Industry Productivity Measures

Industry Productivity Studies (IPS) is a BLS program that produces measures of productivity for detailed U.S. industries. IPS compiles and analyzes a wide array of data produced by both government statistical agencies and nongovernmental organizations to measure productivity.

Quick Facts: Industry Productivity Measures	
Subject areas	Productivity
Key measures	Industry productivity Labor productivity Unit labor costs Industry multifactor productivity
How the data are obtained	Estimated from multiple data sources
Classification system	Industry
Periodicity of data availability	Annual
Geographic detail	National
Scope	Private sector
Key products	• Productivity and Costs by Industry: Wholesale Trade, Retail Trade, and Food Services and Drinking Places Industries • Productivity and Costs by Industry: Selected Service-Providing Industries • Productivity and Costs by Industry: Manufacturing and Mining Industries • Multifactor Productivity Trends for Detailed Industries
Program webpage	www.bls.gov/lpc www.bls.gov/mfp

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Concepts

This section defines key terms and concepts that are central to understanding how BLS produces measures of productivity for U.S. industries.

Productivity is a measure of economic performance that compares the amount of goods and services produced (output) with the amount of inputs used to produce those goods and services. BLS publishes measures of two types of productivity: labor productivity and multifactor productivity.

Measures of industry productivity are useful for tracking changes in efficiency and for determining the effects of technological improvements in particular industries. Individuals and companies also use these data as benchmarks to judge how their firms perform compared with others in the industry.

Industry productivity trends provide information that helps researchers and policymakers better understand how industries and sectors contribute to aggregate productivity growth. Industry productivity analysis also can provide information to assess the impact of policy changes or external shocks on particular industries, and the resulting impact on economic growth of the larger economy.

Output is the total amount of goods and services produced in an industry for sale either to consumers or to businesses outside that industry. This concept is known as *sectoral output*.[1]

Inputs are any resources used to create goods and services and include hours worked, capital services, energy, materials, and purchased services.

Labor productivity describes the relationship between the changes in the amount of output with the amount of labor used to produce that output. Labor productivity is expressed as an index, which is derived as a ratio of output growth to that of hours worked. Therefore, a change in labor productivity reflects the change in output that is not explained by the change in hours worked. Labor productivity can increase over time for many reasons, including technological advances, improved worker skills, improved management practices, economies of scale in production, and increases in the amount of nonlabor inputs used (capital, energy, materials, and purchased services).

Multifactor productivity is a measure of economic performance that compares the amount of output to the amount of combined inputs used to produce that output. Combined inputs are hours worked, capital services, and intermediate purchases. Changes in multifactor productivity do not reflect the specific contributions of capital services, labor, and intermediate purchases. Rather, they reflect the joint influences on economic growth of a number of factors that are not specifically accounted for on the input side, including technological change, returns to scale, improved skills of the workforce, better management techniques, or other efficiency improvements.

Hours worked is the total number of annual hours worked of all people in an industry. This includes paid employees, the self-employed (partners and proprietors), and unpaid family workers (those who work in a family business or farm without pay).

Capital services measure the flow of productive benefits from physical assets. These include equipment, structures, land, and inventories. Financial capital is excluded.

Intermediate purchases are the materials, purchased services, fuels, and electricity consumed by each industry.

Combined inputs is a Törnqvist index of separate quantity indexes of hours worked, capital services, and intermediate purchases. The difference between annual changes in output and combined inputs is expressed as multifactor productivity.

Törnqvist index is an annually chained index that is an aggregation of the growth rates of various components between two adjacent periods, with weights based on the components' share of industry value of production. When aggregating industry output, the components are the various products provided for sale outside the industry. When aggregating combined inputs, the components are capital services, hours worked, and intermediate purchases.

Labor compensation is a measure of the cost to the employer of securing the services of labor. It is defined as payroll plus supplemental payments. Payroll includes salaries, wages, commissions, dismissal pay, bonuses, vacation and sick leave pay, and compensation in kind. Supplemental payments include legally required expenditures and payments for voluntary programs. The legally required portion consists primarily of Social Security, unemployment compensation, and workers' compensation. Payments for voluntary programs include all programs not specifically required by legislation, such as the employer portion of private health insurance and pension plans.

