group, the underlying four-digit industries overwhelmingly exhibit differences in output behavior. At the two-digit level, the $Y^{\text{G-2}}_{\text{BEA-P}}$ and $Y^{\text{G-2}}_{\text{BLS-M-U}}$ constant- and current-dollar output series differ significantly. As seen in table 9B.4, at a four-digit level, $Y^{\text{G-4}}_{\text{BEA-U}}$ and $Y^{\text{S-4}}_{\text{BLS-I-P,U}}$ output series are available for five of the nine four-digit industries, and for four of these industries the $Y^{\text{G-4}}_{\text{BEA-U}}$ and $Y^{\text{S-4}}_{\text{BLS-I-P,U}}$ real output series have differences in acceleration ranging from –1.28 points to 7.54 points. The annual percent changes of the nominal $Y^{\text{G-4}}_{\text{BEA-U}}$ and $Y^{\text{S-4}}_{\text{BLS-I-P,U}}$ output are highly correlated for each of the four-digit industries, although current-dollar trend growth rates for 1011, 1041, and 1044 differ, particularly for 1990–95.

*Printing, Publishing, and Allied Industries (SIC 27).* The $Y^{\text{G-2}}_{\text{BEA-P}}$ and $Y^{\text{S-2}}_{\text{BLS-I-U}}$ real output series exhibit differences in acceleration of –1.51 points and a correlation coefficient of .769. Of the eight underlying three-digit industries, three have differences in acceleration among the $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ real output series ranging from –2.09 points to –5.70 points, and a fourth has a correlation coefficient of .269 between the $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ real output series. Four of the fourteen SIC four-digit industries in this

48. Because SIC three- and four-digit output measures are not available from the BLS major-sector program, the comparisons are limited to industries where the BEA and BLS industry productivity program output measures are both available.

group have low correlations between the annual percent change rates for the real output measures $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$. Particularly noticeable is SIC 2771, Greeting Cards, with a correlation of .269.

*Petroleum Refining and Related Industries (SIC 29).* This industry is included primarily because of the extremely low correlation coefficients between the $Y^{G-2}_{BEA-P}$ and $Y^{S-2}_{BLS-I-P}$ output series (–.044) and the $Y^{G-2}_{BEA-P}$ and $Y^{S-2}_{BLS-M-P}$ output series (–.013). Looking at the constant-dollar output series for the three three-digit industries in this group shows that SIC 291, Petroleum Refining, also has a very low negative correlation (–.130) between the $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ output series. BEA and BLS current-dollar data series are highly correlated in each of these industries.[49]

*Leather and Leather Products (SIC 31).* Both the $Y^{S-2}_{BLS-I-U}$ and $Y^{S-2}_{BLS-M-P}$ output series appear to differ from the $Y^{G-2}_{BEA-P}$ output series. Of the seven underlying three-digit industries, four have differences in acceleration ranging from 1.24 points to –8.77 points using the $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-U,P}$ output series, and one of these four (SIC 313) has a correlation coefficient of .611 between these two output series. Current-dollar data series for these output measures are highly correlated in six of the seven three-digit industries, with a correlation coefficient of .625 for SIC 313.

*Industrial and Commercial Machinery and Computer Equipment (SIC 35).* For this industry, both the $Y^{S-2}_{BLS-I-U}$ and $Y^{S-2}_{BLS-M-P}$ series have an acceleration rate about 1 percentage point greater than the $Y^{G-2}_{BEA-P}$ output series. For the nine three-digit industries in this group, the $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ real output series appear to be quite close, with one exception. SIC 357, Computer and Office Equipment, which exhibits a rather large acceleration between the 1990–95 and 1995–2000 time periods, has an acceleration difference of –2.87 points between the $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ real output series, although the series are highly correlated. This may in part reflect BEA adjustments to underlying data.

*Measuring, Analyzing and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks (SIC 38).* This industry exhibits differences in output series at the two-digit level primarily because of the low correlation between the $Y^{G-2}_{BEA-P}$ and $Y^{S-2}_{BLS-M-P}$ series (.597), and the $Y^{S-2}_{BLS-I-U}$ and $Y^{S-2}_{BLS-M-P}$ series (.701). The trend growth rates of these series for 1990–95 and 1995–2000 are fairly similar. The current-dollar data series for each of these SIC 38 output measures also are very poorly correlated. Of the six three-digit industries in this group, SIC 381, Search, Detection, Navigation, Guidance, Aeronautical and Nautical has a difference in acceleration for the $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ constant-dollar output measures of –1.09 points, and SIC 387, Watches, Clocks, and Clockwork-Operated Devices, has a differences in acceleration for the $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-U}$ constant-

49. It should be noted that the $Y^{S-3}_{BLS-I-p}$ measure is a physical quantity measure, as compared to the $Y^{G-3}_{BEA-U}$ measure, which is developed using Census value of shipments data.

dollar output measures of 5.61 points. However, the real and nominal annual percent change in output series are highly correlated at the SIC three-digit level.

*Communications (SIC 48).* The two-digit output series are found to differ based both on differences in acceleration between the $Y^{G\text{-}2}_{BEA\text{-}P}$ and $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ output series, and a correlation coefficient of .70. Selected data are available for this industry at a three-digit level, including SIC 483, Radio and Television Broadcasting Stations, and SIC 484, Cable and Other Pay Television Stations. $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ constant-dollar output series for both of these industries differ as indicated both by differences in acceleration and low correlation between the output series. In SIC 483, the $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ measures have a difference in acceleration of –1.21 points, and a correlation coefficient of .73. In SIC 484, the $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ measures have a difference in acceleration of –1.70 points and a correlation coefficient of .47. In SICs 483 and 484, the correlation coefficients for annual percent change in the current-dollar output series for the $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ measures are .392 and .494 respectively, suggesting that differences exist in the underlying data.

*SIC Four-Digit Industry Differences*

In addition to comparisons of the $Y^{G\text{-}2}_{BEA\text{-}P}$, $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$, and $Y^{S\text{-}2}_{BLS\text{-}M\text{-}P}$ output measures for the SIC two-digit manufacturing industries, we have compared BEA and BLS SIC four-digit industry real output measures for all industries where both measures are available. The BEA measures for the four-digit industries, $Y^{G\text{-}4}_{BEA\text{-}U}$ are either the unadjusted gross output measures, based primarily on Census annual survey data[50] and benchmarked to the input-output accounts (nonmanufacturing), or the unadjusted shipments-based output measures (manufacturing). The BLS measures for the four-digit industries, $Y^{S\text{-}4}_{BLS\text{-}I\text{-}U,P}$, are BLS sectoral output measures, which are generally based on the quinquennial Census and annual survey data from the Bureau of the Census. Less commonly, in some industries these measures are based on physical quantity data. Where both output measures are available, differences in acceleration rates were computed for the 1990–95 and 1995–2000 time periods. For 128 of the 458 SIC four-digit industries compared, or roughly 28 percent of the industries, differences in acceleration rates of greater than 1.0 points were found to exist between the $Y^{G\text{-}4}_{BEA\text{-}U}$ and the $Y^{S\text{-}4}_{BLS\text{-}I\text{-}U,P}$ output measures.

*Summary of Detailed Industry Differences*

While BEA and BLS output measures for detailed manufacturing industries are quite similar, it may be important to address some differences

50. While these measures generally are based on the Census annual survey data, they may also involve data from a variety of other sources.

in current-dollar source data and agency-specific adjustments in order to improve consistency among these measures. For the majority of nonmanufacturing industries, BEA and BLS output measures differ significantly, primarily because of differences in underlying data sources, price index choices, and deflation methods. However, these differences can be readily addressed. An effort to understand the sources of differences among the BEA and BLS nonmanufacturing output measures, at all levels, is highly recommended and has potentially large benefits for data users. Where appropriate, given the purposes of the measures, greater consistency among measures can be achieved. Finally, reasons for remaining differences among the output measures should be documented and described.

## 9.5 Summary

This chapter takes some initial steps toward the goal of constructing complete integrated production accounts for the U.S. economy. These steps include the provision of a description of an ideal framework, the construction of an illustrative integrated aggregate level account, and an extensive examination of the various industry output measures that have been published by the BEA and the BLS.

This chapter spells out a more ambitious framework for a "production account' than that presented in earlier national accounting literature. The framework is intended to describe, from the ground up, the process of assembling data to account for growth along the lines of JGF. The framework starts with data on industry production of commodities and on interindustry flows (both in nominal terms), similar to those available in an input-output system, and with data on commodity prices. The production account describes deflation and Divisia or superlative aggregation. This leads to measures of real input, real output, and productivity.

The chapter also presents an integrated aggregate production account for the U.S. private business and private nonfarm business sectors. It shows how line items from the BEA's national accounts are used in moving from total economy nominal GDP to business sector nominal output and how that, in turn, consists of components such as labor compensation, property income, indirect taxes, subsidies, and statistical discrepancy. For the business sectors, the chapter also presents real output, published by the BEA, and real inputs and MFP as published by BLS.

Finally, it describes the most comprehensive effort to date to document, present, and compare the various measures of industry output available from the BEA and BLS. The chapter describes which measures are available, provides information on how they are put together by the agencies, and where possible compares the measures empirically. Several comparisons are made to assess whether the differences that exist are due to differences in nominal output (differences in data sources), differences in concept, differences in adjustments to data, or differences in deflation. In the future, the results of these comparisons may be used by the two agencies to construct crosswalks between series and, wherever warranted, to reduce the differences. The comparisons are in the form of spreadsheets, and these materials will be made available to the research community.

This paper represents an important collaborative first step between the BEA and BLS. Future efforts will focus on further explaining and documenting differences in BEA and BLS measures with a goal of improving the accuracy of these accounts. This improvement will be achieved by capturing the best features of both data sets, harmonizing and integrating the measures when appropriate, and increasing understanding of the remaining differences to facilitate economic research, in particular that focusing on economic growth and productivity. In some cases the BEA and BLS measures differ because the primary purpose for which the measures are constructed dictates differences in methodology. For example, the BEA estimates benchmark input-output accounts every five years. Because input-output conventions call for the trade sector to be a margin sector, the BEA follows that convention. The BLS, on the other hand, estimates trade productivity, defining sectoral output in terms of sales volume. In other cases methodological differences are a product of decisions made where the BEA methodology would have been acceptable to the BLS (and vice versa) if methodologies had been coordinated across agencies. In these cases, the BEA and BLS intend to coordinate methodologies after they have been jointly reviewed by the relevant staff. Going forward, the transition to NAICS and any attempt to estimate historical time series on a NAICS basis represent an important opportunity for cross-agency methodology coordination.

# Appendix A

**Table 9A.1 BLS time series: Private business (MFP table PB1a, PB1b, and PB4b)**

| | Time series associated with table 1 (billions of dollars) | | | Index time series associated with table 3 (1996 = 100.0) | | | | |
|---|---|---|---|---|---|---|---|---|
| | Line 9b | Line 9b-ii | Line 9b-i | | | | | |
| Year | Current dollar output | Labor compensation | Cost of capital services | Real output | Labor input | Capital services | Combined input quantity | Multifactor productivity |
| 1948 | 225.5 | 142.4 | 68.8 | 18.6 | 51.1 | 17.2 | 36.1 | 51.6 |
| 1949 | 218.3 | 137.0 | 66.2 | 18.6 | 49.4 | 17.6 | 35.6 | 52.2 |
| 1950 | 243.0 | 149.9 | 76.7 | 20.5 | 50.3 | 18.3 | 36.5 | 56.0 |
| 1951 | 276.6 | 171.1 | 87.7 | 21.8 | 52.1 | 19.3 | 38.0 | 57.3 |
| 1952 | 288.6 | 181.3 | 87.5 | 22.2 | 52.2 | 19.9 | 38.5 | 57.8 |
| 1953 | 303.9 | 194.4 | 88.2 | 23.2 | 53.2 | 20.5 | 39.3 | 59.1 |
| 1954 | 301.9 | 193.2 | 87.7 | 23.0 | 51.7 | 20.9 | 38.8 | 59.2 |
| 1955 | 331.4 | 206.5 | 102.2 | 24.9 | 53.7 | 21.6 | 40.2 | 62.0 |
| 1956 | 352.1 | 223.6 | 104.2 | 25.4 | 54.6 | 22.3 | 41.1 | 61.7 |
| 1957 | 367.7 | 234.6 | 108.3 | 25.8 | 53.9 | 23.0 | 41.1 | 62.6 |
| 1958 | 366.3 | 233.1 | 107.9 | 25.3 | 51.6 | 23.4 | 40.1 | 62.9 |
| 1959 | 400.3 | 251.7 | 121.0 | 27.1 | 53.7 | 23.9 | 41.6 | 65.1 |
| 1960 | 413.6 | 262.4 | 121.0 | 27.5 | 54.0 | 24.6 | 42.1 | 65.5 |
| 1961 | 424.6 | 268.8 | 125.2 | 28.1 | 53.3 | 25.1 | 42.0 | 66.9 |
| 1962 | 455.6 | 286.9 | 136.8 | 29.9 | 54.8 | 25.8 | 43.2 | 69.3 |
| 1963 | 479.9 | 299.5 | 147.1 | 31.3 | 55.2 | 26.7 | 43.8 | 71.4 |
| 1964 | 514.4 | 321.8 | 156.9 | 33.3 | 56.2 | 27.6 | 44.9 | 74.2 |
| 1965 | 559.0 | 346.3 | 174.7 | 35.6 | 58.0 | 28.9 | 46.5 | 76.6 |
| 1966 | 608.2 | 381.3 | 187.5 | 38.1 | 59.5 | 30.5 | 48.2 | 78.9 |
| 1967 | 638.4 | 403.3 | 193.0 | 38.8 | 59.4 | 32.3 | 49.1 | 79.0 |
| 1968 | 697.1 | 440.9 | 209.0 | 40.7 | 60.3 | 33.7 | 50.3 | 81.1 |
| 1969 | 752.3 | 483.2 | 217.4 | 42.0 | 62.1 | 35.5 | 52.1 | 80.6 |
| 1970 | 780.9 | 508.5 | 216.5 | 42.0 | 61.0 | 37.1 | 52.2 | 80.5 |
| 1971 | 842.0 | 539.1 | 240.7 | 43.6 | 60.5 | 38.7 | 52.5 | 83.0 |
| 1972 | 931.2 | 594.3 | 272.0 | 46.5 | 62.6 | 40.3 | 54.5 | 85.5 |
| 1973 | 1050.8 | 673.6 | 306.7 | 49.8 | 64.8 | 42.6 | 56.8 | 87.8 |
| 1974 | 1132.1 | 735.5 | 319.5 | 49.0 | 65.2 | 44.9 | 57.9 | 84.6 |
| 1975 | 1222.0 | 771.9 | 368.9 | 48.5 | 62.4 | 46.6 | 56.8 | 85.4 |
| 1976 | 1367.9 | 868.2 | 414.0 | 51.9 | 64.2 | 48.1 | 58.5 | 88.6 |
| 1977 | 1540.7 | 972.4 | 467.4 | 54.8 | 66.8 | 50.0 | 60.9 | 90.0 |
| 1978 | 1757.3 | 1115.3 | 524.7 | 58.2 | 70.2 | 52.2 | 63.9 | 91.2 |
| 1979 | 1959.2 | 1262.4 | 568.5 | 60.2 | 72.4 | 54.8 | 66.2 | 90.8 |
| 1980 | 2117.8 | 1374.0 | 602.1 | 59.4 | 71.9 | 57.6 | 67.0 | 88.8 |
| 1981 | 2382.8 | 1510.8 | 705.1 | 61.0 | 73.0 | 60.5 | 68.7 | 88.9 |
| 1982 | 2468.6 | 1576.6 | 739.9 | 59.3 | 71.7 | 63.0 | 68.8 | 86.2 |
| 1983 | 2643.6 | 1673.4 | 799.1 | 62.5 | 73.4 | 65.0 | 70.5 | 88.6 |
| 1984 | 2992.3 | 1867.1 | 934.5 | 68.1 | 77.7 | 68.1 | 74.4 | 91.5 |
| 1985 | 3205.2 | 2010.8 | 983.8 | 71.0 | 79.6 | 71.3 | 76.8 | 92.4 |
| 1986 | 3344.3 | 2134.1 | 990.0 | 73.6 | 80.4 | 74.4 | 78.4 | 93.9 |

