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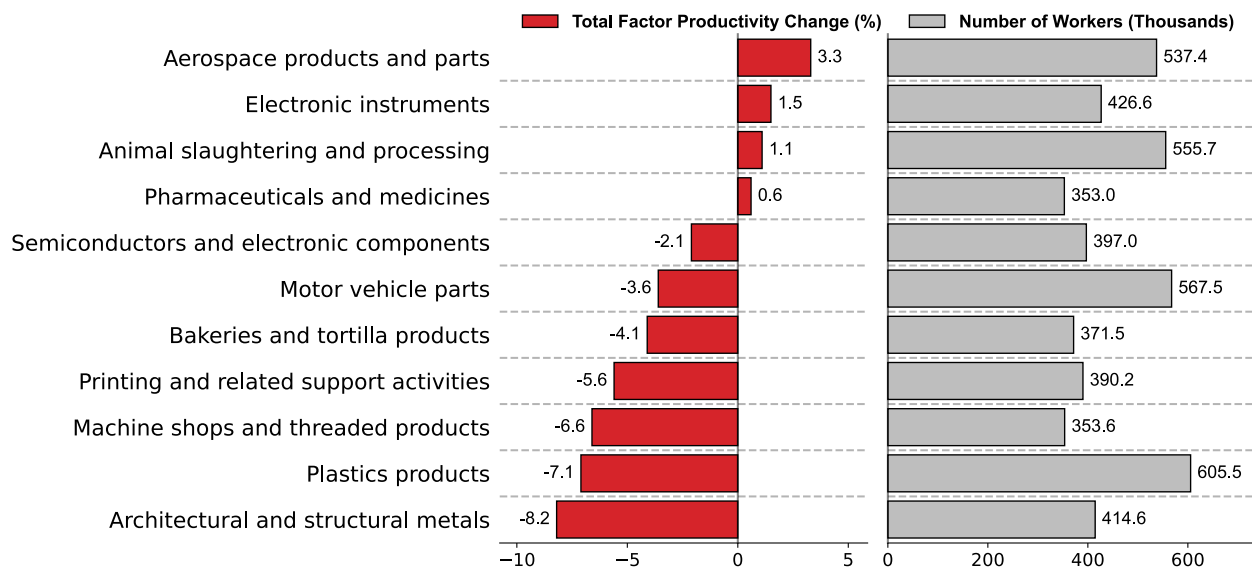
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TOTAL FACTOR PRODUCTIVITY FOR DETAILED INDUSTRIES – 2023

Total factor productivity—defined as output per unit of combined inputs—fell in 70 of the 86 four-digit NAICS manufacturing industries in 2023, the U.S. Bureau of Labor Statistics reported today. Among durable manufacturing industries, 42 of 51 had total factor productivity declines led by an 18.7-percent fall in the spring and wire product industry. Total factor productivity declined in 28 of 35 nondurable manufacturing industries led by an 11.8-percent drop in the beverages industry.

Four of the 11 largest manufacturing industries (those with employment over 350,000 workers) experienced increasing total factor productivity in 2023: aerospace products and parts (+3.3 percent), electronic instruments (+1.5 percent), animal slaughtering and processing (+1.1 percent), and pharmaceutical and medicines (+0.6 percent). (See chart 1.) Output declined in 7 of these 11 industries led by a 9.3-percent decrease in printing and related support activities. Combined inputs (capital, hours worked, energy, materials, and purchased services) declined in 2 of these 11 industries: printing and related support activities (-4.0 percent) and animal slaughtering and processing (-2.1 percent). (See table 1.)

Chart 1. Total factor productivity in largest manufacturing industries, 2023



Four of the 16 industries with rising total factor productivity in 2023 had increases of more than 8.0 percent:

- Agricultural chemicals (+13.4 percent)
- Fiber, yarn, and thread mills (+9.8 percent)
- Plywood and engineered wood products (+9.4 percent)
- Sawmills and wood preservation (+8.2 percent)

Seven industries posted total factor productivity declines of more than 10.0 percent:

- Spring and wire products (-18.7 percent)
- Other electrical equipment and components (-15.0 percent)
- Electrical lighting equipment (-13.0 percent)
- Glass and glass products (-12.7 percent)
- Beverages (-11.8 percent)
- Soaps, cleaning compounds, and toiletries (-11.2 percent)
- Paints, coatings, and adhesives (-10.5 percent)

Total Factor Productivity: Definition and Concepts

Changes in total factor productivity show the relationship between changes in real output and the combined inputs used to produce that output. These combined inputs include hours worked, capital, and intermediate inputs (energy, materials, and purchased services).

Measures of total factor productivity capture a variety of factors that influence economic growth that are not specifically accounted for among measured inputs, including technological change, returns to scale, enhancements in managerial and staff skills, changes in the organization of production, and other efficiency improvements. Total factor productivity reflects these factors. See the technical note for more information.

Components of Total Factor Productivity Growth: Output and Combined Inputs

Output increased in 22 of 86 manufacturing industries in 2023, compared to 42 industries in 2022. (See chart 2.) Among the industries that posted output gains in 2023, the following seven industries had increases of 6.5 percent or more:

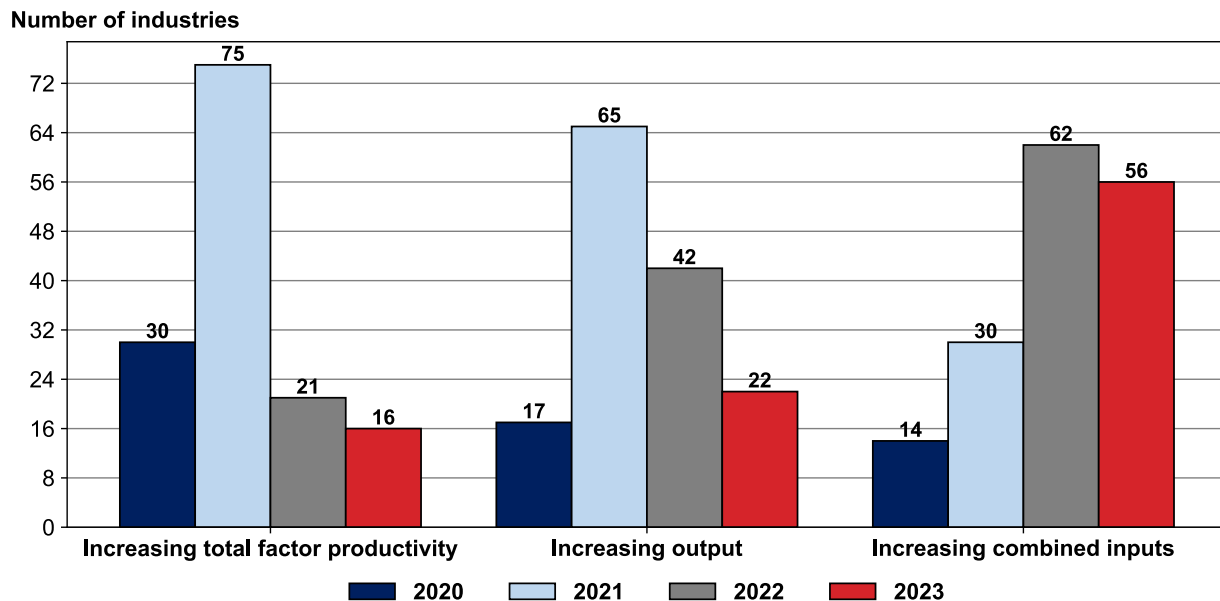
- Agricultural chemicals (+20.8 percent)
- Motor vehicles (+18.7 percent)
- Aerospace products and parts (+9.6 percent)
- Computer and peripheral equipment (+9.2 percent)
- Plywood and engineered wood products (+7.1 percent)
- Electrical equipment (+6.6 percent)
- Electronic instruments (+6.5 percent)

Combined inputs of capital, labor, and intermediate inputs rose in 56 of 86 manufacturing industries in 2023, compared to 62 in 2022. Thirty-nine industries saw increases in hours worked. Intermediate inputs grew in 56 industries. Capital also increased in 31 of the industries reported.

Of the industries with rising combined inputs in 2023, 5 had gains of more than 7.0 percent:

- Motor vehicles (+15.3 percent)
- Electrical equipment (+9.4 percent)
- Animal food (+9.0 percent)
- Footwear (+8.5 percent)
- Petroleum and coal products (+7.4 percent)

Chart 2. Number of manufacturing industries with increases in total factor productivity, output, and combined inputs, 2020-23



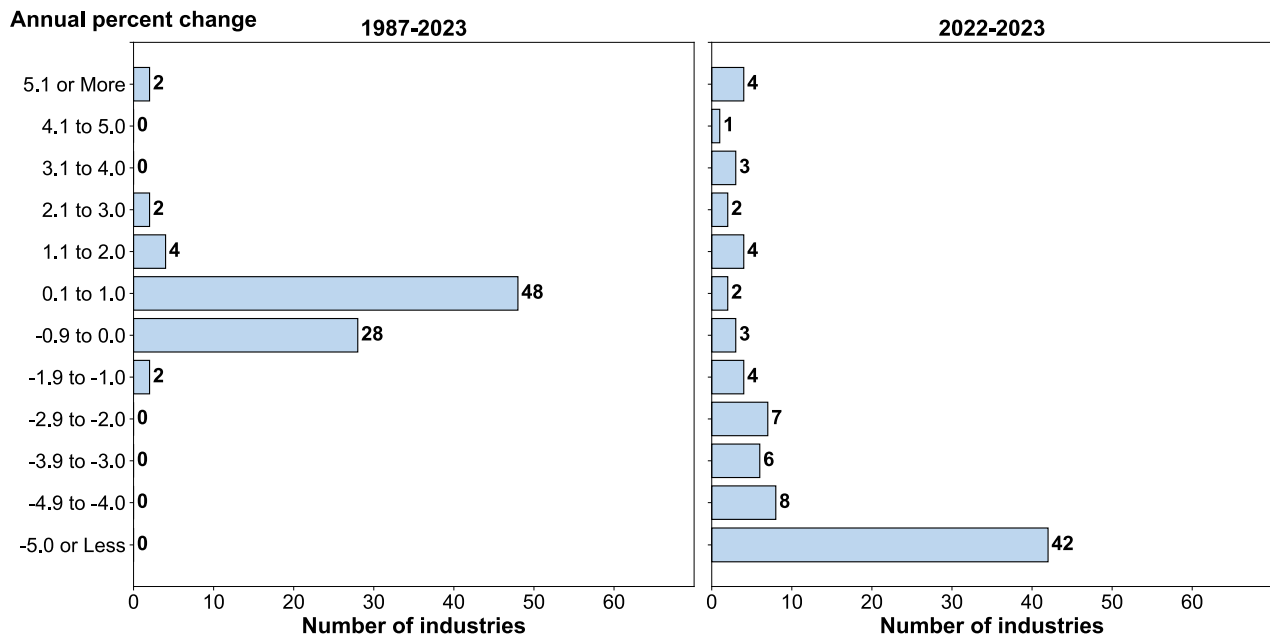
Trends in Total Factor Productivity for Selected Time Periods

Year-to-year movements and long-term trends in industry total factor productivity may reflect cyclical changes in the economy. However, long-term average annual percent changes in total factor productivity are more reliable indicators of historical trends in industry performance.

More industries saw total factor productivity growth over the long term than in the short term. From 1987 to 2023, total factor productivity grew in 56 out of 86 manufacturing industries, compared to 16 from 2022 to 2023. (See tables 1 and 2 and chart 3.) Annual rates of change in total factor productivity for all but 4 manufacturing industries ranged between -2.0 percent and +2.0 percent per year over the long term. In contrast, total factor productivity decreased by 2.0 percent or more in 63 industries in 2023.