Unit labor costs represent the labor compensation businesses pay to produce one unit of output. Unit labor costs are calculated as the ratio of nominal labor compensation to output. Unit labor costs also can be expressed as the relationship between compensation per hour worked (hourly compensation) and real output per hour worked (labor productivity). When hourly compensation growth outpaces productivity, unit labor costs increase. Alternatively, when productivity growth exceeds hourly compensation, unit labor costs decrease.

Unit labor costs are used to analyze trends in production costs. Trends in unit labor costs clarify the relationship between labor productivity, hourly compensation, and the cost of production. These data are used to assess the changing efficiency, cost structure, and competitive position of individual industries.

NOTES

[1] Sectoral output is distinct from two other common measurements of output: gross output and value-added. Gross output is the total amount of goods and services produced, and includes sales to firms within the same industry. Value-added is equal to gross output minus the value of energy, materials, and purchased services which were consumed in the production of goods and services.

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Data Sources

Industry Productivity Studies collects data from a variety of different sources. For almost all industries, output is measured using a different source than inputs (capital, labor, and intermediate purchases).

Output

Output indexes are prepared using data published by various public and private agencies, at the most detailed level possible. The economic censuses and annual surveys of the U.S. Census Bureau are the primary sources of revenue data used in developing deflated value output measures. Price data from either the BLS Producer Price Index (PPI) or BLS Consumer Price Index (CPI) programs, are used to deflate current dollar values into constant dollars. Data for physical quantity output measures come from a number of data sources, including the U.S. Departments of Energy, Interior, and Transportation, the Federal Reserve Board, the Federal Deposit Insurance Corporation, and the U.S. Postal Service. Data from trade associations also are used for some industries.

Most industries use the following sources of value of production:

- Manufacturing industries: The U.S. Census Bureau's Annual Survey of Manufactures and Census of Manufactures.
- Retail trade industries and food services and drinking places: The U.S. Census Bureau's Annual Retail Trade Survey and the Census of Retail Trade.
- Wholesale trade industries: The U.S. Census Bureau's Monthly and Annual Wholesale Trade Surveys and the Census of Wholesale Trade.
- Service-providing industries: The U.S. Census Bureau's Service Annual Survey and Census of Service Industries.

Hours worked

Data on worker hours come primarily from the BLS Current Employment Statistics (CES) survey and Current Population Survey (CPS). CES data on the number of total jobs and production worker jobs held by wage and salary workers in nonfarm establishments are supplemented with CPS data on self-employed and unpaid family workers to estimate total worker hours for each industry. CES data on the average weekly hours paid of production workers are supplemented with CPS data on hours of nonproduction, self-employed, and unpaid family workers. Ratios of hours worked to hours paid are developed using data from the National Compensation Survey (NCS). These ratios are applied to the CES and CPS data to develop total hours worked for all classes of workers. For some industries, hours-worked data are supplemented or further disaggregated using data from the BLS Quarterly Census of Employment and Wages (QCEW), the Census Bureau, or other sources.

Although the hours worked of all persons are usually based on CES and CPS survey data, estimates for some industries are derived from other sources. Estimates for industries in the farm sector are made using data from the U.S. Department of Agriculture, and measures for industries in the nonfarm agriculture sector are created primarily using data from the QCEW and the CPS. For mining industries, estimates of nonproduction worker hours are derived from data collected by the Mine Safety and Health Administration. For the air transportation industry,

hours-worked measures are calculated with data from the Bureau of Transportation Statistics (BTS), U.S. Department of Transportation. For line-haul railroads, hours-worked measures are derived with data from the Surface Transportation Board (STB), U.S. Department of Transportation, and supplemented with data from the Association of American Railroads (AAR). CES provides employment data of postal service employees, and the U.S. Postal Service provides the hours data.