*(continued)*

**Table 9A.1** (continued)

| Year | Time series associated with table 1 (billions of dollars) | | | Index time series associated with table 3 (1996 = 100.0) | | | | |
|---|---|---|---|---|---|---|---|---|
| | Line 9b | Line 9b-ii | Line 9b-i | | | | | |
| | Current dollar output | Labor compensation | Cost of capital services | Real output | Labor input | Capital services | Combined input quantity | Multifactor productivity |
| 1987 | 3591.9 | 2274.7 | 1088.3 | 76.3 | 83.1 | 76.9 | 81.0 | 94.2 |
| 1988 | 3906.9 | 2461.9 | 1212.6 | 79.6 | 86.3 | 79.2 | 83.9 | 94.8 |
| 1989 | 4132.8 | 2606.3 | 1273.6 | 82.4 | 88.8 | 81.6 | 86.4 | 95.3 |
| 1990 | 4329.9 | 2750.1 | 1317.4 | 83.6 | 89.4 | 83.8 | 87.5 | 95.5 |
| 1991 | 4432.0 | 2800.7 | 1328.8 | 82.6 | 88.3 | 85.7 | 87.4 | 94.5 |
| 1992 | 4661.3 | 2956.9 | 1381.2 | 85.7 | 89.3 | 87.5 | 88.7 | 96.7 |
| 1993 | 4897.5 | 3101.3 | 1451.3 | 88.5 | 91.8 | 89.7 | 91.1 | 97.1 |
| 1994 | 5239.6 | 3265.5 | 1602.6 | 92.8 | 95.6 | 92.5 | 94.6 | 98.2 |
| 1995 | 5541.7 | 3430.6 | 1700.8 | 95.8 | 98.0 | 96.0 | 97.3 | 98.4 |
| 1996 | 5874.5 | 3600.7 | 1839.8 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1997 | 6299.3 | 3830.0 | 1973.2 | 105.2 | 103.5 | 104.9 | 104.0 | 101.2 |
| 1998 | 6729.2 | 4149.7 | 2043.6 | 110.5 | 106.1 | 111.3 | 107.9 | 102.5 |
| 1999 | 7121.6 | 4446.1 | 2154.8 | 115.7 | 109.0 | 117.9 | 111.9 | 103.4 |
| 2000 | 7624.2 | 4819.4 | 2222.6 | 120.4 | 110.1 | 124.5 | 114.7 | 105.0 |
| 2001 | 7748.8 | 4899.9 | 2255.5 | 120.2 | 109.5 | 129.6 | 115.7 | 103.9 |

**Table 9A.2** **BLS time series: Private nonfarm business (MFP table NFB1a, NFB1b, and NFB4b)**

| Year | Time series associated with table 1 (billions of dollars) | | | Index time series associated with table 3 (1996 = 100.0) | | | | |
|---|---|---|---|---|---|---|---|---|
| | Line 13b | Line 13b-ii | Line 13b-i | | | | | |
| | Current dollar output | Labor compensation | Cost of capital services | Real output | Labor input | Capital services | Combined input quantity | Multifactor productivity |
| 1948 | 203.2 | 128.6 | 60.2 | 18.0 | 44.1 | 15.2 | 31.8 | 56.4 |
| 1949 | 200.6 | 126.3 | 59.1 | 17.9 | 42.2 | 15.6 | 31.2 | 57.6 |
| 1950 | 224.1 | 139.0 | 68.6 | 19.7 | 43.7 | 16.2 | 32.3 | 61.1 |
| 1951 | 254.7 | 159.6 | 77.2 | 21.3 | 45.8 | 17.1 | 33.9 | 62.7 |
| 1952 | 267.6 | 170.7 | 77.0 | 21.8 | 46.6 | 17.7 | 34.7 | 62.7 |
| 1953 | 285.0 | 184.9 | 78.6 | 22.7 | 48.1 | 18.2 | 35.8 | 63.5 |
| 1954 | 283.5 | 183.9 | 78.5 | 22.4 | 46.7 | 18.7 | 35.3 | 63.5 |
| 1955 | 314.0 | 198.4 | 92.7 | 24.4 | 48.6 | 19.3 | 36.7 | 66.5 |
| 1956 | 334.8 | 215.6 | 94.5 | 24.9 | 49.9 | 20.1 | 37.8 | 65.9 |
| 1957 | 350.6 | 226.7 | 98.2 | 25.4 | 49.8 | 20.7 | 38.1 | 66.6 |
| 1958 | 347.2 | 224.6 | 96.4 | 24.9 | 47.7 | 21.1 | 37.2 | 66.8 |
| 1959 | 382.8 | 243.9 | 110.7 | 26.7 | 49.9 | 21.6 | 38.7 | 69.1 |
| 1960 | 395.2 | 254.7 | 109.5 | 27.2 | 50.1 | 22.3 | 39.2 | 69.4 |

**Table 9A.2** (continued)

| | Time series associated with table 1 (billions of dollars) | | | Index time series associated with table 3 (1996 = 100.0) | | | | |
|---|---|---|---|---|---|---|---|---|
| | Line 13b | Line 13b-ii | Line 13b-i | | | | | |
| Year | Current dollar output | Labor compensation | Cost of capital services | Real output | Labor input | Capital services | Combined input quantity | Multifactor productivity |
| 1961 | 405.9 | 260.5 | 113.4 | 27.7 | 49.9 | 22.9 | 39.3 | 70.5 |
| 1962 | 436.9 | 278.2 | 125.1 | 29.6 | 51.5 | 23.6 | 40.6 | 73.0 |
| 1963 | 461.0 | 291.2 | 135.0 | 31.0 | 52.1 | 24.4 | 41.4 | 75.0 |
| 1964 | 496.6 | 313.5 | 145.6 | 33.1 | 53.4 | 25.4 | 42.6 | 77.8 |
| 1965 | 538.7 | 336.9 | 161.7 | 35.5 | 55.4 | 26.6 | 44.3 | 80.0 |
| 1966 | 587.0 | 371.2 | 173.5 | 38.0 | 57.2 | 28.3 | 46.2 | 82.3 |
| 1967 | 618.0 | 394.2 | 178.9 | 38.7 | 57.1 | 30.0 | 47.0 | 82.2 |
| 1968 | 676.2 | 431.6 | 194.4 | 40.8 | 58.2 | 31.4 | 48.3 | 84.4 |
| 1969 | 729.1 | 473.3 | 200.8 | 42.0 | 60.1 | 33.1 | 50.2 | 83.6 |
| 1970 | 756.8 | 497.9 | 199.8 | 41.9 | 59.3 | 34.8 | 50.5 | 83.1 |
| 1971 | 816.2 | 528.4 | 222.9 | 43.6 | 58.9 | 36.3 | 50.9 | 85.6 |
| 1972 | 901.0 | 582.5 | 250.1 | 46.6 | 60.9 | 38.1 | 52.8 | 88.2 |
| 1973 | 1003.6 | 657.2 | 273.4 | 50.0 | 63.3 | 40.3 | 55.2 | 90.7 |
| 1974 | 1087.4 | 720.5 | 289.3 | 49.2 | 63.7 | 42.6 | 56.3 | 87.4 |
| 1975 | 1175.9 | 756.4 | 337.6 | 48.4 | 60.9 | 44.3 | 55.2 | 87.6 |
| 1976 | 1324.3 | 853.0 | 384.9 | 51.9 | 62.8 | 45.9 | 57.0 | 91.1 |
| 1977 | 1496.5 | 957.4 | 436.5 | 54.9 | 65.4 | 47.7 | 59.3 | 92.4 |
| 1978 | 1705.7 | 1099.4 | 486.6 | 58.4 | 68.8 | 49.9 | 62.3 | 93.7 |
| 1979 | 1898.2 | 1244.3 | 524.5 | 60.3 | 71.1 | 52.6 | 64.8 | 93.1 |
| 1980 | 2065.3 | 1357.8 | 564.8 | 59.6 | 70.7 | 55.4 | 65.5 | 91.0 |
| 1981 | 2316.8 | 1493.6 | 654.8 | 60.8 | 71.7 | 58.4 | 67.2 | 90.5 |
| 1982 | 2407.4 | 1559.2 | 693.9 | 59.0 | 70.6 | 61.0 | 67.4 | 87.5 |
| 1983 | 2598.4 | 1658.5 | 761.3 | 62.8 | 72.3 | 63.3 | 69.3 | 90.6 |
| 1984 | 2927.7 | 1849.9 | 880.1 | 68.1 | 76.7 | 66.4 | 73.3 | 93.0 |
| 1985 | 3141.9 | 1993.9 | 931.3 | 70.8 | 78.8 | 69.8 | 75.8 | 93.4 |
| 1986 | 3285.2 | 2117.6 | 937.9 | 73.5 | 79.8 | 73.0 | 77.6 | 94.8 |
| 1987 | 3530.4 | 2257.1 | 1030.9 | 76.2 | 82.5 | 75.8 | 80.3 | 94.9 |
| 1988 | 3846.7 | 2442.2 | 1160.5 | 79.7 | 85.9 | 78.3 | 83.4 | 95.6 |
| 1989 | 4060.3 | 2584.3 | 1213.9 | 82.4 | 88.5 | 80.8 | 86.0 | 95.8 |
| 1990 | 4254.3 | 2725.4 | 1259.0 | 83.5 | 89.2 | 83.2 | 87.2 | 95.8 |
| 1991 | 4362.8 | 2777.3 | 1276.2 | 82.5 | 87.9 | 85.1 | 87.0 | 94.8 |
| 1992 | 4584.9 | 2932.7 | 1321.4 | 85.5 | 89.0 | 87.0 | 88.4 | 96.7 |
| 1993 | 4828.3 | 3076.1 | 1396.0 | 88.4 | 91.8 | 89.4 | 91.0 | 97.2 |
| 1994 | 5160.3 | 3237.3 | 1545.1 | 92.6 | 95.4 | 92.2 | 94.3 | 98.2 |
| 1995 | 5473.1 | 3404.0 | 1652.8 | 95.8 | 97.8 | 95.8 | 97.2 | 98.6 |
| 1996 | 5787.1 | 3570.8 | 1776.1 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1997 | 6216.1 | 3800.4 | 1913.2 | 105.1 | 103.6 | 105.1 | 104.1 | 101.0 |
| 1998 | 6654.0 | 4120.6 | 1986.5 | 110.5 | 106.4 | 111.7 | 108.1 | 102.2 |
| 1999 | 7052.0 | 4415.7 | 2097.3 | 115.7 | 109.5 | 118.5 | 112.4 | 102.9 |
| 2000 | 7552.3 | 4789.7 | 2161.0 | 120.2 | 110.6 | 125.4 | 115.2 | 104.4 |
| 2001 | 7674.3 | 4866.4 | 2197.0 | 120.1 | 110.1 | 130.5 | 116.3 | 103.3 |

**Table 9A.3 BEA nominal time series associated with table 1 (billions of dollars)**

| | Table 1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Line 1 | Line 2 | Line 2a | Line 2b | Line 3 | Line 4 | Line 6 | Line 7 |
| | NIPA table 1.7 | | | | NIPA table 8.21 | | | |
| | Line 1 | Line 7 | Line 8 | Line 9 | Line 10 | Line 2 | Line 172 | Line 173 |
| Year | Gross domestic product | Households and institutions | Private households | NPIs serving individuals | General government | Gross domestic business product | Owner-occupied housing | Rental value of nonresidential assets owned and used by NPIs serving individuals |
| 1948 | 269.6 | 5.6 | 2.4 | 3.2 | 27.3 | 236.6 | 8.4 | 0.8 |
| 1949 | 267.7 | 5.9 | 2.4 | 3.6 | 28.4 | 233.3 | 9.4 | 0.8 |
| 1950 | 294.3 | 6.5 | 2.6 | 3.9 | 28.7 | 259.1 | 10.6 | 0.9 |
| 1951 | 339.5 | 6.9 | 2.7 | 4.3 | 35.8 | 296.8 | 12.2 | 1.0 |
| 1952 | 358.6 | 7.2 | 2.6 | 4.6 | 40.5 | 310.9 | 14.0 | 1.1 |
| 1953 | 379.9 | 7.8 | 2.7 | 5.1 | 42.2 | 329.9 | 15.9 | 1.1 |
| 1954 | 381.1 | 8.1 | 2.6 | 5.5 | 43.5 | 329.4 | 17.7 | 1.2 |
| 1955 | 415.2 | 9.1 | 3.1 | 6.1 | 45.9 | 360.2 | 19.3 | 1.3 |
| 1956 | 438.0 | 9.9 | 3.3 | 6.6 | 49.2 | 378.9 | 21.0 | 1.4 |
| 1957 | 461.5 | 10.6 | 3.3 | 7.3 | 52.6 | 398.3 | 22.8 | 1.6 |
| 1958 | 467.9 | 11.5 | 3.5 | 8.0 | 55.9 | 400.5 | 24.8 | 1.6 |
| 1959 | 507.4 | 12.4 | 3.6 | 8.9 | 58.4 | 436.6 | 26.9 | 1.6 |
| 1960 | 527.4 | 13.9 | 3.8 | 10.1 | 62.1 | 451.3 | 29.2 | 1.8 |
| 1961 | 545.7 | 14.5 | 3.7 | 10.7 | 66.1 | 465.1 | 31.2 | 1.9 |
| 1962 | 586.5 | 15.6 | 3.8 | 11.8 | 70.9 | 500.0 | 33.6 | 2.0 |
| 1963 | 618.7 | 16.7 | 3.8 | 12.8 | 75.7 | 526.3 | 35.6 | 2.2 |
| 1964 | 664.4 | 17.9 | 3.9 | 14.0 | 81.3 | 565.2 | 37.6 | 2.4 |
| 1965 | 720.1 | 19.3 | 4.0 | 15.3 | 86.8 | 613.9 | 40.1 | 2.6 |
| 1966 | 789.3 | 21.3 | 4.0 | 17.2 | 97.0 | 671.0 | 42.8 | 2.9 |
| 1967 | 834.1 | 23.4 | 4.2 | 19.2 | 107.3 | 703.4 | 45.6 | 3.2 |
| 1968 | 911.5 | 26.1 | 4.4 | 21.7 | 119.3 | 766.1 | 48.4 | 3.6 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1969 | 985.3 | 29.5 | 4.4 | 25.0 | 130.5 | 825.4 | 52.3 | 4.0 |
| 1970 | 1039.7 | 32.4 | 4.5 | 27.9 | 144.2 | 863.1 | 56.1 | 4.5 |
| 1971 | 1128.6 | 35.6 | 4.6 | 31.0 | 157.3 | 935.7 | 61.5 | 5.0 |
| 1972 | 1240.4 | 38.9 | 4.6 | 34.3 | 171.5 | 1030.0 | 66.7 | 5.5 |
| 1973 | 1385.5 | 43.0 | 4.8 | 38.2 | 185.7 | 1156.8 | 72.8 | 6.3 |
| 1974 | 1501.0 | 47.1 | 4.6 | 42.6 | 203.4 | 1250.5 | 79.8 | 7.3 |
| 1975 | 1635.2 | 52.0 | 4.6 | 47.3 | 226.4 | 1356.8 | 86.5 | 8.4 |
| 1976 | 1823.9 | 57.1 | 5.4 | 51.6 | 245.3 | 1521.6 | 94.5 | 9.1 |
| 1977 | 2031.4 | 62.4 | 5.9 | 56.4 | 266.2 | 1702.8 | 103.7 | 9.9 |
| 1978 | 2295.9 | 69.7 | 6.5 | 63.2 | 288.9 | 1937.3 | 117.5 | 11.2 |
| 1979 | 2566.4 | 77.3 | 6.4 | 70.9 | 314.2 | 2174.9 | 134.6 | 12.7 |
| 1980 | 2795.6 | 87.1 | 6.1 | 81.0 | 349.7 | 2358.8 | 157.4 | 14.6 |
| 1981 | 3131.3 | 97.6 | 6.2 | 91.4 | 386.5 | 2647.3 | 179.6 | 16.8 |
| 1982 | 3259.2 | 108.2 | 6.3 | 102.0 | 421.2 | 2729.8 | 196.5 | 19.0 |
| 1983 | 3534.9 | 119.2 | 6.3 | 112.9 | 447.7 | 2968.1 | 209.2 | 20.7 |
| 1984 | 3932.7 | 131.2 | 7.3 | 123.9 | 487.7 | 3313.9 | 228.1 | 22.2 |
| 1985 | 4213.0 | 141.0 | 7.3 | 133.6 | 525.3 | 3546.8 | 246.0 | 24.1 |
| 1986 | 4452.9 | 153.7 | 7.7 | 146.0 | 558.2 | 3740.9 | 263.3 | 25.7 |
| 1987 | 4742.5 | 173.3 | 7.7 | 165.6 | 593.1 | 3976.0 | 284.7 | 28.1 |
| 1988 | 5108.3 | 195.1 | 8.3 | 186.8 | 632.0 | 4281.2 | 311.3 | 30.8 |
| 1989 | 5489.1 | 214.6 | 8.9 | 205.7 | 673.6 | 4600.9 | 338.1 | 33.6 |
| 1990 | 5803.2 | 237.9 | 9.4 | 228.6 | 723.3 | 4842.0 | 362.2 | 36.1 |
| 1991 | 5986.2 | 257.5 | 9.1 | 248.4 | 766.3 | 4962.4 | 381.0 | 38.9 |
| 1992 | 6318.9 | 279.5 | 10.1 | 269.4 | 797.3 | 5242.1 | 398.2 | 41.8 |
| 1993 | 6642.3 | 297.0 | 10.7 | 286.3 | 827.3 | 5518.0 | 413.8 | 45.4 |
| 1994 | 7054.3 | 313.3 | 11.1 | 302.2 | 854.5 | 5886.6 | 439.7 | 45.7 |
| 1995 | 7400.5 | 330.3 | 11.9 | 318.4 | 880.1 | 6190.1 | 464.4 | 48.1 |
| 1996 | 7813.2 | 348.6 | 12.0 | 336.5 | 908.7 | 6556.0 | 487.1 | 49.8 |
| 1997 | 8318.4 | 363.2 | 12.0 | 351.2 | 944.6 | 7010.5 | 509.1 | 52.2 |
| 1998 | 8781.5 | 383.8 | 14.0 | 369.8 | 979.8 | 7418.0 | 541.0 | 55.2 |
| 1999 | 9274.3 | 403.1 | 12.7 | 390.4 | 1023.5 | 7847.7 | 581.9 | 55.2 |
| 2000 | 9824.6 | 431.1 | 13.6 | 417.5 | 1082.1 | 8311.4 | 621.5 | 58.7 |
| 2001 | 10082.2 | 459.6 | 11.9 | 447.7 | 1139.8 | 8482.7 | 648.5 | 61.2 |