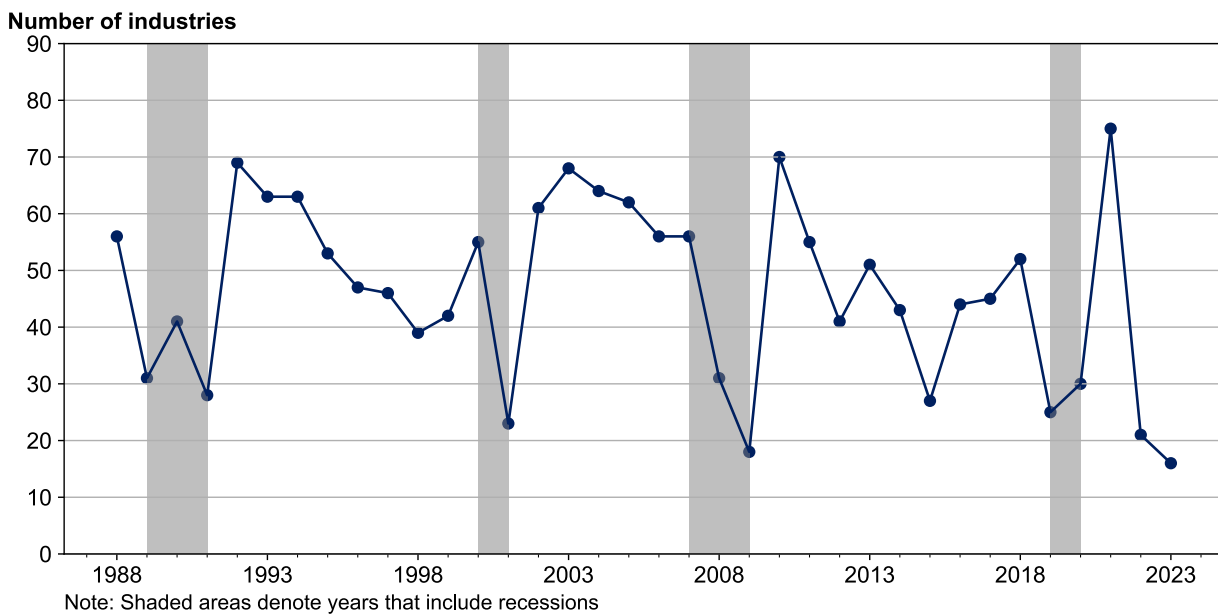
Although the distribution of total factor productivity growth for all the manufacturing industries may change significantly annually, 48 out of 86 industries are clustered between an increase of 0.1 percent and 1.0 percent in the long run.

Chart 3. Distribution of total factor productivity growth for all manufacturing industries, 1987-2023 and 2022-2023



Between 1987 and 2023, the number of manufacturing industries with growth in total factor productivity was highest in 1992, 2003, 2010, and 2021. These were years of economic growth following recessions. In contrast, relatively few manufacturing industries had total factor productivity growth in the recession years of 1991, 2001, and 2009. (See chart 4.) Few industries also recorded total factor productivity growth in 2022 and 2023.

Chart 4. Number of manufacturing industries with increases in total factor productivity, 1988-2023



Annual percent changes in total factor productivity by industry for periods between 1987 and 2023 are provided in table 3. Seventy manufacturing industries had total factor productivity growth from 2000 to

2007, the most of any period. The 1990 to 2000 period recorded the highest number of industries with growth in output (76) and combined inputs (70).

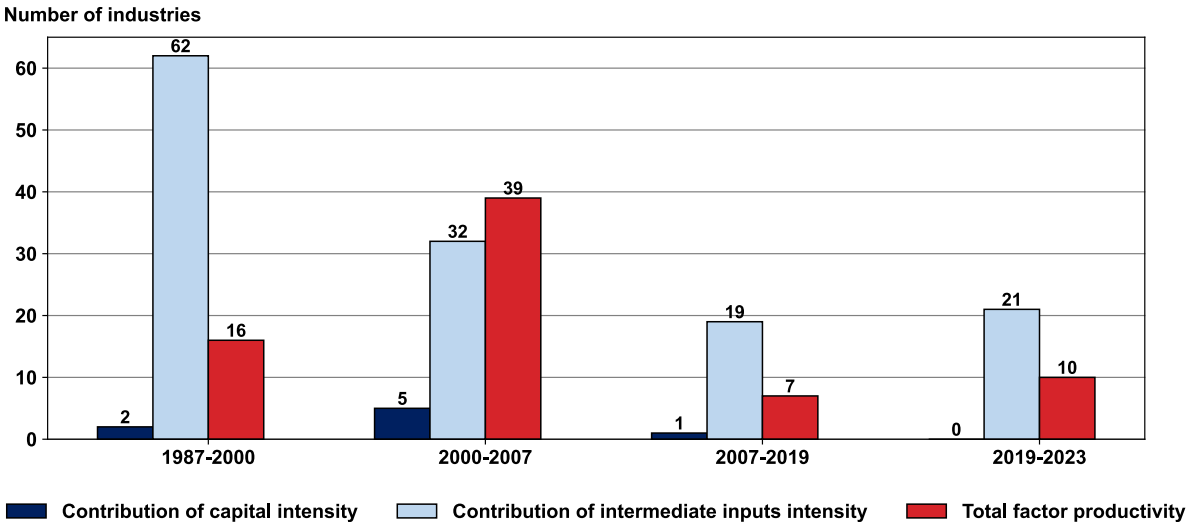
Total Factor Productivity as a Source of Labor Productivity Growth

Total factor productivity measures differ from the BLS labor productivity measures because they compare output to the combined inputs of hours worked, capital, and intermediate inputs. Labor productivity relates output only to hours worked. Mathematically, an industry’s labor productivity is equal to total factor productivity plus the effects of factor substitutions, also known as the contributions of capital intensity and of intermediate inputs intensity. The contribution of capital intensity to labor productivity refers to the change that is directly attributed to the use of capital relative to labor hours. Similarly, the contribution of intermediate inputs intensity refers to the change that is directly attributed to the use of purchased inputs relative to labor hours.

Seventy-eight of the 86 manufacturing industries posted gains in labor productivity from 1987 to 2023. Among these industries, substitution of intermediate inputs for labor was the leading source of labor productivity growth. (See table 4.) Growth in the contribution of intermediate inputs intensity occurs when firms purchase a greater share of materials instead of using their own labor. Contribution of intermediate inputs intensity may also rise when firms substitute contracted labor for payroll labor.

Chart 5 illustrates sources of labor productivity growth for four selected periods between 1987 and 2023. For the majority of industries with labor productivity growth between 1987 and 2000, the contribution of intermediate inputs intensity was the primary source of such growth. For many industries that experienced labor productivity growth during the 2000-2007 period, the greatest source of growth was from the contributions of total factor productivity. For the 2007-2019 and 2019-2023 periods, intermediate inputs intensity returned as the most frequent driver of labor productivity growth for industries with increasing labor productivity.