Labor compensation

For most service-providing, trade, and mining industries, labor compensation is derived using annual wage data from the QCEW published by BLS, along with data on employer costs for supplemental benefits from the Census Bureau and the Bureau of Economic Analysis (BEA). For manufacturing and some service-providing industries, annual payroll and supplemental benefit data from the Census Bureau are used.

Capital

For manufacturing industries, amounts of investment for broad categories of capital assets are derived using annual capital expenditures from the economic censuses and annual surveys of the U.S. Census Bureau. Additional detailed asset investment data comes from the fixed asset accounts from the Bureau of Economic Analysis (BEA). Annual investment data are supplemented with more detailed benchmark data from BEA's capital flow table and the Census Bureau's Annual Capital Expenditures Survey. Price deflators for each asset category are constructed by combining detailed price indexes (mostly BLS producer price indexes) with weights that reflect each industry's use of individual asset commodities.

The Bureau of Transportation Statistics (BTS) provides annual quantities of airframes and engines which comprise a large portion of capital stock in the air transportation industry. For assets other than airframes and engines, detailed annual expenditures on equipment and structures from the BEA is used. Inventories of parts and supplies from BTS are also included; the current dollar series is deflated with a weighted cost index based on data from Airlines for America (A4A) and BTS.

The Surface Transportation Board (STB) and Amtrak provide current dollar investment data for 10 categories of capital equipment and 13 categories of structures within line-haul railroads. Capital investment is deflated with either BLS PPIs or deflators based on BEA data. Estimates of investments in land from the STB and Amtrak are deflated with price indexes from BEA.

Intermediate purchases

Intermediate purchases include the nominal values of materials, fuels, and electricity consumed by industry. For manufacturing industries, these values, along with quantities of electricity, are obtained from economic censuses and annual surveys conducted by the Census Bureau. Purchased business services are estimated using annual industry data and benchmark input-output tables from Bureau of Economic Analysis (BEA). Price deflators for detailed material and service commodities are primarily based on PPIs, but also based on prices from the Departments of Agriculture, Energy, and Interior.

For air transportation, the Bureau of Transportation Statistics data on cost of materials, services, fuels, and electricity are deflated using cost indexes from Airlines for America. For line-haul railroads, estimates of intermediate purchases from the Surface Transportation Board are supplemented with data from other sources, including the Association of American Railroads, Amtrak, U.S. Energy Information Administration, and the Edison Electric Institute. The nominal values are deflated with PPIs from BLS and implicit price deflators from BEA.

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Design

Industry Productivity Studies (IPS) does not conduct a survey to collect data. Rather, data on industry inputs and output is drawn from other publically available sources. These include (but are not limited to) BLS data such as the Current Employment Statistics, Current Population Survey, Quarterly Census of Employment and Wages, Producer Price Index, and Consumer Price Index. For more information, please see the Data Sources section.

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Calculation

Productivity statistics describe how efficiently an industry produces goods and services. This is done is by separately calculating industry inputs and outputs. Change in the quantity of output that is not explained by an equivalent change in inputs is defined as growth (or decline) in productivity. The following section will describe the mathematical principles and techniques by which industry output, inputs, and productivity series are measured.

Output

Industry output is usually measured as a weighted index of the changes in the various products or services (in real terms) provided for sale outside the industry. Real output is most often derived by deflating nominal sales or values of production using BLS price indexes, but for a few industries it is measured by physical quantities of output. Each of these methods is explained below.

Deflated value output indexes are derived from data on the value of industry output adjusted for price change. The adjustment for price change is accomplished by dividing the nominal value of output by one or more price indexes. Nominal values of industry output are adjusted where possible to reflect the total value of industry output from both employer and nonemployer firms and to remove sales between establishments in the same industry, referred to as intraindustry transfers. Value of industry output is further adjusted by removing resales and accounting for changes in inventory. Revenues are deflated at the detailed product-class level to take into account changes in the mix of products over time. The deflated revenues for each output category are then aggregated together using the Törnqvist formula. The resulting real output indexes are conceptually equivalent to indexes that are developed using data derived from physical quantities of output.