*(continued)*

**Table 9A.3** (continued)

| | Table 1 | | | | |
|---|---|---|---|---|---|
| | Line 8a | Line 8b | Line 10 | Line 11 | Line 12 |
| | GDP by industry | | NIPA table 1.7 | NIPA table 8.21 | |
| | | | Line 6 | Line 114 | Line 117 |
| | Line 80 | Line 83 | Farms | Farm space rent for owner-occupied housing | Farm intermediate inputs for owner-occupied housing |
| 1948 | 1.4 | 1.4 | 23.3 | 1.4 | 0.4 |
| 1949 | 1.5 | 1.6 | 18.7 | 1.3 | 0.3 |
| 1950 | 1.3 | 1.7 | 19.9 | 1.4 | 0.3 |
| 1951 | 1.3 | 1.9 | 22.9 | 1.5 | 0.4 |
| 1952 | 2.0 | 2.1 | 22.1 | 1.6 | 0.4 |
| 1953 | 2.1 | 2.3 | 20.1 | 1.6 | 0.4 |
| 1954 | 2.4 | 2.4 | 19.5 | 1.6 | 0.4 |
| 1955 | 2.5 | 2.7 | 18.6 | 1.6 | 0.4 |
| 1956 | 2.4 | 2.9 | 18.4 | 1.6 | 0.4 |
| 1957 | 2.7 | 3.0 | 18.3 | 1.7 | 0.4 |
| 1958 | 2.9 | 3.1 | 20.5 | 1.7 | 0.4 |
| 1959 | 3.2 | 3.6 | 18.9 | 1.8 | 0.5 |
| 1960 | 3.4 | 4.0 | 19.8 | 1.9 | 0.5 |
| 1961 | 3.4 | 4.1 | 20.1 | 2.0 | 0.6 |
| 1962 | 3.6 | 4.5 | 20.2 | 2.0 | 0.6 |
| 1963 | 4.2 | 4.9 | 20.4 | 2.1 | 0.6 |
| 1964 | 4.4 | 5.2 | 19.3 | 2.2 | 0.7 |
| 1965 | 4.7 | 5.5 | 21.9 | 2.3 | 0.7 |
| 1966 | 4.9 | 5.8 | 22.9 | 2.4 | 0.7 |
| 1967 | 5.3 | 6.0 | 22.2 | 2.5 | 0.8 |
| 1968 | 6.2 | 6.5 | 22.7 | 2.6 | 0.7 |
| 1969 | 6.7 | 7.1 | 25.2 | 2.8 | 0.8 |
| 1970 | 7.1 | 7.7 | 26.2 | 3.0 | 0.8 |

| | | | | | |
|---|---|---|---|---|---|
| 1971 | 7.7 | 8.2 | 28.1 | 3.2 | 0.9 |
| 1972 | 9.0 | 8.9 | 32.6 | 3.4 | 1.0 |
| 1973 | 9.0 | 9.9 | 49.8 | 3.5 | 1.0 |
| 1974 | 10.8 | 10.5 | 47.4 | 3.6 | 1.0 |
| 1975 | 10.8 | 11.5 | 48.8 | 3.7 | 1.0 |
| 1976 | 13.5 | 12.0 | 46.4 | 3.8 | 1.0 |
| 1977 | 14.1 | 12.7 | 47.2 | 4.0 | 1.0 |
| 1978 | 16.2 | 14.0 | 54.7 | 4.3 | 1.1 |
| 1979 | 17.9 | 14.7 | 64.5 | 4.5 | 1.1 |
| 1980 | 19.4 | 15.7 | 56.1 | 4.7 | 1.1 |
| 1981 | 24.0 | 16.6 | 69.9 | 4.9 | 1.0 |
| 1982 | 25.0 | 18.3 | 65.1 | 4.7 | 0.8 |
| 1983 | 26.3 | 21.3 | 49.2 | 4.7 | 0.8 |
| 1984 | 27.8 | 25.0 | 68.5 | 4.7 | 0.8 |
| 1985 | 31.1 | 28.7 | 67.1 | 4.6 | 0.8 |
| 1986 | 32.5 | 31.3 | 63.0 | 4.5 | 0.7 |
| 1987 | 34.5 | 33.5 | 65.1 | 4.6 | 1.0 |
| 1988 | 37.4 | 37.0 | 63.8 | 4.5 | 0.8 |
| 1989 | 39.5 | 40.5 | 76.2 | 4.6 | 0.9 |
| 1990 | 40.4 | 42.8 | 79.6 | 4.8 | 0.8 |
| 1991 | 46.5 | 44.3 | 73.2 | 4.9 | 0.9 |
| 1992 | 51.1 | 46.0 | 80.5 | 5.0 | 1.0 |
| 1993 | 49.2 | 48.2 | 73.6 | 5.2 | 0.9 |
| 1994 | 52.2 | 50.9 | 83.6 | 5.5 | 1.1 |
| 1995 | 55.5 | 53.9 | 73.2 | 5.6 | 1.0 |
| 1996 | 54.9 | 56.9 | 92.2 | 5.8 | 1.0 |
| 1997 | 59.2 | 60.9 | 88.3 | 6.1 | 1.0 |
| 1998 | 61.3 | 62.2 | 80.6 | 6.4 | 1.0 |
| 1999 | 62.2 | 65.6 | 75.2 | 6.8 | 1.2 |
| 2000 | 66.1 | 69.4 | 77.8 | 7.2 | 1.3 |
| 2001 | 63.4 | 78.1 | 80.6 | 7.6 | 1.4 |

*Note:* The GDP-by-industry data are from http://www.bea.gov/bea/dn2/gpo.htm, the zip files Gpo72sic.xls and Gpo87sic.xls.

# Appendix B

**Table 9B.1 Comparison of output measures: Concept of measurement methods**

| | BEA published gross output ($Y^{G}_{BEA\text{-}P}$) | BEA unpublished unadjusted gross output for nonmanufacturing detailed industries ($Y^{G\text{-}2,3,4}_{BEA\text{-}U}$) | BEA unpublished sum of shipments output series for detailed manufacturing industries ($Y^{SS\text{-}2,3,4}_{BEA\text{-}U}$) | BEA published value added output series ($Y^{VA}_{BEA\text{-}P}$) |
|---|---|---|---|---|
| Output concept | Gross output is the market value value of an industry's production including commodity taxes.<br>Gross output is measured as value of shipments plus inventory changes less cost of resales plus misreporting and coverage adjustments, plus adjustments for own-account production of software, own-account construction work, and commodity (sales) taxes. Adjustments for inventory change and cost of resales are made only for goods-producing industries. | For nonmanufacturing industries, unadjusted gross output is usually measured as receipts or sales.<br>For wholesale trade and retail trade, gross output is measured as sales minus the cost of goods sold (margin). | Sum of shipments is a narrower concept than gross output, computed puted as an intermediate step in the calculation of BEA's published gross output measure. | Value added output is the difference between gross output and the cost of raw materials and other inputs (intermediate inputs), which are used up in production. |
| Industry coverage | All industries, private industries, goods-producing industries, services-producing industries, SIC divisions, and selected 2-digit major groups of industries.<br>Data are available for all 2-digit manufacturing industries with the exception of 37. Instead of 37, data are available at the more detailed level for 371 and 372-9. Data are available for numerous 2-digit nonmanufacturing industries, including SIC 10, 12, 13, 14, 40, 41, 42, 44, 45, 46, 47, 48, 49, 60, 61, 62, 63, 64, 65, 67, 70, 72, 73, 75, 76, 78, 79, 80, 81, 82, 83, 86, and 88. | Data are available for selected SIC 2-, 3-, and 4-digit nonmanufacturing industries. | SIC 2-digit major groups, 3-digit industry groups, and 4-digit industries. | All industries, private industries, goods-producing industries, services-producing industries, SIC divisions, and selected 2-digit major groups of industries.<br>Data are available for all 2-digit manufacturing industries with the exception of 37. Instead of 37, data are available at the more detailed level for 371 and 372-9. Data are available for numerous 2-digit nonmanufacturing industries, including SIC 10, 12, 13, 14, 40, 41, 42, 44, 45, 46, 47, 48, 49, 60, 61, 62, 63, 64, 65, 67, 70, 72, 73, 75, 76, 78, 79, 80, 81, 82, 83, 86, and 88 |

| | | | | |
|---|---|---|---|---|
| Industry classification | Data for 1977–86 are on a 1972 SIC basis. Data for 1988–2001 are on a 1987 SIC basis. For 1987, both the 1972 and 1987 SIC basis is available. | Data for 1977–86 are on a 1972 SIC basis. Data for 1988–2001 are on a 1987 SIC basis. For 1987, both the 1972 and 1987 SIC basis is available. | Data for 1977–86 are on a 1972 SIC basis. Data for 1988–2001 are on a 1987 SIC basis. For 1987, both the 1972 and 1987 SIC basis is available. | Data for 1947–86 are on a 1972 SIC basis. Data for 1988–2001 are on a 1987 SIC basis. For 1987, both the 1972 and 1987 SIC basis is available. |
| Source data | The gross output data series are developed by additional adjustments to the unadjusted or "raw" data series ($Y^{G\text{-}2}_{BEA\text{-}U}$ and $Y^{SS\text{-}2}_{BEA\text{-}U}$) created for the detailed industries.<br>Additional adjustments are made for cost of resales, misreporting and coverage adjustments, own-account production of software, own-account construction work, and commodity (sales) taxes. | Current dollar estimates are obtained from BEA's benchmark input-output accounts for 1977, 1982, 1987, and 1992.<br>For nonbenchmark years, current dollar estimates are developed by interpolating annual series between benchmark levels and by extrapolating from the most recent benchmark. Annual interpolator and extrapolator series are developed from various sources, including BEA's NIPAs, Census Bureau annual surveys, other government surveys, and trade sources. | Census Bureau Annual Survey of Manufactures: Statistics for Industry Groups and Industries (Value of Estimated Shipments Data). | Current-dollar estimates are largely based on the components of gross domestic income from the NIPAs. Value added is the sum of compensation of employees, property-type income, and indirect business taxes and nontax liabilities. |
| Deflation procedure | Deflation is generally done with price indexes obtained from the BLS, the NIPAs, and trade sources. Deflation takes place at the most detailed component level possible. | Deflation is generally done with price indexes obtained from the BLS, the NIPAs, and trade sources. | Primary product, secondary product, and miscellaneous receipt deflators are largely derived from the BLS's Producer Price Indexes, but also BEA's deflators for computers, selected semiconductor products, telephone switching equipment, local area network equipment, and government purchases.<br>In the computation of these quantity and price indexes, the 4-digit industry shipments are first decomposed into their components: primary products, secondary products, and miscellaneous receipts. Each component is then deflated separately before applying the chain-type index formulas. | Double-deflation is used in most cases. |