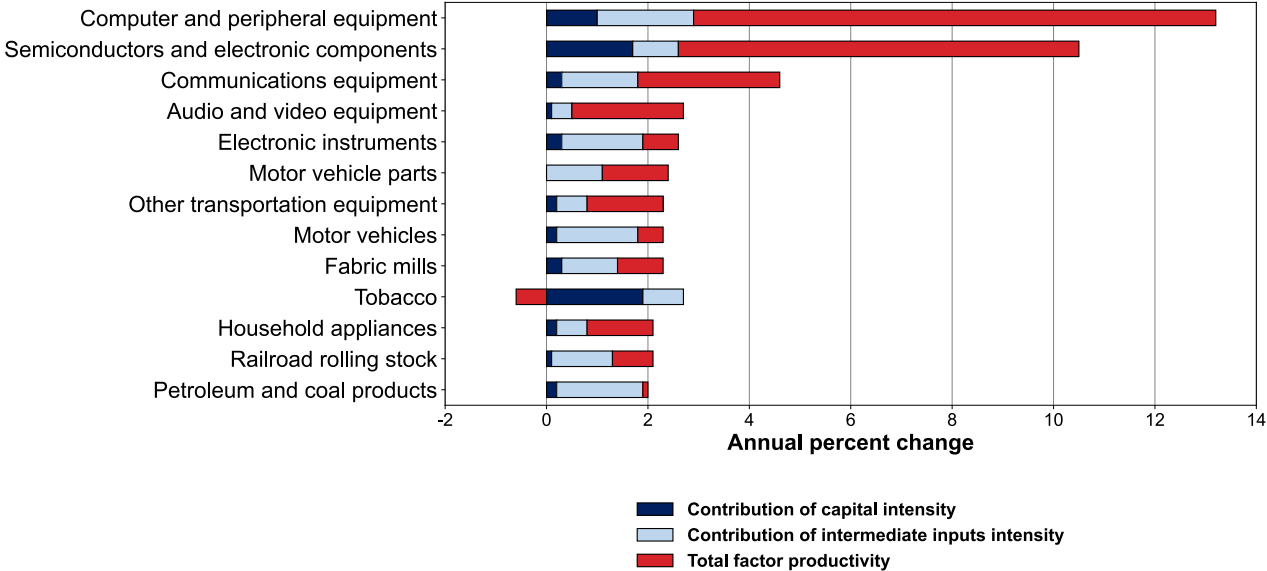
Chart 5. Greatest sources of labor productivity growth for manufacturing industries with increasing labor productivity, selected periods



Note: Chart only includes industries with a single largest source of labor productivity growth. Instances where the greatest source of labor productivity growth are equal among two or more sources are not pictured.

Chart 6 illustrates that there were 13 manufacturing industries with labor productivity growth of at least 2.0 percent per year from 1987 to 2023. Of these 13 industries, total factor productivity was the dominant source of labor productivity growth in 7, including 4 industries that manufacture computers and electronic products (computer and peripheral equipment, semiconductors and electronic components, communications equipment, and audio and video equipment). Uniquely, the tobacco industry’s labor productivity growth was fueled by the contribution of capital intensity.

Chart 6. Sources of labor productivity growth for manufacturing industries with greatest growth in labor productivity, 1987-2023



Additional Information

Measures of output and combined inputs for this release incorporate data from the U.S. Census Bureau's 2023 Annual Integrated Economic Survey (AIES). In years without an Economic Census, total factor productivity measures for detailed manufacturing industries used to be based on data from the Annual Survey of Manufactures (ASM), also produced by the Census Bureau. That survey has been replaced by the AIES beginning in 2023. The ASM was generally published about 1 year after the end of the calendar year being measured. Because of the longer publication schedule of the 2022 Economic Census and the transition to the AIES, the 2023 total factor productivity data for detailed industries are being published with a 1-year lag behind BLS's typical publication schedule.

Durable manufacturing industries are those which produce durable goods. These are defined as tangible products that can be stored or inventoried and that have an average life of at least 3 years, including vehicles, appliances, and computers. Durable goods manufacturing industries are classified by the North American Industry Classification System (NAICS) under the codes beginning with 321, 327, 331, 332, 333, 334, 335, 336, 337, and 339.

Nondurable manufacturing industries are those which produce nondurable goods. These are defined as tangible products that can be stored or inventoried and that have an average life of less than 3 years, including food products, chemicals, and apparel. Nondurable goods manufacturing industries are classified by NAICS under the codes beginning with 311, 312, 313, 314, 315, 316, 322, 323, 324, 325, and 326.

Access www.bls.gov/productivity/tables/total-factor-productivity-manufacturing-and-transportation-detailed-industries.xlsx for:

- Additional industries and sectors, including air transportation and line-haul railroads
- Detailed data series: indexes of total factor productivity and related measures; rates of change; and levels of industry employment, hours worked, sectoral output, and labor compensation

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Technical Note

Total Factor Productivity: Total factor productivity measures are derived by dividing an index of real industry output by an index of the combined inputs of labor, capital, and intermediate inputs. The total factor productivity indexes do not measure the specific contributions of capital, labor, and intermediate inputs. 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.

Output: Industry output is measured as annual sectoral output, the total value, in real terms, of goods and services produced for sale outside the industry. Industry value of production is derived by adjusting industry shipments for changes in inventories and subtracting intra-industry transfers and resales. For most manufacturing industries, real output is measured by deflating nominal value of production, but for some industries physical quantities of output are measured.

Output measures are constructed using data primarily from the economic censuses and annual surveys of the Bureau of the Census, U.S. Department of Commerce, together with information on price changes chiefly from the Bureau of Labor Statistics (BLS).

Combined Inputs: The index of combined inputs is a Törnqvist index of separate quantity indexes of capital, labor, and intermediate inputs (including fuels, electricity, materials, and purchased services). The annual growth rates of the various inputs are aggregated using their relative cost shares as weights. The labor weight is based on labor compensation, including fringe benefits. The weight for intermediate inputs is based on the total cost of materials, fuels, electricity, and purchased services. The capital weight is based on total capital cost, which is calculated as the value of sectoral production minus the costs of labor compensation and intermediate inputs.