Where possible, *physical quantity output indexes* are Törnqvist aggregations of the quantities of individual products. The basic data on quantities generally reflect primary products for each industry, at the most detailed level possible. Physical quantity output indexes are used for some industries within the mining, utilities, and transportation sectors, and at community hospitals, commercial banking, and postal services.

For an industry producing a single uniform product or service, the output index is simply the ratio of the number of units produced in the current year divided by the number of units produced in the base year. More typically, industries produce a number of different products or perform a number of different services. For these industries, output is calculated with a Törnqvist formula:

$$\bar{y} = \frac{\sum_{i \in S} w_i \, y_i}{\sum_{i \in S} w_i}$$

The Törnqvist formula yields the ratio of output in a given year to that in the previous year. The ratios arrived at in this manner then must be chained together to form a time series. If $t = 3$ and the base year is denoted by o, then

$$SE(\bar{y}) = \sqrt{\frac{1}{44}\sum_{r=1}^{44}(\bar{y}_r - y)^2}$$

Hours worked

Total annual hours worked for each industry are estimated separately for three categories: paid employees, self-employed, and unpaid family workers. Average weekly hours of paid employees are collected by the BLS Current Employment Statistics (CES) on an hours-paid basis. This includes time when employees are on leave. Therefore, ratios of hours worked to hours paid from the National Compensation Survey are applied to the CES data. This results in the average weekly hours worked, which are multiplied by employment to calculate total annual hours worked. The annual hours of the three categories of workers are then aggregated to derive total industry hours worked. Hours worked of all persons at the industry level are treated as homogeneous, with no distinction made between the quality of hours worked by employees with different skill levels and education.

Labor productivity

To calculate a labor productivity index, an index of industry output is divided by an index of hours worked:

$$CV = (\bar{y}) = \frac{SE(\bar{y})}{\bar{y}} x100\%$$

Unit labor costs

Indexes of unit labor costs are computed by dividing an index of industry labor compensation by an index of real industry output:

$$\frac{C_t}{C_0} \div \frac{Q_t}{Q_0}$$

where

C = total labor compensation, expressed as an annual index,

Q = quantity of aggregate output, expressed as an annual index,

t = the current year, and
0 = the base year.

Capital services

Capital services are estimated by calculating productive capital stocks; capital services are assumed to be proportional to changes in the quantity of capital stocks for each asset. The capital index is a Törnqvist index of separate quantity indexes of equipment, structures, inventories, and land.

Capital stocks are composed of numerous different assets purchased at different times, including categories of equipment, structures, inventories, and land. The measure of capital stock for each year includes that year's investment in an asset plus the remaining productive stock from all previous years' investments. Capital stocks of equipment and structures for each industry are calculated using the perpetual inventory method, which takes into account the continual additions to and subtractions from the stock of capital as new investment and retirement of old capital occur. Real (constant dollar) investments in various assets are estimated by deflating current dollar investments with appropriate price deflators. The perpetual inventory method measures real stocks at the end of a year equal to a weighted sum of all past investments, where the weights are the asset's efficiency relative to a new asset. A hyperbolic age efficiency function is used to calculate the relative efficiency of an asset at different ages.

The hyperbolic age-efficiency function can be expressed as

$$S_t = (L - t)/(L - (\beta)t)$$

where
S_t = the relative efficiency of a $t - year$ old asset,
L = the service life of the asset,
t = the age of the asset, and
β = the parameter of efficiency decline.

The service life of the asset for each cohort of each type of equipment and structure is assumed to be normally distributed around an average service life for that asset type. For most assets, these service lives are the same across all industries. The parameter of efficiency decline is assumed to be 0.5 for equipment and 0.75 for structures.[1]

These parameters yield a function in which assets lose efficiency more slowly at first, and then lose efficiency more rapidly later in their service lives.

Stocks are calculated for three separate categories of inventories: finished goods, work in process, and materials and supplies. Inventory stocks for each year are calculated as the average of the end-of-year stocks in years *t* and *t-1* to represent the average on hand during the year as a whole. Current-dollar values of finished goods and work in process inventories are deflated with an implicit price deflator of each industry's output. Current-dollar values of materials and supplies inventories are deflated with a weighted aggregation of PPIs matched to various amounts of materials consumed, specific to each industry.