*(continued)*

**Table 9B.1** (continued)

| | BEA published gross output ($Y^{G}_{BEA\text{-}P}$) | BEA unpublished unadjusted gross output for nonmanufacturing detailed industries ($Y^{G\text{-}2,3,4}_{BEA\text{-}U}$) | BEA unpublished sum of shipments output series for detailed manufacturing industries ($Y^{SS\text{-}2,3,4}_{BEA\text{-}U}$) | BEA published value added output series ($Y^{VA}_{BEA\text{-}P}$) |
|---|---|---|---|---|
| Aggregation methods | Fisher Index | Laspeyres Index | Fisher Index | Fisher Double-Deflation Index |
| Data available | Current-dollar output data are available for 1977–2001. Chain-type quantity and price indexes (1996 = 100) are available for 1977–2001. Data are available on the BEA web site, www.bea.gov. | Current-dollar receipts data are available for 1977–2001. Constant-dollar output data are available for 1977–86 in 1987 dollars and for 1988–2001 in 1996 dollars. Constant (1987) dollar and constant (1996) dollar estimates are available for 1987. Data are available on the BEA web site, www.bea.gov. | Current-dollar shipments data are available for 1977–2001. Chain-type quantity and price indexes with 1987 = 100 are available for 1977–86 and chain type quantity and price indexes with 1996 = 100 are available for 1988–2001. Chain-type quantity and price indexes with both 1987 = 100 and 1996 = 100 are available for 1987. Data are available on the BEA web site, www.bea.gov. | Current-dollar output data are available for 1947–2001. Chain-type quantity and price indexes (1996 = 100) are available for 1977–2001. Chain-dollar data are also available. Data are available on the BEA web site, www.bea.gov. |
| | BLS published sectoral output series for manufacturing industries ($Y^{S\text{-}1,2}_{BLS\text{-}P}$) | BLS unpublished gross ouput series for nonmanufacturing industries ($Y^{G\text{-}2}_{BLS\text{-}U}$) | BLS unpublished sectoral output series for SIC 2-digit manufacturing industries ($Y^{S\text{-}2}_{BLS\text{-}U}$) | BLS published sectoral output series for detailed industries ($Y^{S\text{-}3,4}_{BLS\text{-}P}$) |
| Output concept | Sectoral output is the value of shipments plus inventory changes, less intra-industry shipments. This sectoral output series is measured by BLS as the deflated value of shipments plus inventory change, plus federal excise taxes. Federal excise taxes are added so that production will be shown at market value. | Gross output is the market value of an industry's production, including commodity taxes. | Sectoral output is the value of shipments plus inventory changes, less resales and intra-industry shipments. The constant dollar output series is constructed for comparison purposes only, by Tornqvist aggregation of BLS SIC 3-digit sectoral real output measures. Note that this measure does not include adjustments to remove intrasectoral transactions at the SIC 2-digit level. | Sectoral output is the value of shipments plus inventory changes, less resales and intra-industry shipments. |

| | | | | |
|---|---|---|---|---|
| Industry coverage | SIC 1-digit manufacturing division and 20 SIC 2-digit manufacturing industries. | Selected SIC 2-digit nonmanufacturing industries, including SIC 10, 13, 14, 40, 41, 42, 44, 45, 46, 47, 48, 49, 62, 63, 64, 70, 72, 75, 78, 79, 80, and 82. | 20 SIC 2-digit manufacturing industries | SIC 3- and 4-digit industries, including over 190 3-digit industries and over 335 4-digit industries. All SIC 3- and 4-digit manufacturing and wholesale and retail trade industries are covered. |
| Industry classification | Data for 1947–2000 are available on a 1987 SIC basis. | Data for 1947, 1958, 1963, and 1967–2000 is available on a 1987 SIC basis. | Data for 1987–2000 are available on a 1987 SIC basis. | Data for 1987–2000 are available on a 1987 SIC basis. |
| Source data | Receipts, value of shipments, inventory change and cost of materials data are obtained from the Bureau of the Census for 4-digit establishment groups in manufacturing. | Gross output measures are developed based on BLS OEP data on gross output and output price series. Values of production and output measures are constructed by interpolation between input-output tables, using interpolator series from the best available sources. The input-output benchmarks used by OEP are those presently part of their growth model (i.e., the 1977, 1982, and 1987 benchmarks). Earlier tables for 1963, 1967, and 1972 were conformed to the 1987 SIC by Harper and Gullickson. The employment projections series on output were also adjusted to conform with the 1992 I/O table published by BEA. This output measure was originally developed with a five year periodicity, 1947–97 (47, 58, 63, 67, 72, 77, 82, 87, 92, 97). The output measure was updated to annual periodicity using OEP I/O tables, October, 2002. Output is developed from BEA input-output tables, adjusted by BLS. | A real output series was constructed for comparison purposes only by Tornqvist aggregation of the BLS real sectoral output series for SIC 3-digit manufacturing industries. | Industry output indexes are prepared from basic data published by various public and private agencies, using the greatest level of detail available. Bureau of the Census quinquennial survey data and other Census Survey data are used extensively in developing output statistics for manufacturing, trade, and services industries. The U.S. Geological Survey compiles most of the information for the mining and cement industries. Other important government sources include the U.S. Departments of Energy, Agriculture, Transportation, and Housing and Urban Development, and the Federal Railroad Administration, the Federal Reserve Board, and the Federal Deposit Insurance Corporation. In addition, a wide range of industry trade sources are used to provide detailed data. |

*(continued)*

**Table 9B.1** (continued)

| | BLS published sectoral output series for manufacturing industries ($Y^{S\text{-}1,2}_{BLS\text{-}P}$) | BLS unpublished gross ouput series for nonmanufacturing industries ($Y^{G\text{-}2}_{BLS\text{-}U}$) | BLS unpublished sectoral output series for SIC 2-digit manufacturing industries ($Y^{S\text{-}2}_{BLS\text{-}U}$) | BLS published sectoral output series for detailed industries ($Y^{S\text{-}3,4}_{BLS\text{-}P}$) |
|---|---|---|---|---|
| Deflation procedure | Deflation is done at the 5-digit product code level by BEA using primarily BLS producer price indexes. In some instances, 5-digit price estimates developed by BEA are used. Four-digit industry real output is aggregated by BEA from the 5-digit indexes, and then BLS Tornqvist aggregates from the 4-digit to the 2-digit level. | Deflation is done using price measures obtained from the OEP. The price data rely heavily on the detail of the industry sector price indexes, the producer price indexes, and the consumer price indexes prepared and published by BLS. | None | Deflation is done at the 5-digit product code level using BLS Producer Price Indexes. For a small number of product classes, such as selected electronic products, price deflators developed by BEA, are used. In a few other product classes, a weighted deflator is specifically developed. |
| Aggregation methods | Constant-dollar output at the SIC 2-digit level is computed as a Tornqvist Index of the 4-digit industry data. | Constant-dollar output at the SIC 2-digit level is computed as a Tornqvist Index of the 3-digit industry data. | Constant-dollar output at the SIC 2-digit level is computed as a Tornqvist Index of the BLS real sectoral output for the SIC 3-digit manufacturing industries. | Constant-dollar output at the SIC 4-digit level is computed as a Tornqvist Index of the 5-digit product class data. |
| Data available | Current- and constant-dollar output data are available annually for 1947–2000. Data are available on the BLS web site, www.bls.gov. | Current- and constant-dollar output data are available for 1947, 1958, 1963, and annually for 1967–2000. Data are available upon request from the authors. | Current- and constant-dollar output data are available annually for 1987–2000. Data are constructed for comparison purposes only and are available from the authors. | Current- and constant-dollar output data are available annually for all industries, for 1987–2000. For selected industries, data extend back as far as 1947. Data are available on the BLS web site, www.bls.gov. |

*Notes:* BEA = Bureau of Economic Analysis; BLS = Bureau of Labor Statistics; NIPAs = National Income and Product Accounts; OEP = Office of Employment Projections; I/O = input-ouput.

**Table 9B.2 BEA and BLS output measure availability for detailed industries, 1987–2001**

| SIC industry | SIC 2-digit output measures available | SIC 2-digit output measures available: BEA only or BLS only | SIC 2-digit output measures available: BEA and BLS Series | SIC 3-digit output measure comparisons possible | SIC 4-digit output measure comparisons possible |
|---|---|---|---|---|---|
| 01, Agricultural Production Crops | n.a. | | | No | No |
| 02, Agricultural Production Livestock and Animal Specialties | n.a. | | | No | No |
| 07, Agricultural Services | n.a. | | | No | No |
| 08, Forestry | | $Y^{G\text{-}2}_{BEA\text{-}U}$ | | No | No |
| 09, Fishing, Hunting and Trapping | n.a. | | | No | No |
| ***10, Metal Mining*** | | | $Y^{G\text{-}2}_{BEA\text{-}P}$<br>$Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | Selected industries | Selected industries |
| 12, Coal Mining | | | $Y^{G\text{-}2}_{BEA\text{-}P}$<br>$Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | No | No |
| *13, Oil and Gas Extraction* | | | $Y^{G\text{-}2}_{BEA\text{-}P}$<br>$Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$<br>$Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | No | No |
| *14, Mining and Quarrying of Nonmetallic Minerals, Except Fuels* | | | $Y^{G\text{-}2}_{BEA\text{-}P}$<br>$Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$<br>$Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | Selected industries | No |
| 15, Building Construction General Contractors and Operative Builders | n.a. | | | No | No |
| 16, Heavy Construction Other Than Building Construction Contractors | n.a. | | | No | No |
| 17, Construction Special Trade Contractors | n.a. | | | No | No |
| *20, Food and Kindred Products* | | | $Y^{G\text{-}2}_{BEA\text{-}P}$<br>$Y^{G\text{-}2}_{BEA\text{-}U}$<br>$Y^{S\text{-}2}_{BLS\text{-}M\text{-}P}$<br>$Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | All industries | All industries |

*(continued)*

**Table 9B.2** (continued)

| SIC industry | SIC 2-digit output measures available | SIC 2-digit output measures available: BEA only or BLS only | SIC 2-digit output measures available: BEA and BLS Series | SIC 3-digit output measure comparisons possible | SIC 4-digit output measure comparisons possible |
|---|---|---|---|---|---|
| *21, Tobacco Products* | | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BEA-U}$<br>$Y^{S-2}_{BLS-M-P}$<br>$Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 22, Textile Mill Products | | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BEA-U}$<br>$Y^{S-2}_{BLS-M-P}$<br>$Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 23, Apparel and Other Finished Products Made From Fabrics and Similar Materials | | | $Y^{G-2}_{BEA-P}$, $Y^{G-2}_{BEA-U}$,<br>$Y^{S-2}_{BLS-M-P}$, and<br>$Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 24, Lumber and Wood Products, Except Furniture | | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BEA-U}$<br>$Y^{G-2}_{BEA-U}$<br>$Y^{S-2}_{BLS-M-P}$<br>$Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 25, Furniture and Fixtures | | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BEA-U}$<br>$Y^{S-2}_{BLS-M-P}$<br>$Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 26, Paper and Allied Products | | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BEA-U}$<br>$Y^{S-2}_{BLS-M-P}$<br>$Y^{S-2}_{BLS-I-U}$ | All industries | All industries |

| | | | |
|---|---|---|---|
| ***27, Printing, Publishing, and Allied Industries*** | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 28, Chemicals and Allied Products | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| ***29, Petroleum Refining and Related Industries*** | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 30, Rubber and Miscellaneous Plastics Products | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| ***31, Leather and Leather Proeducts*** | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 32, Stone, Clay, Glass, and Concrete Products | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 33, Primary Metal Industries | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 34, Fabricated Metal Products, Except Machinery and Transportation Equipment | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |

*(continued)*

**Table 9B.2** (continued)

| SIC industry | SIC 2-digit output measures available | SIC 2-digit output measures available: BEA only or BLS only | SIC 2-digit output measures available: BEA and BLS Series | SIC 3-digit output measure comparisons possible | SIC 4-digit output measure comparisons possible |
|---|---|---|---|---|---|
| ***35, Industrial and Commercial Machinery and Computer Equipment*** | | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 36, Electronic and Other Electrical Equipment and Components, Except Computer Equipment | | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| 37, Transportation Equipment | | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| ***38, Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks*** | | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| *39, Miscellaneous Manufacturing Industries* | | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{S-2}_{BLS-M-P}$ $Y^{S-2}_{BLS-I-U}$ | All industries | All industries |
| *40, Railroad Transportation* | | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BLS-M-U}$ | No | No |
| *41, Local and Suburban Transit and Interurban Highway Passenger Transportation* | | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BLS-M-U}$ | No | No |

| | | | | |
|---|---|---|---|---|
| *42, Motor Freight Transportation and Warehousing* | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BLS-M-U}$ | No | No |
| 43, United States Postal Service | $Y^{S-2}_{BLS-I-U}$ | | All industries (***431*** with 4311) | All industries (***431*** with 4311) |
| *44, Water Transportation* | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BLS-M-U}$ | No | No |
| *45, Transportation By Air* | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BLS-M-U}$ | No | No |
| *46, Pipelines, Except Natural Gas* | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BEA-U}$ $Y^{G-2}_{BLS-M-U}$ | No | No |
| *47, Transportation Services* | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BLS-M-U}$ | No | No |
| ***48, Communications*** | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BLS-M-U}$ | Selected industries | No |
| *49, Electric, Gas, and Sanitary Services* | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BLS-M-U}$ | No | No |
| 50, Wholesale Trade-Durable Goods | $Y^{S-2}_{BLS-I-U}$ | | All industries | No |
| 51, Wholesale Trade-Nondurable Goods | $Y^{S-2}_{BLS-I-U}$ | | All industries | No |
| 52, Building Materials, Hardware, Garden Supply, and Mobile Home Dealers | $Y^{S-2}_{BLS-I-U}$ | | Selected industries | No |
| 53, General Merchandise Stores | $Y^{S-2}_{BLS-I-U}$ | | Selected industries | No |
| 54, Food Stores | $Y^{S-2}_{BLS-I-U}$ | | Selected industries | No |
| 55, Automotive Dealers and Gasoline Service Stations | $Y^{S-2}_{BLS-I-U}$ | | Selected industries | No |
| 56, Apparel and Accessory Stores | $Y^{S-2}_{BLS-I-U}$ | | Selected industries | No |
| 57, Home Furniture, Furnishings, and Equipment Stores | $Y^{S-2}_{BLS-I-U}$ | | No | Selected industries |
| 58, Eating and Drinking Places | $Y^{S-2}_{BLS-I-U}$ | | No | All industries |
| 59, Miscellaneous Retail | $Y^{S-2}_{BLS-I-U}$ | | Selected industries | Selected industries |

*(continued)*

**Table 9B.2** (continued)

| SIC industry | SIC 2-digit output measures available: BEA only or BLS only | SIC 2-digit output measures available: BEA and BLS Series | SIC 3-digit output measure comparisons possible | SIC 4-digit output measure comparisons possible |
|---|---|---|---|---|
| 60, Depository Institutions | $Y^{G-2}_{BEA-P}$ | | No | No |
| 61, Non-depository Credit Institutions | $Y^{G-2}_{BEA-P}$ | | No | No |
| *62, Security and Commodity Brokers, Dealers, Exchanges, and Services* | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BLS-M-U}$ | No | No |
| *63, Insurance Carriers* | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BLS-M-U}$ | No | No |
| *64, Insurance Agents, Brokers and Service* | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BEA-U}$<br>$Y^{G-2}_{BLS-M-U}$ | No | No |
| 65, Real Estate | $Y^{G-2}_{BEA-P}$ | | No | No |
| 67, Holding and Other Investment Offices | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BEA-U}$ | | No | No |
| 70, Hotels, Rooming Houses, Camps, and Other Lodging Places | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BLS-M-U}$ | No | No |
| ***72, Personal Services*** | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BLS-M-U}$<br>$Y^{S-2}_{BLS-I-U}$ | Selected industries | Selected industries |
| 73, Business Services | $Y^{G-2}_{BEA-P}$ | | No | No |
| 75, Automotive Repair, Services, and Parking | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BLS-M-U}$ | Selected industries | No |
| 76, Miscellaneous Repair Services | $Y^{G-2}_{BEA-P}$ | | No | No |
| *78, Motion Pictures* | | $Y^{G-2}_{BEA-P}$<br>$Y^{G-2}_{BLS-M-U}$ | Selected industries | No |

| | | | | | |
|---|---|---|---|---|---|
| *79, Amusement and Recreation Services* | | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BLS-M-U}$ | No | No |
| 80, Health Services | | | $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BLS-M-U}$ | No | No |
| 81, Legal Services | | $Y^{G-2}_{BEA-P}$ | | No | No |
| *82, Educational Services* | | | $Y^{G-2}_{BEA-U}$ $Y^{G-2}_{BEA-P}$ $Y^{G-2}_{BLS-M-U}$ | No | No |
| 83, Social Services | | $Y^{G-2}_{BEA-P}$ | | No | No |
| 84, Museums, Art Galleries, and Botanical and Zoological Gardens | n.a. | | | No | No |
| 86, Membership Organizations | | $Y^{G-2}_{BEA-P}$ | | No | No |
| 87, Engineering, Accounting, Research, Management and Related Services | n.a. | | | No | No |
| 88, Private Households | n.a. | | | No | No |
| 91, Executive, Legislative, And General Government, Except Finance | n.a. | | | No | No |
| 92, Justice, Public Order, And Safety | n.a. | | | No | No |
| 93, Public Finance, Taxation, And Monetary Policy | n.a. | | | No | No |
| 94, Administration Of Human Resource Programs | n.a. | | | No | No |
| 95, Administration Of Environmental Quality And Housing Programs | n.a. | | | No | No |
| 96, Administration Of Economic Programs | n.a. | | | No | No |
| 97, National Security And International Affairs | n.a. | | | No | No |
| 99, Nonclassifiable Establishments | n.a. | | | No | No |

*Note: Italic* type indicates industries with SIC 2-digit output measure differences and ***bold italic*** indicates such industries with case studies completed.