Capital Input: Capital input reflects the flow of services derived from the stock of physical assets. Capital services are estimated by calculating productive capital stocks and are assumed to be proportional to changes in these capital stocks for each asset. The capital index is a Törnqvist index of separate quantity indexes of equipment, structures, inventories, and land.

Physical capital is composed of 24 categories of equipment, 10 categories of structures, 3 categories of inventories, and land. Measures of total capital services for each industry are estimated by aggregating the capital stocks of individual asset types. Estimates of investment by asset type for each industry are derived using annual capital expenditures for detailed industries from the economic censuses and annual surveys of the Bureau of the Census. Additional annual investment data comes from the fixed asset accounts from the Bureau of Economic Analysis (BEA).

Annual investment data is supplemented with the 1997 benchmark capital flow table from the BEA as well as the 2008, 2012, and 2017 Annual Capital Expenditures Surveys from the Bureau of the Census. Price changes are removed from the annual investment data before calculating stocks. 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 capital stocks for the different assets are combined using weights based on estimated annual rental prices for each asset type, averaged between two time periods. Each rental price reflects the nominal rate of return to all assets within the industry and the rates of economic depreciation and revaluation of the specific asset. Rental prices are adjusted for the effects of taxes.

Labor Hours: Labor hours are measured as annual hours worked by all employed persons in an industry. Data on industry employment and hours come primarily from the BLS Current Employment Statistics (CES) survey and the Current Population Survey (CPS). CES data on the number of total 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 industry employment. Hours worked estimates are derived using CES and CPS employment, CES data on the average weekly hours paid all employees, CPS data on hours of self-employed and unpaid family workers, and ratios of hours worked to hours paid based on data from both the CPS and the National Compensation Survey (NCS). For some industries, employment and hours data are supplemented or further disaggregated using data from the BLS Quarterly Census of Employment and Wages (QCEW), the Census Bureau, or other sources. Hours worked are estimated separately for different types of workers and then are directly aggregated; no adjustments for labor composition are made.

Intermediate Inputs: The index of intermediate inputs is a Törnqvist index of separate quantities of materials, purchased services, fuels, and electricity consumed by each industry. 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.

Nominal values of materials, fuels and electricity, along with quantities of electricity consumed by each industry are obtained from economic censuses and annual surveys of the Bureau of the Census. To avoid double counting, an adjustment is made to the materials estimates to exclude the value of intra-industry commodity transfers. Purchased business services are estimated using annual industry data and benchmark input-output tables from BEA.

Constant dollar materials consumed are derived by dividing annual current dollar industry purchases by a weighted price deflator for each industry. Aggregate 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 BEA benchmark input-output tables. Aggregate price indexes to deflate purchased business services are constructed in a similar manner using consumer price indexes (CPIs), PPIs, and 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.

Labor Productivity: Labor productivity describes the relationship between real output and the labor hours involved in its production. These measures show the changes from period to period in the amount of goods and services produced per hour worked. Although the labor productivity measures relate output in an industry to hours worked of all persons in that industry, they do not measure the specific contribution of labor to growth in output. Rather, they reflect the joint effects of many influences, including: changes in technology; capital investment; utilization of capacity, energy, and materials; the use of purchased services inputs, including contract employment services; the organization of production; the characteristics and effort of the workforce; and managerial skill.

Contributions to Labor Productivity:

Contribution of Capital Intensity: Capital intensity is the ratio of capital services to hours worked in the production process. Multiplying the change in capital intensity times capital's share of combined inputs yields the contribution of capital intensity.

Contribution of Intermediate Inputs Intensity: Intermediate inputs intensity is the ratio of intermediate inputs to hours worked in the production process. Multiplying the change in intermediate inputs intensity times intermediate inputs' share of combined inputs yields the contribution of intermediate inputs intensity.

When positive, both the contribution of capital intensity and the contribution of intermediate inputs intensity represent sources of labor productivity growth. These statistics represent factor substitution in the production process. In other words, positive change in the contribution of capital intensity indicates that labor productivity growth is being achieved in part through the substitution of capital for labor. Likewise, positive change in the contribution of intermediate inputs intensity indicates that labor productivity growth is being achieved in part through the substitution of intermediate inputs for labor.

Over a given time period, the average logarithmic growth rate of labor productivity will equal the sum of the average logarithmic growth rates of the contribution of capital intensity, the contribution of intermediate inputs intensity, and total factor productivity. However, because both output and input data are expressed annually, average annual (as opposed to logarithmic) rates of change are calculated. Therefore, the sum of growth rates of total factor productivity, the contribution of capital intensity, and the contribution of intermediate inputs intensity may not precisely equal the rate of change of labor productivity.

Annual Percent Change: The annual percent change is the change in a series from one year to the next as a percent of the series-value in the previous year. Over a period of more than one year, the annual percent change is the compound annual growth rate in an index series, or an annualized average growth rate. Because the change of an index series varies from year to year, the annual percent change for a long time period reflects the constant rate that can be applied to each year in a period, from the start to the end, that would give the same total result. It is calculated as $(\text{Ending Value}/\text{Starting Value})^{(1/\text{Number of Years})}-1$.