Land stocks are estimated as a function of the change in constant-dollar structures stocks for each industry.

The various equipment, structure, inventory, and land stock series in constant dollars are aggregated into one capital input measure using a Törnqvist formula. Capital stocks multiplied by implicit rental prices yield cost share weights. Rental prices are calculated for each asset as

$$RP = [(P * R) + (P * D) - (\Delta p)] \ (1 - uz - k) / (1 - u)$$

where
RP = the rental price,
P = the deflator for the asset,
R = the internal rate of return,
D = the rate of depreciation for the asset, and
Δp = the capital gain term representing the price change of the asset over the prior three
$(1 - uz - k)/(1 - u)$ reflects the effects of taxation where
u = the corporate tax rate,
z = the present value of \$1 of depreciation deductions, and
k = the effective investment tax credit rate.

Rental prices are expressed in rates per constant dollar of productive capital stocks. Each rental price is multiplied by its constant-dollar capital stock to obtain asset-specific capital costs, the shares of which are used for Törnqvist aggregation.

Intermediate purchases

The materials, purchased services, fuels, and electricity consumed by each industry are called intermediate purchases. Except for electricity consumed by manufacturing industries, for which direct quantity data are available, quantities are derived by deflating current-dollar values with appropriate price deflators.

Constant-dollar materials consumed are calculated by dividing annual current-dollar industry purchases by a weighted price deflator for each industry. Materials deflators are constructed for each industry by combining producer price indexes and import price indexes from BLS for detailed commodities. The deflators are combined using weights based on detailed commodity data from the Bureau of Economic Analysis (BEA) benchmark input-output tables. Price indexes to deflate purchased business services are constructed in a similar manner using CPIs, PPIs, or deflators developed by BEA. The value of fuels consumed by each industry is deflated with a weighted price deflator based on PPIs for individual fuel categories; the weights reflect fuel expenditures by industry from the Energy Information Administration (EIA), U.S. Department of Energy.

The separate indexes of real materials, services, fuels, and electricity are aggregated into a total intermediate purchases index using the Törnqvist formula. The weights for each component are derived by dividing the current dollar cost of each by the total combined cost of intermediate purchases, and averaging these weights at times t and t-1.

Combined Inputs

The annual growth rates of hours worked, capital services, and intermediate purchases are aggregated using their relative cost shares as weights. The cost of hours worked equals labor compensation. The weight for intermediate purchases is the sum total cost of materials, fuels, electricity, and purchased services. The cost of capital is derived as a residual, which is calculated as the value of sectoral production minus the costs of labor compensation and intermediate purchases.

The quantity indexes of hours worked, capital services, and intermediate purchases are combined using the Törnqvist formula to create an index of combined inputs.

Multifactor productivity

Multifactor productivity measures are derived by dividing an index of real industry output by an index of combined inputs of hours worked, capital services, and intermediate purchases.

$$\ln\left(\frac{A_t}{A_{t-1}}\right) = \ln\left(\frac{Q_t}{Q_{t-1}}\right) - \left[w_k\left(\ln\frac{K_t}{K_{t-1}}\right) + w_l\left(\ln\frac{L_t}{L_{t-1}}\right) + w_{ip}\left(\ln\frac{IP_t}{IP_{t-1}}\right)\right]$$

where
$\ln$ = the natural logarithm of the variable,
A = multifactor productivity,
Q = output,
K = capital services,
L = labor input (i.e. hours worked),
IP = intermediate purchases input, and
$w_k w_l w_{ip}$ = cost share weights.

The input cost share weights are 2-year averages of the cost shares for each input (capital services, hours worked, and intermediate purchases), in years t and t-1, where

$$w_i = \frac{\left(\frac{p_i x_i}{\sum_i (p_i x_i)}\right)_t + \left(\frac{p_i x_i}{\sum_i (p_i x_i)}\right)_{t-1}}{2}$$

p_i = price of input i (capital, hours worked, or intermediate purchases) in period t

x_i = quantity of input i in period t

Since the growth rates are represented by differences in logarithms, the antilogs of the differences must be chained to form the index of multifactor productivity. A chain index is an index number in which the value of any given period is related to the value of its immediately preceding period; this is distinct from a fixed-base index, where the value of every period in a time series is directly related to the same value of one fixed base period.