**Table 9B.3** **Constant and current U.S. dollar trends, selected industries**

| SIC Industry | Output measure | Constant $ 1990–1995 | Constant $ 1995–2000 | Current $ 1990–1995 | Current $ 1995–2000 | Constant $ less current $ 1990–1995 | Constant $ less current $ 1995–2000 | Acceleration, constant $ | Acceleration, current $ | Difference in constant and current $ acceleration (for each measure) | Output measure comparisons | Correlation coefficient: Annual percent change in constant dollar output measures | Correlation coefficient: Annual percent change in current dollar output measures |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10, Metal Mining | $Y^{G-2}_{BEA-P}$ | 2.08 | –0.48 | 2.72 | –5.62 | –0.64 | 5.14 | –2.56 | –8.34 | 5.78 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.927 | 0.83 |
| | $Y^{G-2}_{BLS-M-U}$ | 1.69 | 0.65 | 2.5 | 0.89 | –0.81 | –0.24 | –1.04 | –1.61 | 0.57 | | | |
| 1011, Iron Ores | $Y^{G-4}_{BEA-U}$ | 3.21 | 0.18 | 3.84 | –1.55 | –0.62 | 1.73 | –3.03 | –5.39 | 2.35 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-U}$ | 0.960 | 0.915 |
| | $Y^{S-4}_{BLS-I-U}$ | 1.88 | 0.13 | 0.40 | –1.70 | 1.48 | 1.83 | –1.75 | –2.10 | 0.35 | | | |
| 1021, Copper Ores | $Y^{G-4}_{BEA-U}$ | 2.39 | –5.43 | 4.79 | –13.58 | –2.41 | 81.5 | –7.81 | –18.37 | 10.56 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | 0.87 | 0.987 |
| | $Y^{S-4}_{BLS-I-P}$ | 2.86 | –4.90 | 5.18 | –12.43 | –2.32 | 7.52 | –7.77 | –17.60 | 9.84 | | | |
| 1031, Lead and Zinc Ores | $Y^{G-4}_{BEA-U}$ | 1.61 | 5.24 | –3.60 | 5.30 | 5.21 | –0.05 | 3.64 | 8.89 | –5.26 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-U}$ | 0.77 | 0.985 |
| | $Y^{S-4}_{BLS-I-U}$ | 8.81 | 4.91 | –3.59 | 5.53 | 12.39 | –0.62 | –3.90 | 9.11 | –13.01 | | | |
| 1041, Gold Ores | $Y^{G-4}_{BEA-U}$ | 2.75 | 2.17 | 2.89 | –4.25 | –0.14 | 6.43 | –0.58 | –7.15 | 6.57 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | 0.98 | 0.987 |
| | $Y^{S-4}_{BLS-I-P}$ | 1.29 | 2.08 | 1.64 | –4.24 | –0.35 | 6.32 | 0.79 | –5.89 | 6.68 | | | |
| 1044, Silver Ores | $Y^{G-4}_{BEA-U}$ | –8.53 | 3.54 | –7.11 | 2.96 | –1.42 | 0.58 | 12.07 | 10.07 | 2.00 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-U}$ | 0.77 | 0.921 |
| | $Y^{S-4}_{BLS-I-U}$ | –4.83 | 2.53 | –4.65 | 2.91 | –0.17 | –0.38 | 7.36 | 7.57 | –0.21 | | | |
| 1061, Ferroalloy Ores, Except Vanadium | No BEA or BLS output series available. | | | | | | | | | | | | |
| 1081, Metal Mining Services | Only a single series ($Y^{G-4}_{BEA-U}$) is available. | | | | | | | | | | | | |
| 1094, Uranium-Radium-Vanadium Ores | Only a single series ($Y^{G-4}_{BEA-U}$) is available. | | | | | | | | | | | | |
| 1099, Miscellaneous Metal Ores, NEC | Only a single series ($Y^{G-4}_{BEA-U}$) is available. | | | | | | | | | | | | |
| 13, Oil and Gas Extraction | $Y^{G-2}_{BEA-P}$ | –0.4 | 0.74 | –3.81 | 13.84 | 3.41 | –13.1 | 1.14 | 17.65 | –16.51 | $Y^{G-2}_{BEA-P}$ and $Y^{S-2}_{BLS-I-U}$ | 0.684 | 0.980 |
| | $Y^{S-2}_{BLS-I-U}$ | –0.75 | –0.75 | –5.28 | 14.88 | 4.53 | –15.63 | 0 | 20.16 | –20.16 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.919 | 0.770 |
| | $Y^{G-2}_{BLS-M-U}$ | –1.12 | 1.12 | –4.65 | 2.89 | 3.53 | –1.77 | 2.24 | 7.54 | –5.30 | $Y^{S-2}_{BLS-I-U}$ and $Y^{G-2}_{BLS-M-U}$ | 0.697 | 0.710 |
| 20, Food and Kindred Products | $Y^{G-2}_{BEA-P}$ | 1.95 | 1.23 | 2.84 | 2.09 | –0.89 | –0.86 | –0.72 | –0.75 | 0.03 | $Y^{G-2}_{BEA-P}$ and $Y^{S-2}_{BLS-U}$ | 0.979 | 0.990 |
| | $Y^{S-2}_{BLS-I-U}$ | 1.96 | 1.27 | 2.81 | 1.98 | –0.85 | –0.71 | –0.69 | –0.83 | 0.14 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.640 | 0.740 |
| | $Y^{G-2}_{BLS-M-U}$ | 2.67 | 1.02 | 3.48 | 1.88 | –0.81 | –0.86 | –1.65 | –1.6 | –0.05 | $Y^{S-2}_{BLS-I-U}$ and $Y^{G-2}_{BLS-M-U}$ | 0.687 | 0.760 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21, Tobacco Products | $Y^{\text{G-2}}_{\text{BEA-P}}$ | 0.33 | –2.62 | 2.74 | 7.87 | –2.41 | –10.49 | –2.95 | 5.13 | –8.06 | $Y^{\text{G-2}}_{\text{BEA-P}}$ and $Y^{\text{S-2}}_{\text{BLS-I-U}}$ | 0.996 | 0.980 |
| | $Y^{\text{S-2}}_{\text{BLS-I-U}}$ | 0.82 | –2.78 | 2.09 | 8.3 | –1.27 | –11.08 | –3.6 | 6.21 | –9.81 | $Y^{\text{G-2}}_{\text{BEA-P}}$ and $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | 0.977 | 0.810 |
| | $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | 0.7 | –3.2 | 2.19 | 4.46 | –1.49 | –7.66 | –3.9 | 2.27 | –6.17 | $Y^{\text{S-2}}_{\text{BLS-I-U}}$ and $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | 0.991 | 0.890 |
| 27, Printing, Publishing, and Allied Industries | $Y^{\text{G-2}}_{\text{BEA-P}}$ | –0.47 | 1.22 | 3.17 | 3.89 | –3.64 | –2.67 | 1.69 | 0.72 | 0.97 | $Y^{\text{G-2}}_{\text{BEA-P}}$ and $Y^{\text{S-2}}_{\text{BLS-I-U}}$ | 0.769 | 0.699 |
| | $Y^{\text{S-2}}_{\text{BLS-I-U}}$ | –0.42 | 2.77 | 3.31 | 5.51 | –3.73 | –2.74 | 3.19 | 2.2 | 0.99 | $Y^{\text{G-2}}_{\text{BEA-P}}$ and $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | 0.904 | 0.883 |
| | $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | –0.1 | 1.18 | 3.54 | 3.79 | –3.64 | –2.61 | 1.28 | 0.25 | 1.03 | $Y^{\text{S-2}}_{\text{BLS-I-U}}$ and $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | 0.727 | 0.660 |
| 271, Newspapers: Publishing, or Publishing and Printing | $Y^{\text{G-3}}_{\text{BEA-U}}$ | –3.79 | 0.19 | 1.38 | 4.47 | –5.17 | –4.26 | 3.97 | 3.09 | 0.88 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.907 | 0.818 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | –3.86 | 2.20 | 1.37 | 6.50 | –5.23 | –4.30 | 6.06 | 5.13 | 0.93 | | | |
| 272, Periodicals: Publishing, or Publishing and Printing | $Y^{\text{G-3}}_{\text{BEA-U}}$ | –0.71 | 3.71 | 2.74 | 6.60 | –3.45 | –3.43 | 3.88 | 3.86 | 0.02 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.692 | 0.689 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | –1.15 | 7.39 | 2.73 | 11.13 | –3.88 | –3.74 | 8.55 | 8.40 | 0.15 | | | |
| 273, Books | $Y^{\text{G-3}}_{\text{BEA-U}}$ | 1.64 | 0.12 | 5.52 | 2.78 | –3.88 | –2.66 | –1.52 | –2.74 | 1.22 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.891 | 0.877 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 1.80 | 1.25 | 5.52 | 4.07 | –3.72 | –2.82 | –0.55 | –1.45 | 0.90 | | | |
| 274, Miscellaneous Publishing | $Y^{\text{G-3}}_{\text{BEA-U}}$ | 1.27 | 2.46 | 5.90 | 6.46 | –4.63 | –4.00 | 1.19 | 0.56 | 0.63 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.888 | 0.877 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 1.20 | 8.09 | 5.78 | 12.40 | –4.58 | –4.31 | 6.89 | 6.62 | 0.27 | | | |
| 275, Commercial Printing | $Y^{\text{G-3}}_{\text{BEA-U}}$ | 1.50 | 1.83 | 3.88 | 3.23 | –2.38 | –1.40 | 0.33 | –0.65 | 0.98 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.995 | 0.998 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 1.47 | 1.94 | 3.91 | 3.28 | –2.44 | –1.34 | 0.47 | –0.63 | 1.10 | | | |
| 276, Manifold Business Forms | $Y^{\text{G-3}}_{\text{BEA-U}}$ | –5.58 | –3.52 | –0.12 | –1.25 | –5.46 | –2.27 | 2.06 | –1.13 | 3.19 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.994 | 0.996 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | –5.74 | –3.60 | –0.10 | –1.53 | –5.64 | –2.07 | 2.14 | –1.43 | 3.57 | | | |
| 277, Greeting Cards | $Y^{\text{G-3}}_{\text{BEA-U}}$ | –0.54 | 1.05 | 4.38 | 3.77 | –4.92 | –2.72 | 1.59 | –0.61 | 2.20 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.269 | 0.196 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | –1.14 | 0.88 | 4.02 | 3.55 | –5.16 | –2.67 | 2.02 | –0.47 | 2.49 | | | |
| 278, Blankbooks, Looseleaf Binders and Bookbinding | $Y^{\text{G-3}}_{\text{BEA-U}}$ | 1.73 | 0.23 | 5.52 | 1.65 | –3.79 | –1.42 | –1.50 | –3.87 | 2.37 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.994 | 0.994 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 1.59 | 0.11 | 5.41 | 1.52 | –3.82 | –1.41 | –1.48 | –3.89 | 2.41 | | | |
| 279, Service Industries for the Printing Trade | $Y^{\text{G-3}}_{\text{BEA-U}}$ | 0.03 | –2.24 | 0.86 | –1.46 | –0.83 | –0.78 | –2.27 | –2.32 | 0.05 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.998 | 0.998 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.00 | –2.12 | 0.85 | –1.48 | –0.85 | –0.64 | –2.12 | –2.33 | 0.21 | | | |
| 29, Petroleum Refining and Related Industries | $Y^{\text{G-2}}_{\text{BEA-P}}$ | 0.81 | 1.08 | –2.53 | 8.88 | 3.34 | –7.8 | 0.27 | 11.41 | –11.14 | $Y^{\text{G-2}}_{\text{BEA-P}}$ and $Y^{\text{S-2}}_{\text{BLS-I-U}}$ | –0.044 | 0.997 |
| | $Y^{\text{S-2}}_{\text{BLS-I-U}}$ | 1.2 | 1.58 | –2.86 | 9.27 | 4.06 | –7.69 | 0.38 | 12.13 | –11.75 | $Y^{\text{G-2}}_{\text{BEA-P}}$ and $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | –0.013 | 0.994 |
| | $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | 0.88 | 1.51 | –2.76 | 9.2 | 3.64 | –7.69 | 0.63 | 11.96 | –11.33 | $Y^{\text{S-2}}_{\text{BLS-I-U}}$ and $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | 0.988 | 0.992 |
| 291, Petroleum Refining | $Y^{\text{G-3}}_{\text{BEA-U}}$ | 0.63 | 1.20 | –3.19 | 9.47 | 3.82 | –8.26 | 0.57 | 12.66 | –12.08 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | –0.130 | 0.998 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 1.15 | 1.57 | –3.38 | 9.73 | 4.52 | –8.17 | 0.42 | 13.11 | –12.69 | | | |
| 295, Asphalt Paving and Roofing Materials | $Y^{\text{G-3}}_{\text{BEA-U}}$ | 1.95 | 2.96 | 2.74 | 5.75 | –0.79 | –2.79 | 1.01 | 3.01 | –2.00 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.997 | 0.997 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 1.96 | 2.87 | 2.71 | 5.93 | –0.76 | –3.06 | 0.91 | 3.21 | –2.30 | | | |
| 299, Miscellaneous Products of Petroleum and Coal | $Y^{\text{G-3}}_{\text{BEA-U}}$ | 1.11 | 0.69 | 3.05 | 2.70 | –1.93 | –2.01 | –0.43 | –0.35 | –0.08 | $Y^{\text{G-3}}_{\text{BEA-U}}$ and $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.984 | 0.982 |
| | $Y^{\text{S-3}}_{\text{BLS-I-P}}$ | 0.94 | 0.58 | 2.91 | 2.58 | –1.96 | –2.00 | –0.36 | –0.33 | –0.03 | | | |
| 31, Leather and Leather Products | $Y^{\text{G-2}}_{\text{BEA-P}}$ | –1.97 | –1.59 | –0.13 | –1.42 | –1.84 | –0.17 | 0.38 | –1.29 | 1.67 | $Y^{\text{G-2}}_{\text{BEA-P}}$ and $Y^{\text{S-2}}_{\text{BLS-I-U}}$ | 0.949 | 0.953 |
| | $Y^{\text{S-2}}_{\text{BLS-I-U}}$ | –2.67 | –1.15 | –0.85 | –0.92 | –1.82 | –0.23 | 1.52 | –0.07 | 1.59 | $Y^{\text{G-2}}_{\text{BEA-P}}$ and $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | 0.923 | 0.915 |
| | $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | –3.14 | –1.53 | –1.28 | –1.31 | –1.86 | –0.22 | 1.61 | –0.03 | 1.64 | $Y^{\text{S-2}}_{\text{BLS-I-U}}$ and $Y^{\text{G-2}}_{\text{BLS-M-U}}$ | 0.969 | 0.951 |