Table 1. Recent total factor productivity and related data

| Industry | 2017 NAICS code | 2023 Employment (thousands) | Percent change, 2022-2023 | | | | | |
|---|-----------------------|-----------------------------------|------------------------------|--------|--------------------|-----------------|---------|------------------------|
| | | | Total factor productivity | Output | Combined inputs | Hours worked | Capital | Intermediate inputs |
| Manufacturing | | | | | | | | |
| Animal food..... | 3111 | 73.7 | -3.8 | 4.9 | 9.0 | -5.6 | 3.8 | 12.2 |
| Grain and oilseed milling..... | 3112 | 64.8 | -1.9 | 3.2 | 5.2 | -5.1 | 1.4 | 7.0 |
| Sugar and confectionery products..... | 3113 | 82.0 | -3.0 | -0.5 | 2.6 | -4.5 | 0.0 | 5.3 |
| Fruit and vegetable preserving and specialty..... | 3114 | 175.0 | -9.8 | -8.7 | 1.3 | -5.4 | -0.9 | 4.0 |
| Dairy products..... | 3115 | 166.3 | -3.9 | 1.0 | 5.1 | 5.0 | 1.2 | 6.0 |
| Animal slaughtering and processing..... | 3116 | 555.7 | 1.1 | -1.0 | -2.1 | 2.1 | 0.6 | -3.7 |
| Seafood product preparation and packaging..... | 3117 | 31.7 | -8.8 | -6.0 | 3.1 | -6.4 | 0.3 | 5.6 |
| Bakeries and tortilla products..... | 3118 | 371.5 | -4.1 | -1.6 | 2.5 | 1.2 | -0.3 | 3.9 |
| Other food products..... | 3119 | 267.6 | -1.7 | 0.4 | 2.1 | 0.6 | 1.5 | 2.8 |
| Beverages..... | 3121 | 333.8 | -11.8 | -13.7 | -2.1 | 2.4 | -1.3 | -4.0 |
| Tobacco..... | 3122 | 10.8 | 2.1 | 4.2 | 2.0 | -0.3 | 0.4 | 9.0 |
| Fiber, yarn, and thread mills..... | 3131 | 22.0 | 9.8 | -1.6 | -10.4 | -17.4 | -4.2 | -9.3 |
| Fabric mills..... | 3132 | 45.4 | -4.8 | -4.6 | 0.3 | -10.6 | -4.9 | 5.7 |
| Textile and fabric finishing mills..... | 3133 | 24.5 | -5.3 | -10.2 | -5.2 | -7.5 | -4.5 | -4.5 |
| Textile furnishings mills..... | 3141 | 42.9 | -0.1 | -4.8 | -4.7 | -12.4 | -3.4 | -2.4 |
| Other textile product mills..... | 3149 | 64.8 | -2.8 | -7.0 | -4.3 | -8.2 | -4.2 | -2.1 |
| Apparel knitting mills..... | 3151 | 7.3 | -1.9 | -5.8 | -4.1 | -5.1 | -5.9 | -3.4 |
| Cut and sew apparel..... | 3152 | 84.2 | -7.4 | -6.6 | 0.9 | -10.7 | -4.9 | 8.2 |
| Accessories and other apparel..... | 3159 | 16.4 | -5.4 | -2.2 | 3.4 | -4.6 | -3.9 | 9.5 |
| Leather and hide tanning and finishing..... | 3161 | 4.1 | 1.5 | -15.7 | -16.9 | 4.4 | -3.2 | -22.2 |
| Footwear..... | 3162 | 12.2 | -5.5 | 2.5 | 8.5 | 3.4 | -4.3 | 15.5 |
| Other leather products..... | 3169 | 13.7 | -8.6 | -6.6 | 2.2 | -0.5 | -3.1 | 7.0 |
| Sawmills and wood preservation..... | 3211 | 104.1 | 8.2 | -0.9 | -8.4 | 3.4 | 3.4 | -16.0 |
| Plywood and engineered wood products..... | 3212 | 83.1 | 9.4 | 7.1 | -2.1 | -4.6 | 1.3 | -3.0 |
| Other wood products..... | 3219 | 265.5 | -9.8 | -9.5 | 0.4 | 0.3 | 6.2 | -1.4 |
| Pulp, paper, and paperboard mills..... | 3221 | 87.7 | -8.7 | -6.9 | 2.0 | -6.3 | -2.2 | 6.6 |
| Converted paper products..... | 3222 | 272.5 | -3.9 | -5.4 | -1.6 | -3.7 | 0.9 | -1.5 |
| Printing and related support activities..... | 3231 | 390.2 | -5.6 | -9.3 | -4.0 | -3.4 | -3.5 | -4.4 |
| Petroleum and coal products..... | 3241 | 109.4 | -7.7 | -0.8 | 7.4 | -4.0 | -0.7 | 9.6 |
| Basic chemicals..... | 3251 | 157.6 | -2.8 | 1.7 | 4.6 | 4.4 | -0.1 | 7.2 |
| Resin, rubber, and artificial fibers..... | 3252 | 96.9 | 1.6 | 2.5 | 0.9 | -0.9 | 3.7 | 0.0 |
| Agricultural chemicals..... | 3253 | 38.1 | 13.4 | 20.8 | 6.5 | 1.5 | -0.8 | 14.9 |
| Pharmaceuticals and medicines..... | 3254 | 353.0 | 0.6 | 3.0 | 2.4 | 0.2 | 2.5 | 3.6 |
| Paints, coatings, and adhesives..... | 3255 | 66.1 | -10.5 | -10.8 | -0.3 | -2.9 | 5.0 | -1.8 |
| Soaps, cleaning compounds, and toiletries..... | 3256 | 124.1 | -11.2 | -8.6 | 2.9 | 0.5 | -2.3 | 7.7 |
| Other chemical products and preparations..... | 3259 | 81.9 | -9.9 | -4.4 | 6.1 | -1.1 | -1.3 | 10.7 |
| Plastics products..... | 3261 | 605.5 | -7.1 | -6.8 | 0.4 | -2.7 | -0.1 | 1.7 |
| Rubber products..... | 3262 | 137.4 | -6.8 | -3.9 | 3.0 | -1.3 | 5.8 | 4.2 |
| Clay products and refractories..... | 3271 | 42.1 | -0.9 | -2.2 | -1.3 | -13.5 | -1.8 | 6.3 |
| Glass and glass products..... | 3272 | 86.9 | -12.7 | -9.6 | 3.5 | 0.9 | -1.9 | 6.0 |
| Cement and concrete products..... | 3273 | 210.2 | -4.6 | -1.6 | 3.2 | 2.8 | -1.9 | 5.5 |
| Lime and gypsum products..... | 3274 | 16.2 | -7.3 | -2.4 | 5.2 | 6.6 | 2.4 | 6.5 |
| Other nonmetallic mineral products..... | 3279 | 82.1 | -9.0 | -7.7 | 1.4 | 7.5 | -0.8 | -0.1 |
| Iron and steel mills and ferroalloys..... | 3311 | 85.5 | 3.9 | 3.4 | -0.5 | 2.6 | 0.5 | -1.3 |
| Steel products from purchased steel..... | 3312 | 60.4 | 3.9 | 3.2 | -0.7 | 5.4 | 1.8 | -2.6 |
| Alumina and aluminum production..... | 3313 | 60.4 | -8.2 | -8.8 | -0.7 | -0.5 | 0.2 | -0.9 |
| Other nonferrous metal production..... | 3314 | 63.9 | -4.4 | -4.6 | -0.2 | 6.6 | 0.7 | -2.0 |
| Foundries..... | 3315 | 110.9 | -7.5 | -4.7 | 3.0 | 1.1 | -2.7 | 5.5 |