Labor productivity is related to multifactor productivity in the manner given by the following formula:

$$ln\left(\frac{Q_t}{Q_{t-1}}\right) - ln\left(\frac{L_t}{L_{t-1}}\right) = ln\left(\frac{A_t}{A_{t-1}}\right) + w_k\left[ln\left(\frac{K_t}{K_{t-1}}\right) - ln\left(\frac{L_t}{L_{t-1}}\right)\right] + w_{ip}\left[ln\left(\frac{IP_t}{IP_{t-1}}\right) - ln\left(\frac{L_t}{L_{t-1}}\right)\right]$$

.

The equation above shows that the rate of change in labor productivity (on the left side of the equation) is equal to the change in multifactor productivity plus the effects of factor substitution; that is, the combined effects of changes in the weighted capital–labor ratio and the weighted intermediate purchases–labor ratio (which are represented on the right side of the equation). Conversely, the equation also shows that the change in multifactor productivity equals the change in labor productivity, adjusted to remove the weighted changes in capital and intermediate purchases relative to labor.

Limitations

Labor productivity and multifactor productivity measures are subject to certain limitations. First, existing techniques may not fully take into account changes in the quality of goods and services produced, which could result in reduced measures of output. Second, although efforts have been made to maintain consistency of coverage between the output and input estimates, some statistical differences may remain. For example, establishment lists might differ between surveys of industry revenue and surveys of hours. Third, estimates of outputs and inputs for detailed industries are subject to more volatility and error than estimates for more aggregate sectors. Finally, year-to-year changes in productivity are volatile and, therefore, are not necessarily indicative of changes in long-term trends. Conversely, long-term trends are not necessarily applicable to any one year or to any period in the future. Because of these and other statistical limitations, these indexes cannot be considered precise measures; instead, they should be interpreted as general indicators of movements of productivity.

NOTES

[1]See "The Measurement of Capital by Charles R. Hulten, available at http://www.nber.org/chapters/c5974, page 25.

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Presentation

Annual BLS industry labor productivity measures are published in the [Productivity and Costs by Industry news releases](#). Three of these news releases are produced each year, each covering a separate sector of the economy:

- Productivity and Costs by Industry: Wholesale Trade, Retail Trade, and Food Services and Drinking Places Industries
- Productivity and Costs by Industry: Selected Service-Providing Industries
- Productivity and Costs by Industry: Manufacturing and Mining Industries

News releases, data tables, documentation, and other publications can be accessed at https://www.bls.gov/lpc/. Data is also available in [interactive Excel tables](#) and [dashboards](#). Labor productivity data within the manufacturing and service-providing sectors are revised following the publication of annual surveys by the Census Bureau.

Industry multifactor productivity measures are published annually in the Multifactor Productivity Trends for Detailed Industries news releases and can be accessed at https://www.bls.gov/mfp/. Multifactor productivity series cover the manufacturing industries, airline transportation, and line-haul railroads. Data are also available in tables and an interactive dashboard at the same locations. More detailed capital and intermediate purchases data is available upon request, by calling (202) 691-5618 or by sending an email to productivity@bls.gov.

Subscribe to the industry productivity news releases on the BLS website at https://subscriptions.bls.gov/accounts/USDOLBLS/subscriber/new.

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History

Timeline Events:

The U.S. Bureau of Labor Statistics has produced studies of labor productivity in individual industries since the 1800s. Prompted by congressional concern that human labor was being displaced by machinery, a study of 60 manufacturing industries was released as "Hand and Machine Labor" in 1898. This report provided striking evidence of the savings in labor resulting from mechanization in the last half of the 19th century. The effects of productivity advances on employment remained an important focus of BLS throughout the 1920s and 1930s. During this period, BLS also began publishing industry indexes of labor productivity, which were based on available production data from the periodic "Census of Manufactures" and employment statistics collected by BLS.