*(continued)*

**Table 9B.3** (continued)

| SIC Industry | Output measure | Constant $ 1990–1995 | Constant $ 1995–2000 | Current $ 1990–1995 | Current $ 1995–2000 | Constant $ less current $ 1990–1995 | Constant $ less current $ 1995–2000 | Acceleration, constant $ | Acceleration, current $ | Difference in constant and current $ acceleration (for each measure) | Output measure comparisons | Correlation coefficient: Annual percent change in constant dollar output measures | Correlation coefficient: Annual percent change in current dollar output measures |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 311, Leather Tanning and | $Y^{G\text{-}3}_{BEA\text{-}U}$ | 4.22 | 0.13 | 6.02 | –1.07 | –1.80 | 1.20 | –4.09 | –7.10 | 3.01 | $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | 0.984 | 0.984 |
| Finishing | $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | 3.41 | 1.65 | 5.15 | 0.58 | –1.74 | 1.07 | –1.76 | –4.57 | 2.81 | | | |
| 313, Boot and Shoe Cut Stock | $Y^{G\text{-}3}_{BEA\text{-}U}$ | –8.30 | –8.63 | –6.71 | –7.89 | –1.59 | –0.74 | –0.33 | –1.18 | 0.85 | $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | 0.611 | 0.625 |
| and Findings | $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | –8.14 | 0.30 | –6.64 | 1.10 | –1.50 | –0.80 | 8.44 | 7.75 | 0.69 | | | |
| 314, Footwear, Except Rubber | $Y^{G\text{-}3}_{BEA\text{-}U}$ | –3.28 | –5.49 | –1.29 | –4.70 | –1.99 | –0.79 | –2.21 | –3.41 | 1.20 | $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ | 0.984 | 0.985 |
| | $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ | –3.62 | –7.07 | –1.65 | –6.44 | –1.97 | –0.63 | –3.45 | –4.79 | 1.34 | | | |
| 315, Leather Gloves and Mittens | $Y^{G\text{-}3}_{BEA\text{-}U}$ | –7.49 | 5.54 | –5.21 | 7.15 | –2.28 | –1.61 | 13.03 | 12.36 | 0.67 | $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | 0.992 | 0.992 |
| | $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | –7.95 | 5.71 | –5.84 | 7.22 | –2.11 | –1.51 | 13.66 | 13.06 | 0.60 | | | |
| 316, Luggage | $Y^{G\text{-}3}_{BEA\text{-}U}$ | –4.50 | 5.53 | –3.48 | 6.48 | –1.02 | –0.95 | 10.03 | 9.96 | 0.07 | $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | 0.971 | 0.975 |
| | $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | –4.00 | 4.75 | –2.87 | 5.99 | –1.13 | –1.24 | 8.75 | 8.85 | –0.10 | | | |
| 317, Handbags and Other | $Y^{G\text{-}3}_{BEA\text{-}U}$ | –7.35 | –1.27 | –6.61 | –0.94 | –0.74 | –0.33 | 6.08 | 5.66 | 0.42 | $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | 0.996 | 0.996 |
| Leather Goods | $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | –7.40 | –0.91 | –6.61 | –0.54 | –0.79 | –0.37 | 6.49 | 6.07 | 0.42 | | | |
| 319, Leather Goods, NEC | $Y^{G\text{-}3}_{BEA\text{-}U}$ | –8.75 | 7.86 | –7.39 | 9.94 | –1.36 | –2.08 | 16.61 | 17.33 | –0.72 | $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | 0.994 | 0.995 |
| | $Y^{S\text{-}3}_{BLS\text{-}I\text{-}U}$ | –8.63 | 7.13 | –7.23 | 9.14 | –1.40 | –2.01 | 15.76 | 16.38 | –0.62 | | | |
| 35, Industrial and Commercial | $Y^{G\text{-}2}_{BEA\text{-}P}$ | 8.44 | 9.38 | 6.66 | 3.6 | 1.78 | 5.78 | 0.94 | –3.06 | 4.00 | $Y^{G\text{-}2}_{BEA\text{-}P}$ and $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | 0.991 | 0.989 |
| Machinery and Computer | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ | 8.02 | 10.05 | 6.61 | 4.12 | 1.41 | 5.93 | 2.03 | –2.49 | 4.52 | $Y^{G\text{-}2}_{BEA\text{-}P}$ and $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | 0.976 | 0.975 |
| Equipment | $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | 7.84 | 10.03 | 6.21 | 4.12 | 1.63 | 5.91 | 2.19 | –2.09 | 4.28 | $Y^{S\text{-}2}_{BLS\text{-}I\text{-}U}$ and $Y^{G\text{-}2}_{BLS\text{-}M\text{-}U}$ | 0.985 | 0.986 |
| 351, Engines and Turbines | $Y^{G\text{-}3}_{BEA\text{-}U}$ | 3.62 | 4.41 | 6.00 | 5.28 | –2.38 | –0.87 | 0.79 | –0.72 | 1.51 | $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ | 0.955 | 0.939 |
| | $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ | 3.40 | 2.35 | 5.48 | 5.72 | –2.08 | –3.37 | –1.05 | 0.23 | –1.28 | | | |
| 352, Farm and Garden | $Y^{G\text{-}3}_{BEA\text{-}U}$ | 2.14 | –0.85 | 4.48 | 0.42 | –2.34 | –1.27 | –2.99 | –4.06 | 1.07 | $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ | 0.993 | 0.992 |
| Machinery and Equipment | $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ | 2.13 | –0.87 | 4.43 | 0.41 | –2.30 | –1.28 | –3.00 | –4.02 | 1.02 | | | |
| 353, Construction, Mining, and | $Y^{G\text{-}3}_{BEA\text{-}U}$ | 2.49 | 3.75 | 4.50 | 5.43 | –2.01 | –1.68 | 1.26 | 0.92 | 0.34 | $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ | 0.991 | 0.990 |
| Materials Handling | $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ | 2.73 | 3.83 | 4.75 | 5.43 | –2.02 | –1.60 | 1.10 | 0.68 | 0.42 | | | |
| 354, Metalworking Machinery | $Y^{G\text{-}3}_{BEA\text{-}U}$ | 3.41 | 1.46 | 6.01 | 2.89 | –2.60 | –1.43 | –1.95 | –3.12 | 1.17 | $Y^{G\text{-}3}_{BEA\text{-}U}$ and $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ | 0.991 | 0.990 |
| and Equipment | $Y^{S\text{-}3}_{BLS\text{-}I\text{-}P}$ | 3.75 | 1.11 | 6.42 | 2.59 | –2.67 | –1.48 | –2.64 | –3.83 | 1.19 | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 355, Special Industry Machinery, | $Y^{G-3}_{BEA-U}$ | 5.83 | 5.39 | 8.48 | 7.07 | –2.65 | –1.68 | –0.44 | –1.42 | 0.98 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.994 | 0.993 |
| Except Metalworking | $Y^{S-3}_{BLS-I-P}$ | 6.31 | 5.11 | 9.08 | 6.90 | –2.77 | –1.79 | –1.20 | –2.18 | 0.98 | | | |
| 356, General Industrial | $Y^{G-3}_{BEA-U}$ | 2.36 | 1.29 | 5.21 | 3.16 | –2.85 | –1.87 | –1.07 | –2.05 | 0.98 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.993 | 0.992 |
| Machinery and Equipment | $Y^{S-3}_{BLS-I-P}$ | 2.36 | 1.11 | 5.30 | 3.01 | –2.94 | –1.90 | –1.25 | –2.29 | 1.04 | | | |
| 357, Computer and Office | $Y^{G-3}_{BEA-U}$ | 21.89 | 32.38 | 6.94 | 4.09 | 14.95 | 28.29 | 10.49 | –2.85 | 13.34 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.990 | 0.981 |
| Equipment | $Y^{S-3}_{BLS-I-P}$ | 22.55 | 35.91 | 7.43 | 4.27 | 15.12 | 31.64 | 13.36 | –3.16 | 16.52 | | | |
| 358, Refrigeration and Service | $Y^{G-3}_{BEA-U}$ | 5.10 | 2.61 | 6.72 | 3.54 | –1.62 | –0.93 | –2.49 | –3.18 | 0.69 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.994 | 0.993 |
| Industry Machinery | $Y^{S-3}_{BLS-I-P}$ | 5.31 | 2.72 | 7.05 | 3.72 | –1.74 | –1.00 | –2.59 | –3.33 | 0.74 | | | |
| 359, Miscellaneous Industrial | $Y^{G-3}_{BEA-U}$ | 6.80 | 2.56 | 8.09 | 3.72 | –1.29 | –1.16 | –4.24 | –4.38 | 0.14 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.995 | 0.995 |
| and Commercial | $Y^{S-3}_{BLS-I-P}$ | 6.73 | 2.49 | 8.10 | 3.69 | –1.37 | –1.20 | –4.24 | –4.41 | 0.17 | | | |
| 38, Measuring, Analyzing, and | $Y^{G-2}_{BEA-P}$ | 1.05 | 3.20 | 2.58 | 3.43 | –1.53 | –0.23 | 2.15 | 0.85 | 1.30 | $Y^{G-2}_{BEA-P}$ and $Y^{S-2}_{BLS-I-U}$ | 0.916 | 0.160 |
| Controlling Instruments, | $Y^{S-2}_{BLS-I-U}$ | 0.87 | 3.41 | 2.29 | 3.58 | –1.42 | –0.17 | 2.54 | 1.29 | 1.25 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.597 | 0.054 |
| Photographic and Optical | $Y^{G-2}_{BLS-M-U}$ | 1.27 | 4.04 | 2.71 | 4.08 | –1.44 | –0.04 | 2.77 | 1.37 | 1.40 | $Y^{S-2}_{BLS-I-U}$ and $Y^{G-2}_{BLS-M-U}$ | 0.701 | 0.657 |
| Goods, Watches and Clocks | | | | | | | | | | | | | |
| 381, Search, Detection, Navigation, | $Y^{G-3}_{BEA-U}$ | –5.25 | –0.11 | –3.69 | 0.34 | –1.56 | –0.45 | 5.14 | 4.02 | 1.12 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.973 | 0.957 |
| Guidance, Aeronautical, | $Y^{S-3}_{BLS-I-P}$ | –5.52 | 0.71 | –4.03 | 1.16 | –1.49 | –0.45 | 6.23 | 5.19 | 1.04 | | | |
| and Nautical | | | | | | | | | | | | | |
| 382, Laboratory Apparatus and | $Y^{G-3}_{BEA-U}$ | 4.29 | 2.74 | 6.28 | 3.54 | –1.99 | –0.80 | –1.55 | –2.74 | 1.19 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.990 | 0.985 |
| Analytical, Optical | $Y^{S-3}_{BLS-I-P}$ | 4.32 | 2.52 | 6.26 | 3.41 | –1.94 | –0.89 | –1.80 | –2.86 | 1.06 | | | |
| 384, Surgical Medical and | $Y^{G-3}_{BEA-U}$ | 3.97 | 6.98 | 5.95 | 6.97 | –1.98 | 0.01 | 3.01 | 1.02 | 1.99 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.987 | 0.989 |
| Dental Instruments | $Y^{S-3}_{BLS-I-P}$ | 3.85 | 6.73 | 5.89 | 6.97 | –2.04 | –0.24 | 2.88 | 1.08 | 1.80 | | | |
| 385, Opthalmic Goods | $Y^{G-3}_{BEA-U}$ | 3.90 | 7.73 | 5.57 | 7.00 | –1.67 | 0.73 | 3.83 | 1.42 | 2.41 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.972 | 0.973 |
| | $Y^{S-3}_{BLS-I-P}$ | 3.45 | 7.50 | 5.13 | 6.81 | –1.68 | 0.69 | 4.05 | 1.68 | 2.37 | | | |
| 386, Photographic Eqiupment and | $Y^{G-3}_{BEA-U}$ | 0.72 | 0.75 | 0.58 | –0.18 | 0.14 | 0.93 | 0.03 | –0.76 | 0.79 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.920 | 0.960 |
| Supplies | $Y^{S-3}_{BLS-I-P}$ | 0.84 | 1.39 | 0.39 | –0.64 | 0.45 | 2.03 | 0.55 | –1.03 | 1.58 | | | |
| 387, Watches, Clocks, Clockwork | $Y^{G-3}_{BEA-U}$ | –9.33 | 5.51 | –7.74 | 6.16 | –1.59 | –0.65 | 14.84 | 13.91 | 0.93 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.880 | 0.913 |
| Operated Devices | $Y^{S-3}_{BLS-I-P}$ | –6.57 | 2.67 | –7.11 | 3.44 | 0.54 | –0.77 | 9.24 | 10.55 | –1.31 | | | |
| 39, Miscellaneous Manufacturing | $Y^{G-2}_{BEA-P}$ | 1.44 | 3.22 | 3.52 | 4.13 | –2.08 | –0.91 | 1.78 | 0.61 | 1.17 | $Y^{G-2}_{BEA-P}$ and $Y^{S-2}_{BLS-I-U}$ | 0.954 | 0.947 |
| | $Y^{S-2}_{BLS-I-U}$ | 2.00 | 2.82 | 4.01 | 3.63 | –2.01 | –0.81 | 0.82 | –0.38 | 1.20 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.867 | 0.863 |
| | $Y^{G-2}_{BLS-M-U}$ | 2.02 | 2.85 | 4.02 | 3.64 | –2 | –0.79 | 0.83 | –0.38 | 1.21 | $Y^{S-2}_{BLS-I-U}$ and $Y^{G-2}_{BLS-M-U}$ | 0.842 | 0.838 |
| 40, Railroad Transportation | $Y^{G-2}_{BEA-P}$ | 3.39 | 0.67 | 3.18 | 1.26 | 0.21 | –0.59 | –2.72 | –1.92 | –0.80 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.638 | 0.970 |
| | $Y^{G-2}_{BLS-M-U}$ | 1.63 | –0.62 | 2.41 | –0.02 | –0.78 | –0.6 | –2.25 | –2.43 | 0.18 | | | |
| 41, Local and Suburban Transit | $Y^{G-2}_{BEA-P}$ | 0.54 | 2.36 | 3.71 | 4.64 | –3.17 | –2.28 | 1.82 | 0.93 | 0.89 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.747 | 0.090 |
| and Interurban Highway | $Y^{G-2}_{BLS-M-U}$ | 1.59 | 1.22 | 5.09 | 3.73 | –3.5 | –2.51 | –0.37 | –1.36 | 0.99 | | | |
| Passenger Transportation | | | | | | | | | | | | | |