Table 1. Recent total factor productivity and related data — Continued

| Industry | 2017 NAICS code | 2023 Employment (thousands) | Percent change, 2022-2023 | | | | | |
|--|-----------------------|-----------------------------------|------------------------------|--------|--------------------|-----------------|---------|------------------------|
| | | | Total factor productivity | Output | Combined inputs | Hours worked | Capital | Intermediate inputs |
| Forging and stamping..... | 3321 | 91.1 | -1.9 | -2.2 | -0.3 | -4.1 | -0.4 | 1.1 |
| Cutlery and handtools..... | 3322 | 36.7 | -8.6 | -6.1 | 2.7 | 0.8 | -1.8 | 5.9 |
| Architectural and structural metals..... | 3323 | 414.6 | -8.2 | -3.1 | 5.5 | 3.5 | 1.6 | 7.9 |
| Boilers, tanks, and shipping containers..... | 3324 | 95.4 | -8.4 | -4.6 | 4.2 | 0.2 | 2.1 | 6.0 |
| Hardware..... | 3325 | 24.6 | -7.9 | -5.1 | 3.1 | -2.8 | -1.5 | 7.6 |
| Spring and wire products..... | 3326 | 40.8 | -18.7 | -16.7 | 2.4 | -2.7 | -2.8 | 5.9 |
| Machine shops and threaded products..... | 3327 | 353.6 | -6.6 | -4.5 | 2.2 | -0.9 | -1.0 | 5.7 |
| Coating, engraving, and heat treating metals..... | 3328 | 131.6 | -9.6 | -8.0 | 1.8 | 1.0 | 0.1 | 2.9 |
| Other fabricated metal products..... | 3329 | 285.8 | -7.3 | -6.5 | 0.9 | 1.6 | 0.0 | 0.9 |
| Agriculture, construction, and mining machinery..... | 3331 | 222.0 | -5.6 | 0.9 | 6.8 | 0.9 | -0.4 | 11.0 |
| Industrial machinery..... | 3332 | 135.9 | -4.4 | -2.7 | 1.7 | 0.5 | -2.2 | 2.9 |
| Commercial and service industry machinery..... | 3333 | 90.2 | -4.6 | -1.6 | 3.2 | -0.2 | -1.1 | 5.8 |
| HVAC and commercial refrigeration equipment..... | 3334 | 146.5 | -6.2 | -2.3 | 4.1 | -2.0 | 1.6 | 7.5 |
| Metalworking machinery..... | 3335 | 162.3 | -7.3 | -7.9 | -0.6 | -1.2 | -2.9 | 0.4 |
| Turbine and power transmission equipment..... | 3336 | 92.9 | -0.3 | 1.3 | 1.6 | -0.8 | -1.7 | 3.4 |
| Other general purpose machinery..... | 3339 | 290.9 | -4.4 | -0.9 | 3.6 | -0.5 | 1.5 | 6.3 |
| Computer and peripheral equipment..... | 3341 | 115.5 | 4.9 | 9.2 | 4.1 | -2.7 | -3.8 | 6.4 |
| Communications equipment..... | 3342 | 86.1 | -5.0 | -9.4 | -4.6 | -4.8 | -4.6 | -4.6 |
| Audio and video equipment..... | 3343 | 19.5 | -7.1 | -6.5 | 0.6 | -4.0 | -2.8 | 2.5 |
| Semiconductors and electronic components..... | 3344 | 397.0 | -2.1 | -1.4 | 0.7 | -0.1 | 3.4 | 0.6 |
| Electronic instruments..... | 3345 | 426.6 | 1.5 | 6.5 | 5.0 | -1.1 | -1.0 | 12.1 |
| Magnetic media manufacturing and reproducing..... | 3346 | 11.8 | -2.4 | -9.7 | -7.6 | -9.9 | -7.1 | -6.7 |
| Electric lighting equipment..... | 3351 | 39.1 | -13.0 | -14.5 | -1.8 | 0.8 | -3.2 | -2.5 |
| Household appliances..... | 3352 | 64.9 | -3.1 | -3.6 | -0.5 | -1.0 | -0.8 | -0.3 |
| Electrical equipment..... | 3353 | 150.5 | -2.6 | 6.6 | 9.4 | 7.3 | -1.1 | 14.1 |
| Other electrical equipment and components..... | 3359 | 168.8 | -15.0 | -19.5 | -5.3 | 3.9 | 1.8 | -11.2 |
| Motor vehicles..... | 3361 | 294.0 | 2.9 | 18.7 | 15.3 | 3.0 | 5.4 | 18.4 |
| Motor vehicle bodies and trailers..... | 3362 | 169.1 | -6.5 | -12.5 | -6.3 | 0.4 | 3.3 | -8.1 |
| Motor vehicle parts..... | 3363 | 567.5 | -3.6 | 2.8 | 6.7 | 2.5 | -3.6 | 8.3 |
| Aerospace products and parts..... | 3364 | 537.4 | 3.3 | 9.6 | 6.1 | 6.8 | -1.5 | 8.9 |
| Railroad rolling stock..... | 3365 | 21.6 | -2.9 | -3.1 | -0.2 | 5.6 | -2.2 | -2.6 |
| Ship and boat building..... | 3366 | 157.9 | -5.6 | -0.9 | 4.9 | 3.2 | 2.6 | 6.8 |
| Other transportation equipment..... | 3369 | 42.6 | 0.3 | 5.7 | 5.4 | -4.9 | 0.7 | 10.9 |
| Household and institutional furniture..... | 3371 | 249.0 | -6.7 | -10.3 | -3.8 | -7.8 | -1.9 | -2.1 |
| Office furniture and fixtures..... | 3372 | 105.8 | -8.2 | -7.4 | 0.8 | -0.5 | -2.9 | 2.8 |
| Other furniture related products..... | 3379 | 31.7 | -5.2 | -9.4 | -4.4 | -13.4 | -0.7 | -2.3 |
| Medical equipment and supplies..... | 3391 | 340.1 | -2.1 | -2.6 | -0.6 | 0.2 | -0.9 | -0.9 |
| Other miscellaneous manufacturing..... | 3399 | 346.7 | -4.6 | -3.3 | 1.4 | 2.6 | -3.0 | 2.3 |