Productivity, as it related to wage adjustments, was an issue in labor–management relations in the 1920s. Later, during the Depression, as concerns grew over the effects of increased productivity and technological change on employment, BLS developed data on the impact of technology on employment and the displacement of workers. In 1935, BLS applied to the Works Progress Administration (WPA) for funds to conduct studies of productivity in 50 industries.

In 1940, Congress authorized BLS to start continuing studies of productivity and technological changes. BLS extended earlier indexes of labor productivity developed by the National Research Project of the WPA, and published measures for selected industries. This work, however, decreased during World War II, because of the lack of meaningful production and employee hour data for many manufacturing industries.

With the arrival of World War II, the BLS Productivity program began to focus on the most efficient use of scarce labor resources. BLS began a number of studies of labor requirements for defense industries, such as synthetic rubber and shipbuilding. After the war, the industry studies program resumed on a regular basis; the program supplemented data for a number of industry studies by directly collecting data from employers. Budget restrictions after 1952 prevented the continuation of direct collection of data. Consequently, the preparation of industry measures was largely limited to those industries where data were readily available.

Over the years, the BLS productivity program has made improvements in production theory and index number theory and has expanded the number of series it produces. In 1987, the program published the first multifactor productivity measures for detailed industries. These measures relate output to combined inputs of capital, labor, energy, materials, and purchased services. In 1995, following a careful review of its methods and the economic literature, the program released labor productivity measures that incorporated an annual chain-weighted Törnqvist index for measuring changes in industry output. The index aggregates the growth rates of various industry outputs with annual weights based on the products' shares in total value of industry production.

In 1998, the program completed a major industry expansion, increasing coverage from 180 industries to more than 500, as defined by the Standard Industrial Classification (SIC) system. In 1999, the program published industry unit labor cost measures for the first time. These measures reflect the relationship between labor compensation and real output. In 2000, industry multifactor productivity measures were expanded to cover all 140 3-digit SIC manufacturing industries. Industry labor productivity measures were converted from the SIC system to the North

American Industry Classification System (NAICS) in 2003, and industry multifactor productivity measures were converted from SIC to NAICS in 2007. Efforts to expand industry coverage for service industries with nontraditional sources and methods continue.

In 2009, BLS developed and published measures of employment and hours of all persons for a comprehensive set of all 3- and 4-digit industries, including industries for which labor productivity measures are not available. In 2011, similar measures were developed for all National Income and Product Accounts (NIPA) industries, and were provided to the Bureau of Economic Analysis for use in the development of a set of prototype industry production accounts. In 2014, BLS began publishing labor measures as hours worked instead of hours paid.

Archives

- [May 09, 2011](#)

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More Information

Labor productivity, costs, employment, and hours data as well as a variety of supporting documentation is available on the BLS website at www.bls.gov/lpc. This page includes data for both Industry Productivity Studies as well as the Division of Major Sector Productivity.

Multifactor productivity data for both industries and major sectors can be found at www.bls.gov/mfp.

Below are direct links to specific topics:

- Current labor productivity and costs news releases: https://www.bls.gov/lpc/news.htm
- Archived historical labor productivity and costs news releases: https://www.bls.gov/bls/news-release/prin.htm
- Labor productivity and costs tables and charts: https://www.bls.gov/lpc/tables.htm
- Current multifactor productivity news releases: https://www.bls.gov/mfp/news.htm
- Archived historical multifactor productivity news releases: https://www.bls.gov/bls/news-release/home.htm#PRIN3
- Labor productivity and costs publications: https://www.bls.gov/lpc/publications.htm
- Productivity glossary: https://www.bls.gov/mfp/optglossary.htm
- Labor productivity and costs frequently asked questions: https://www.bls.gov/lpc/faqs.htm
- Multifactor productivity publications: https://www.bls.gov/mfp/publications.htm
- Multifactor productivity frequently asked questions: https://www.bls.gov/mfp/mprfaq.htm

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