*(continued)*

**Table 9B.3** (continued)

| SIC Industry | Output measure | Constant $ 1990–1995 | Constant $ 1995–2000 | Current $ 1990–1995 | Current $ 1995–2000 | Constant $ less current $ 1990–1995 | Constant $ less current $ 1995–2000 | Acceleration, constant $ | Acceleration, current $ | Difference in constant and current $ acceleration (for each measure) | Output measure comparisons | Correlation coefficient: Annual percent change in constant dollar output measures | Correlation coefficient: Annual percent change in current dollar output measures |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42, Motor Freight Transportation | $Y^{G-2}_{BEA-P}$ | 4.89 | 4.06 | 5.56 | 7.14 | –0.67 | –3.08 | –0.83 | 1.58 | –2.41 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.536 | 0.980 |
| and Warehousing | $Y^{G-2}_{BLS-M-U}$ | 4.48 | 4.63 | 5.14 | 6.80 | –0.66 | –2.17 | 0.15 | 1.66 | –1.51 | | | |
| 44, Water Transportation | $Y^{G-2}_{BEA-P}$ | 2.39 | 4.72 | 3.76 | 7.07 | –1.37 | –2.35 | 2.33 | 3.31 | –0.98 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.544 | 0.280 |
| | $Y^{G-2}_{BLS-M-U}$ | 2.40 | –0.52 | 4.98 | 1.71 | –2.58 | –2.23 | –2.92 | –3.27 | 0.35 | | | |
| 45, Transportation by Air | $Y^{G-2}_{BEA-P}$ | 3.14 | 5.39 | 4.27 | 6.90 | –1.13 | –1.51 | 2.25 | 2.63 | –0.38 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.399 | 0.360 |
| | $Y^{G-2}_{BLS-M-U}$ | 3.84 | 1.48 | 4.41 | 3.11 | –0.57 | –1.63 | –2.36 | –1.3 | –1.06 | | | |
| 46, Pipelines, Except Natural Gas | $Y^{G-2}_{BEA-P}$ | –5.39 | 0.14 | –3.00 | –0.85 | –2.39 | 0.99 | 5.53 | 2.15 | 3.38 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.617 | 0.670 |
| | $Y^{G-2}_{BLS-M-U}$ | –1.39 | –3.04 | 1.53 | –4.99 | –2.92 | 1.95 | –1.65 | –6.52 | 4.87 | | | |
| 47, Transportation Services | $Y^{G-2}_{BEA-P}$ | 4.78 | 6.21 | 6.77 | 7.80 | –1.99 | –1.59 | 1.43 | 1.03 | 0.40 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.557 | 0.560 |
| | $Y^{G-2}_{BLS-M-U}$ | 4.48 | 5.75 | 5.59 | 2.45 | –1.11 | 3.3 | 1.27 | –3.14 | 4.41 | | | |
| 48, Communications | $Y^{G-2}_{BEA-P}$ | 5.55 | 11.38 | 6.77 | 11.09 | –1.22 | 0.29 | 5.83 | 4.32 | 1.51 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.701 | 0.760 |
| | $Y^{G-2}_{BLS-M-U}$ | 4.38 | 6.67 | 6.06 | 8.61 | –1.68 | –1.94 | 2.29 | 2.55 | –0.26 | | | |
| 481, Telephone Communications | | | | | | | | Only a single series ($Y^{S-3}_{BLS-I-P}$) is available. | | | | | |
| 482 Telegraph and Other Message Communications | | | | | | | | No BEA or BLS output series available. | | | | | |
| 483 Radio and Television | $Y^{G-3}_{BEA-U}$ | 0.08 | –0.06 | 2.65 | 8.13 | –2.57 | –8.19 | –0.14 | 5.48 | –5.62 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.733 | 0.392 |
| Broadcasting Stations | $Y^{S-3}_{BLS-I-P}$ | 1.13 | 2.19 | 4.14 | –0.05 | –3.01 | 2.24 | 1.06 | –4.19 | 5.25 | | | |
| 484 Cable and Other Pay | $Y^{G-3}_{BEA-U}$ | 5.38 | 8.93 | 10.42 | 13.48 | –5.04 | –4.55 | 3.55 | 3.07 | 0.48 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.470 | 0.494 |
| Television Stations | $Y^{S-3}_{BLS-I-P}$ | 2.96 | 8.21 | 7.92 | 13.55 | –4.96 | –5.34 | 5.25 | 5.62 | –0.37 | | | |
| 489, Communications Services, NEC | | | | | | | | No BEA or BLS output series available. | | | | | |
| 49, Electric, Gas and Sanitary | $Y^{G-2}_{BEA-P}$ | 1.96 | 1.48 | 3.49 | 4.40 | –1.53 | –2.92 | –0.48 | 0.91 | –1.39 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.108 | 0.650 |
| Services | $Y^{G-2}_{BLS-M-U}$ | 0.14 | 1.63 | 2.36 | 2.20 | –2.22 | –0.57 | 1.49 | –0.16 | 1.65 | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 62, Security and Commodity Brokers, Dealers, Exchanges, and Services | $Y^{G-2}_{BEA-P}$ | 16.11 | 23.35 | 17.11 | 19.02 | –1.00 | 4.33 | 7.24 | 1.91 | 5.33 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.800 | 0.760 |
| | $Y^{G-2}_{BLS-M-U}$ | 13.54 | 22.02 | 10.55 | 17.21 | 2.99 | 4.81 | 8.48 | 6.66 | 1.82 | | | |
| 63, Insurance Carriers | $Y^{G-2}_{BEA-P}$ | –0.15 | –1.53 | 7.10 | 3.11 | –7.25 | –4.64 | –1.38 | –3.90 | 2.61 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.718 | 0.790 |
| | $Y^{G-2}_{BLS-M-U}$ | 0.87 | 0.64 | 8.74 | 4.56 | –7.87 | –3.92 | –0.23 | –4.18 | 3.95 | | | |
| 64, Insurance Agents, Brokers, and Service | $Y^{G-2}_{BEA-P}$ | –2.67 | 4.07 | 3.91 | 7.91 | –6.58 | –3.84 | 6.74 | 4 | 2.74 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | –0.114 | 0.040 |
| | $Y^{G-2}_{BLS-M-U}$ | –0.41 | 4.03 | 1.17 | 4.93 | –1.58 | –0.9 | 4.44 | 3.76 | 0.68 | | | |
| 72, Personal Services | $Y^{G-2}_{BEA-P}$ | 2.45 | 2.71 | 5.56 | 5.44 | –3.11 | –2.73 | 0.26 | –0.12 | 0.38 | $Y^{G-2}_{BEA-P}$ and $Y^{S-2}_{BLS-I-U}$ | 0.946 | 0.930 |
| | $Y^{S-2}_{BLS-I-U}$ | 1.44 | 2.89 | 5.00 | 6.02 | –3.56 | –3.13 | 1.45 | 1.02 | 0.43 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.900 | 0.880 |
| | $Y^{G-2}_{BLS-M-U}$ | 1.33 | 3.56 | 4.48 | 6.32 | –3.15 | –2.76 | 2.23 | 1.84 | 0.39 | $Y^{S-2}_{BLS-I-U}$ and $Y^{G-2}_{BLS-M-U}$ | 0.965 | 0.960 |
| 721, Laundry, Cleaning, and Garment Services | $Y^{G-3}_{BEA-U}$ | 1.16 | 2.78 | 3.84 | 4.88 | –2.68 | –2.10 | 1.62 | 1.04 | 0.58 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.975 | 0.986 |
| | $Y^{S-3}_{BLS-I-P}$ | 0.82 | 2.85 | 3.61 | 5.00 | –2.79 | –2.15 | 2.03 | 1.39 | 0.64 | | | |
| 722, Photographic Studios, Portrait | $Y^{G-3}_{BEA-U}$ | 5.32 | 0.85 | 8.48 | 2.62 | –3.16 | –1.77 | –4.47 | –5.87 | 1.40 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.975 | 0.972 |
| | $Y^{S-3}_{BLS-I-P}$ | 5.54 | 1.49 | 8.71 | 3.17 | –3.17 | –1.68 | –4.05 | –5.54 | 1.49 | | | |
| 723, Beauty Shops | $Y^{G-3}_{BEA-U}$ | 2.69 | 3.06 | 5.05 | 6.29 | –2.36 | –3.23 | 0.37 | 1.24 | –0.87 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.989 | 0.987 |
| | $Y^{S-3}_{BLS-I-P}$ | 2.63 | 3.16 | 4.99 | 6.39 | –2.36 | –3.23 | 0.53 | 1.40 | –0.87 | | | |
| 724, Barber Shops | $Y^{G-3}_{BEA-U}$ | –0.06 | 1.28 | 2.93 | 4.53 | –2.99 | –3.25 | 1.34 | 1.59 | –0.25 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.934 | 0.934 |
| | $Y^{S-3}_{BLS-I-P}$ | –0.71 | 1.61 | 2.26 | 4.88 | –2.97 | –3.27 | 2.32 | 2.63 | –0.31 | | | |
| 725, Shoe Repair Shops and Shoeshine Parlors | Only a single series ($Y^{G-3}_{BEA-U}$) is available. | | | | | | | | | | | | |
| 726, Funeral Service and Crematories | $Y^{G-3}_{BEA-U}$ | 1.76 | –0.13 | 7.09 | 3.87 | –5.33 | –4.00 | –1.89 | –3.21 | 1.32 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.941 | 0.959 |
| | $Y^{S-3}_{BLS-I-P}$ | 1.39 | –0.58 | 6.70 | 3.40 | –5.31 | –3.98 | –1.97 | –3.30 | 1.33 | | | |
| 729, Miscellaneous Personal Services | Only a single series ($Y^{S-3}_{BLS-I-U}$) is available. | | | | | | | | | | | | |
| 78, Motion Pictures | $Y^{G-2}_{BEA-P}$ | 3.89 | 2.95 | 6.54 | 6.72 | –2.65 | –3.77 | –0.94 | 0.18 | –1.12 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.458 | 0.700 |
| | $Y^{G-2}_{BLS-M-U}$ | 4.74 | 6.58 | 7.40 | 4.24 | –2.66 | 2.34 | 1.84 | –3.16 | 5.00 | | | |
| 79, Amusement and Recreation Services | $Y^{G-2}_{BEA-P}$ | 6.74 | 3.87 | 10.03 | 7.62 | –3.29 | –3.75 | –2.87 | –2.41 | –0.46 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.337 | 0.340 |
| | $Y^{G-2}_{BLS-M-U}$ | 5.85 | 6.79 | 8.89 | 10.20 | –3.04 | –3.41 | 0.94 | 1.31 | –0.37 | | | |
| 82, Educational Services | $Y^{G-2}_{BEA-P}$ | 2.86 | 2.75 | 6.19 | 6.48 | –3.33 | –3.73 | –0.11 | 0.29 | –0.40 | $Y^{G-2}_{BEA-P}$ and $Y^{G-2}_{BLS-M-U}$ | 0.584 | 0.570 |
| | $Y^{G-2}_{BLS-M-U}$ | 0.35 | 3.68 | 4.90 | 7.38 | –4.55 | –3.7 | 3.33 | 2.48 | 0.85 | | | |

*Notes:* NEC = not elsewhere classified. SIC 2-digit industry current dollar data: BEA, published (adjusted) current dollar gross output series GOC from BEA file GPO87SIC; BLS industry program, sum of nominal value of production for 3-digit industries into 2-digit groups for manufacturing, and nominal value of production data for 2-digit nonmanufacturing industries; BLS major sector program, value of production series. For 3- and 4-digit industries: BEA, value of shipments data for manufacturing and unadjusted gross output data from GO8701 for nonmanufacturing; BLS industry program, benchmark value of production data.

**Table 9B.4 Comparison of real output series: Selected SIC 3- and 4-digit industries**

| SIC 4-digit industry | Output series | Average annual growth rate 1990–1995 (1) | 1995–2000 (2) | Acceleration (2) – (1) | Output series comparisons | Difference in acceleration | Correlation coefficient |
|---|---|---|---|---|---|---|---|
| *SIC 4-digit industries in major group 10, Metal Mining Industries* | | | | | | | |
| 1011, Iron Ores | $Y^{G-4}_{BEA-U}$ | 3.21 | 0.18 | –3.03 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-U}$ | –1.28 | 0.960 |
| | $Y^{S-4}_{BLS-I-U}$ | 1.88 | 0.13 | –1.75 | | | |
| 1021, Copper Ores | $Y^{G-4}_{BEA-U}$ | 2.39 | –5.43 | –7.81 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –0.04 | 0.872 |
| | $Y^{S-4}_{BLS-I-P}$ | 2.86 | –4.90 | –7.77 | | | |
| 1031, Lead and Zinc Ores | $Y^{G-4}_{BEA-U}$ | 1.61 | 5.24 | 3.64 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-U}$ | 7.54 | 0.768 |
| | $Y^{S-4}_{BLS-I-U}$ | 8.81 | 4.91 | –3.90 | | | |
| 1041, Gold Ores | $Y^{G-4}_{BEA-U}$ | 2.75 | 2.17 | –0.58 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –1.36 | 0.982 |
| | $Y^{S-4}_{BLS-I-P}$ | 1.29 | 2.08 | 0.79 | | | |
| 1044, Silver Ores | $Y^{G-4}_{BEA-U}$ | –8.53 | 3.54 | 12.07 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-U}$ | 4.71 | 0.767 |
| | $Y^{S-4}_{BLS-I-U}$ | –4.83 | 2.53 | 7.36 | | | |
| 1061, Ferroalloy Ores, Except Vanadium | No BEA or BLS output series available. | | | | | | |
| 1081, Metal Mining Services | Only a single series ($Y^{G-4}_{BEA-U}$) is available. | | | | | | |
| 1094, Uranium-Radium-Vanadium Ores | Only a single series ($Y^{G-4}_{BEA-U}$) is available. | | | | | | |
| 1099, Miscellaneous Metal Ores, NEC | Only a single series ($Y^{G-4}_{BEA-U}$) is available. | | | | | | |
| *SIC 4-digit industries in major group 27, Printing, Publishing and Allied Industries* | | | | | | | |
| 2711 Newspapers: Publishing, or Publishing and Printing | $Y^{G-4}_{BEA-U}$ | –3.79 | 0.19 | 3.97 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –2.09 | 0.907 |
| | $Y^{S-4}_{BLS-I-P}$ | –3.86 | 2.20 | 6.06 | | | |
| 2721, Periodicals: Publishing or Publishing and Printing | $Y^{G-4}_{BEA-U}$ | –0.71 | 3.17 | 3.88 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –4.66 | 0.692 |
| | $Y^{S-4}_{BLS-I-P}$ | –1.15 | 7.39 | 8.55 | | | |
| 2731 Books: Publishing, or Publishing and Printing | $Y^{G-4}_{BEA-U}$ | 1.56 | –0.31 | –1.87 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –1.14 | 0.895 |
| | $Y^{S-4}_{BLS-I-P}$ | 1.84 | 1.11 | –0.73 | | | |
| 2732 Book Printing | $Y^{G-4}_{BEA-U}$ | 1.98 | 1.85 | –0.13 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –0.32 | 0.973 |
| | $Y^{S-4}_{BLS-I-P}$ | 1.62 | 1.81 | 0.19 | | | |
| 2741 Miscellaneous Publishing | $Y^{G-4}_{BEA-U}$ | 1.27 | 2.46 | 1.19 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –5.70 | 0.888 |
| | $Y^{S-4}_{BLS-I-P}$ | 1.20 | 8.09 | 6.89 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2752 Commercial Printing, Lithographic | $Y^{G-4}_{BEA-U}$ | 1.75 | 2.41 | 0.66 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –0.07 | 0.997 |
| | $Y^{S-4}_{BLS-I-P}$ | 1.72 | 2.45 | 0.73 | | | |
| 2754 Commercial Printing, Gravure | $Y^{G-4}_{BEA-U}$ | 1.93 | –0.40 | –2.33 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | 0.75 | 0.975 |
| | $Y^{S-4}_{BLS-I-P}$ | 2.71 | –0.37 | –3.08 | | | |
| 2759 Commercial Printing, NEC | $Y^{G-4}_{BEA-U}$ | 0.51 | 0.10 | –0.41 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –0.63 | 0.997 |
| | $Y^{S-4}_{BLS-I-P}$ | 0.24 | 0.46 | 0.22 | | | |
| 2761 Manifold Business Forms | $Y^{G-4}_{BEA-U}$ | –5.58 | –3.52 | 2.05 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –0.08 | 0.994 |
| | $Y^{S-4}_{BLS-I-P}$ | –5.74 | –3.60 | 2.13 | | | |
| 2771 Greeting Cards | $Y^{G-4}_{BEA-U}$ | –0.54 | 1.05 | 1.58 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –0.43 | 0.269 |
| | $Y^{S-4}_{BLS-I-P}$ | –1.14 | 0.88 | 2.02 | | | |
| 2782 Blankbooks, Looseleaf Binders | $Y^{G-4}_{BEA-U}$ | 2.42 | –1.52 | –3.94 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –0.08 | 0.993 |
| and Devices | $Y^{S-4}_{BLS-I-P}$ | 2.22 | –1.64 | –3.86 | | | |
| 2789 Bookbinding and Related Work | $Y^{G-4}_{BEA-U}$ | –0.03 | 4.89 | 4.92 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | 0.44 | 0.994 |
| | $Y^{S-4}_{BLS-I-P}$ | 0.06 | 4.54 | 4.48 | | | |
| 2791 Typesetting | $Y^{G-4}_{BEA-U}$ | –4.85 | 4.48 | 9.32 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –0.01 | 0.999 |
| | $Y^{S-4}_{BLS-I-P}$ | –4.95 | 4.39 | 9.34 | | | |
| 2796 Platemaking and Related Services | $Y^{G-4}_{BEA-U}$ | 3.03 | –6.39 | –9.42 | $Y^{G-4}_{BEA-U}$ and $Y^{S-4}_{BLS-I-P}$ | –0.25 | 0.999 |
| | $Y^{S-4}_{BLS-I-P}$ | 3.03 | –6.15 | –9.18 | | | |
| *SIC 3-digit industries in major group 29, Petroleum Refining and Related Industries* | | | | | | | |
| 291 Petroleum Refining | $Y^{G-3}_{BEA-U}$ | 0.63 | 1.20 | 0.57 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.15 | –0.130 |
| | $Y^{S-3}_{BLS-I-P}$ | 1.15 | 1.57 | 0.42 | | | |
| 295, Asphalt Paving and Roofing | $Y^{G-3}_{BEA-U}$ | 1.95 | 2.96 | 1.01 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.10 | 0.997 |
| Materials | $Y^{S-3}_{BLS-I-P}$ | 1.96 | 2.87 | 0.91 | | | |
| 299, Miscellaneous Products of | $Y^{G-3}_{BEA-U}$ | 1.11 | 0.69 | –0.43 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | –0.06 | 0.984 |
| Petroleum and Coal | $Y^{S-3}_{BLS-I-P}$ | 0.94 | 0.58 | –0.36 | | | |
| *SIC 3-digit industries in major group 31, Leather and Leather Products* | | | | | | | |
| 311, Leather Tanning and Finishing | $Y^{G-3}_{BEA-U}$ | 4.22 | 0.13 | –4.09 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-U}$ | –2.33 | 0.984 |
| | $Y^{S-3}_{BLS-I-U}$ | 3.41 | 1.65 | –1.76 | | | |
| 313, Boot and Shoe Cut Stock and | $Y^{G-3}_{BEA-U}$ | –8.30 | –8.63 | –0.33 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-U}$ | –8.77 | 0.611 |
| Findings | $Y^{S-3}_{BLS-I-U}$ | –8.14 | 0.30 | 8.44 | | | |

*(continued)*

**Table 9B.4** (continued)

| SIC 4-digit industry | Output series | Average annual growth rate 1990–1995 (1) | 1995–2000 (2) | Acceleration (2) – (1) | Output series comparisons | Difference in acceleration | Correlation coefficient |
|---|---|---|---|---|---|---|---|
| 314, Footwear, Except Rubber | $Y^{G-3}_{BEA-U}$ | –3.28 | –5.49 | –2.21 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 1.24 | 0.984 |
| | $Y^{S-3}_{BLS-I-P}$ | –3.62 | –7.07 | –3.45 | | | |
| 315, Leather Gloves and Mittens | $Y^{G-3}_{BEA-U}$ | –7.49 | 5.54 | 13.03 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-U}$ | –0.63 | 0.992 |
| | $Y^{S-3}_{BLS-I-U}$ | –7.95 | 5.71 | 13.66 | | | |
| 316, Luggage | $Y^{G-3}_{BEA-U}$ | –4.50 | 5.53 | 10.03 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-U}$ | 1.28 | 0.971 |
| | $Y^{S-3}_{BLS-I-U}$ | –4.00 | 4.75 | 8.75 | | | |
| 317, Handbags and Other Leather Goods | $Y^{G-3}_{BEA-U}$ | –7.35 | –1.27 | 6.08 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-U}$ | –0.41 | 0.996 |
| | $Y^{S-3}_{BLS-I-U}$ | –7.40 | –0.91 | 6.49 | | | |
| 319, Leather Goods, NEC | $Y^{G-3}_{BEA-U}$ | –8.75 | 7.86 | 16.62 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-U}$ | 0.86 | 0.994 |
| | $Y^{S-3}_{BLS-I-U}$ | –8.63 | 7.13 | 15.75 | | | |
| *SIC 3-digit industries in major group 35, Industrial and Commercial Machinery and Computer Equipment* | | | | | | | |
| 351, Engines and Turbines | $Y^{G-3}_{BEA-U}$ | 3.62 | 4.41 | 0.78 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | –0.94 | 0.955 |
| | $Y^{S-3}_{BLS-I-P}$ | 3.13 | 4.86 | 1.73 | | | |
| 352, Farm and Garden Machinery and Equipment | $Y^{G-3}_{BEA-U}$ | 2.14 | –0.85 | –2.99 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.00 | 0.993 |
| | $Y^{S-3}_{BLS-I-P}$ | 2.13 | –0.87 | –3.00 | | | |
| 353, Construction, Mining, and Materials Handling | $Y^{G-3}_{BEA-U}$ | 2.49 | 3.75 | 1.26 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.16 | 0.991 |
| | $Y^{S-3}_{BLS-I-P}$ | 2.73 | 3.83 | 1.10 | | | |
| 354, Metalworking Machinery and Equipment | $Y^{G-3}_{BEA-U}$ | 3.41 | 1.46 | –1.95 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.69 | 0.991 |
| | $Y^{S-3}_{BLS-I-P}$ | 3.75 | 1.11 | –2.64 | | | |
| 355, Special Industry Machinery, Except Metalworking | $Y^{G-3}_{BEA-U}$ | 5.83 | 5.39 | –0.43 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.76 | 0.994 |
| | $Y^{S-3}_{BLS-I-P}$ | 6.31 | 5.11 | –1.20 | | | |
| 356, General Industrial Machinery and Equipment | $Y^{G-3}_{BEA-U}$ | 2.36 | 1.29 | –1.07 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.18 | 0.993 |
| | $Y^{S-3}_{BLS-I-P}$ | 2.36 | 1.11 | –1.25 | | | |
| 357, Computer and Office Equipment | $Y^{G-3}_{BEA-U}$ | 21.89 | 32.38 | 10.48 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | –2.87 | 0.990 |
| | $Y^{S-3}_{BLS-I-P}$ | 22.55 | 35.91 | 13.35 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 358, Refrigeration and Service Industry | $Y^{G-3}_{BEA-U}$ | 5.10 | 2.61 | –2.49 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.09 | 0.994 |
| Machinery | $Y^{S-3}_{BLS-I-P}$ | 5.31 | 2.72 | –2.59 | | | |
| 359, Miscellaneous Industrial and | $Y^{G-3}_{BEA-U}$ | 6.80 | 2.56 | –4.24 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.00 | 0.995 |
| Commercial | $Y^{S-3}_{BLS-I-P}$ | 6.73 | 2.49 | –4.24 | | | |
| *SIC 3-digit industries in major group 38, Measuring, Analyzing, and Controlling Instruments, Photographic, Medical and Optical Goods, Watches and Clocks* | | | | | | | |
| 381, Search, Detection, Navigation, | $Y^{G-3}_{BEA-U}$ | –5.25 | –0.11 | 5.14 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | –1.09 | 0.973 |
| Guidance, Aeronautical, and Nautical | $Y^{S-3}_{BLS-I-P}$ | –5.52 | 0.71 | 6.23 | | | |
| 382, Laboratory Apparatus and | $Y^{G-3}_{BEA-U}$ | 4.29 | 2.74 | –1.55 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.26 | 0.990 |
| Analytical, Optical | $Y^{S-3}_{BLS-I-P}$ | 4.32 | 2.52 | –1.81 | | | |
| 384, Surgical Medical and Dental | $Y^{G-3}_{BEA-U}$ | 3.97 | 6.98 | 3.00 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | 0.12 | 0.987 |
| Instruments | $Y^{S-3}_{BLS-I-P}$ | 3.85 | 6.73 | 2.88 | | | |
| 385, Opthalmic Goods | $Y^{G-3}_{BEA-U}$ | 3.90 | 7.73 | 3.84 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | –0.21 | 0.972 |
| | $Y^{S-3}_{BLS-I-P}$ | 3.45 | 7.50 | 4.05 | | | |
| 386, Photographic Equipment and | $Y^{G-3}_{BEA-U}$ | 0.72 | 0.75 | 0.03 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | –0.52 | 0.920 |
| Supplies | $Y^{S-3}_{BLS-I-P}$ | 0.84 | 1.39 | 0.55 | | | |
| 387, Watches, Clocks, Clockwork | $Y^{G-3}_{BEA-U}$ | –9.33 | 5.51 | 14.85 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-U}$ | 5.61 | 0.880 |
| Operated Devices | $Y^{S-3}_{BLS-I-U}$ | –6.57 | 2.67 | 9.24 | | | |
| *SIC 3-digit industries in major group 48, Communications* | | | | | | | |
| 481, Telephone Communications | Only a single series ($Y$S-3BLS-I-P) is available. | | | | | | |
| 482 Telegraph and Other Message Communications | No BEA or BLS output series available. | | | | | | |
| 483 Radio and Television Broadcasting | $Y^{G-3}_{BEA-U}$ | 0.08 | –0.06 | –0.14 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | –1.21 | 0.733 |
| Stations | $Y^{S-3}_{BLS-I-P}$ | 1.13 | 2.19 | 1.06 | | | |
| 484 Cable and Other Pay Television | $Y^{G-3}_{BEA-U}$ | 5.38 | 8.93 | 3.55 | $Y^{G-3}_{BEA-U}$ and $Y^{S-3}_{BLS-I-P}$ | –1.70 | 0.470 |
| Stations | $Y^{S-3}_{BLS-I-P}$ | 2.96 | 8.21 | 5.25 | | | |
| 489, Communications Services, NEC | No BEA or BLS output series available. | | | | | | |

## References

Bosworth, Barry P. 2003a. Output and productivity growth in the communications industry, chapter IIb. Draft. Productivity in Services Industries: Trends and Measurement Issues, Summary of What We Have Learned from the Brookings Economic Measurement Workshops Economic Measurement Workshop. Washington, DC: Brookings Institution, November 21.

———. 2003b. Output and productivity in the transportation sector, chapter IIa. Draft. Productivity in Services Industries: Trends and Measurement Issues, Summary of What We Have Learned from the Brookings Economic Measurement Workshops Economic Measurement Workshop. Washington, DC: Brookings Institution, November 21.

Bureau of Labor Statistics (BLS). 2002. Multifactor productivity trends in manufacturing, 2000. News release. Washington, DC: BLS, August 29.

Domar, Evsey D. 1961. On the measurement of technological change. *Economic Journal* 71 (284): 709–29.

Gollop, Frank M. 1981. Growth accounting in an open economy. Paper presented at conference on Current Issues in Productivity. April, Newark, New Jersey.

Gullickson, William. 1995. Measurement of productivity growth in U.S. manufacturing. *Monthly Labor Review* 118 (7): 13–27.

Gullickson, William, and Michael J. Harper. 1999. Possible measurement bias in aggregate productivity growth. *Monthly Labor Review* 122 (2): 47–67.

———. 2002. Bias in aggregate productivity trends revisited. *Monthly Labor Review* 125 (3): 32–40.

Guo, Jiemin, Ann M. Lawson, and Mark A. Planting. 2002. From make-use to symmetric I-O tables: An assessment of alternative technology assumptions. Paper presented at the fourteenth international conference on Input-Output Techniques. 10–15 October, Montreal, Canada.

Hulten, Charles R. 1995. Capital and wealth in the revised SNA. In *The new system of national accounts,* ed. J. W. Kendrick, 149–81. Boston: Kluwer Academic.

Jorgenson, Dale W. 2003. Economic growth in the information age. National Bureau of Economic Research, Conference on Research in Income and Wealth. Hard-to-Measure Goods and Services: Essays in Memory of Zvi Griliches Conference. 19 September, Bethesda, MD.

Jorgenson, Dale W., Frank M. Gollop, and Barbara M. Fraumeni. 1987. *Productivity and U.S. economic growth.* Cambridge, MA: Harvard University Press.

Jorgenson, Dale W., and Zvi Griliches. 1967. The expansion of productivity change. *Review of Economic Studies* 34 (99): 249–83.

Moulton, Brent R. 2004. The System of National Accounts for the new economy: What should change? *Review of Income and Wealth* 50 (2): 261–78.

Moulton, Brent R., and Eugene P. Seskin. 2003. Preview of the 2003 comprehensive revision of the National Income and Product Accounts: Changes in definitions and classifications. *Survey of Current Business* 83 (June): 17–34.

Nordhaus, William D. 2002. Productivity growth and the new economy. *Brookings Papers on Economic Activity,* Issue no. 2:211–65.

Organisation for Economic Co-operation and Development (OECD). 2001. *Measuring capital: OECD manual; Measurement of capital stocks, consumption of fixed capital and capital services.* Paris: OECD.

Triplett, Jack E., and Barry P. Bosworth. 2004. *Productivity in the U.S. services sector: New sources of economic growth.* Washington, DC: Brookings Institution Press.

United Nations, Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, and World Bank. 1993. *System of National Accounts 1993.* Series F, no. 2, rev. 4. New York: United Nations.

## Comment Carol Corrado

The empirical analysis of the sources of economic growth requires consistent measures of outputs and inputs. The requirement is important because the rate of change in productivity is usually estimated residually from measures of outputs and inputs. This paper focuses on the definition and construction of the output measures used to estimate productivity. Because the BEA and BLS each publish apparently similar, but statistically different, major sector and industry-level output measures, a major goal of this chapter is to take some steps to document and understand these differences.

The chapter first reviews the theoretically ideal production account, that is, one that includes capital services so that the account can be used to construct estimates of multifactor productivity. The authors show how the theoretical account can be adapted for a major sector, which reveals the relationship between GDP and the output of the major sector. They also illuminate the role of imports and show how reconciling items in economic accounts (certain taxes and subsidies) should be treated to calculate capital income as required for productivity measurement. Using elements currently published by both the BEA and BLS, the chapter then illustrates an empirical production account for the nonfarm business sector and presents the BLS multifactor productivity (MFP) estimates derived from the account.

Thus, the U.S. national accounts, viewed broadly across the agencies, already contain a cornerstone of the new architecture, a production account for (something close to) GDP in current and constant prices. The new architecture also calls for a production account for GDI in current and constant prices and suggests that both be extended to the industry level. The theoretical framework laid out in the chapter shows how aggregate output and productivity can be built from industry-level data, an approach that is conceptually consistent with GDP as measured in benchmark input-output accounts. Other chapters in this volume indicate the BEA's plans for more timely integration of its industry and input-output accounts, and thus the theoretical section of this paper illustrates how productivity measurement fits into this longer range scheme.

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