Table 2. Long run total factor productivity and related data

| Industry | 2017 NAICS code | Annual percent change, 1987-2023 | | | | | |
|---|-----------------------|----------------------------------|--------|--------------------|-----------------|---------|------------------------|
| | | Total factor productivity | Output | Combined inputs | Hours worked | Capital | Intermediate inputs |
| Manufacturing | | | | | | | |
| Animal food..... | 3111 | -0.2 | 1.6 | 1.8 | 0.3 | 1.8 | 2.0 |
| Grain and oilseed milling..... | 3112 | 0.2 | 1.2 | 1.0 | -0.6 | 0.3 | 1.3 |
| Sugar and confectionery products..... | 3113 | 0.1 | 0.5 | 0.4 | -0.3 | 0.7 | 0.5 |
| Fruit and vegetable preserving and specialty..... | 3114 | 0.0 | 0.6 | 0.6 | -0.2 | 0.6 | 0.7 |
| Dairy products..... | 3115 | 0.1 | 1.3 | 1.2 | 0.3 | 1.4 | 1.3 |
| Animal slaughtering and processing..... | 3116 | 0.7 | 1.5 | 0.8 | 1.0 | 1.9 | 0.5 |
| Seafood product preparation and packaging..... | 3117 | 0.0 | -0.5 | -0.4 | -1.4 | 0.8 | -0.5 |
| Bakeries and tortilla products..... | 3118 | -0.8 | 0.2 | 1.0 | 0.3 | 0.8 | 1.5 |
| Other food products..... | 3119 | 0.1 | 1.9 | 1.8 | 2.3 | 1.3 | 2.1 |
| Beverages..... | 3121 | 0.1 | 0.6 | 0.5 | 1.2 | 0.5 | 0.3 |
| Tobacco..... | 3122 | -0.6 | -2.7 | -2.1 | -4.7 | -2.3 | -0.8 |
| Fiber, yarn, and thread mills..... | 3131 | 0.9 | -2.9 | -3.7 | -4.1 | -2.8 | -3.6 |
| Fabric mills..... | 3132 | 0.9 | -3.0 | -3.8 | -5.1 | -2.7 | -3.6 |
| Textile and fabric finishing mills..... | 3133 | -0.4 | -3.9 | -3.5 | -4.3 | -2.7 | -3.4 |
| Textile furnishings mills..... | 3141 | 0.1 | -2.4 | -2.5 | -2.9 | -1.2 | -3.0 |
| Other textile product mills..... | 3149 | 0.4 | -1.1 | -1.4 | -1.8 | -0.1 | -1.5 |
| Apparel knitting mills..... | 3151 | 0.4 | -6.4 | -6.8 | -7.2 | -3.3 | -6.6 |
| Cut and sew apparel..... | 3152 | -0.6 | -5.9 | -5.4 | -6.2 | -2.9 | -5.6 |
| Accessories and other apparel..... | 3159 | -1.7 | -5.2 | -3.6 | -2.5 | -2.4 | -4.2 |
| Leather and hide tanning and finishing..... | 3161 | 1.0 | -3.1 | -4.1 | -3.9 | -2.4 | -4.3 |
| Footwear..... | 3162 | -0.4 | -4.7 | -4.3 | -5.5 | -3.3 | -3.8 |
| Other leather products..... | 3169 | 0.4 | -2.7 | -3.1 | -3.4 | -1.8 | -2.9 |
| Sawmills and wood preservation..... | 3211 | 1.0 | 0.4 | -0.6 | -1.2 | -0.7 | -0.4 |
| Plywood and engineered wood products..... | 3212 | 0.0 | 0.0 | -0.1 | -0.6 | 0.2 | 0.5 |
| Other wood products..... | 3219 | -0.4 | -0.2 | 0.2 | -0.7 | 0.8 | 0.5 |
| Pulp, paper, and paperboard mills..... | 3221 | 0.3 | -1.2 | -1.5 | -2.7 | -1.3 | -1.1 |
| Converted paper products..... | 3222 | -0.2 | -0.6 | -0.4 | -1.1 | 0.5 | -0.4 |
| Printing and related support activities..... | 3231 | -0.1 | -1.2 | -1.2 | -2.0 | -0.4 | -0.9 |
| Petroleum and coal products..... | 3241 | 0.1 | 0.9 | 0.8 | -1.0 | 0.6 | 1.0 |
| Basic chemicals..... | 3251 | 0.0 | 0.6 | 0.6 | -1.1 | 0.4 | 1.1 |
| Resin, rubber, and artificial fibers..... | 3252 | 0.4 | 0.3 | -0.1 | -1.1 | 0.6 | -0.1 |
| Agricultural chemicals..... | 3253 | 1.2 | 0.7 | -0.5 | -0.9 | 0.0 | -0.8 |
| Pharmaceuticals and medicines..... | 3254 | -1.0 | 1.0 | 2.0 | 1.9 | 3.4 | 0.4 |
| Paints, coatings, and adhesives..... | 3255 | -0.8 | -0.6 | 0.2 | -0.5 | 0.3 | 0.2 |
| Soaps, cleaning compounds, and toiletries..... | 3256 | -0.3 | 0.3 | 0.6 | 0.1 | 1.1 | 0.1 |
| Other chemical products and preparations..... | 3259 | 0.2 | 0.0 | -0.2 | -1.6 | -0.1 | 0.2 |
| Plastics products..... | 3261 | 0.1 | 1.0 | 0.9 | 0.1 | 1.7 | 0.9 |
| Rubber products..... | 3262 | 0.2 | 0.1 | -0.1 | -1.3 | 0.4 | 0.5 |
| Clay products and refractories..... | 3271 | 0.3 | -1.4 | -1.6 | -2.4 | -1.5 | -1.2 |
| Glass and glass products..... | 3272 | 0.4 | 0.0 | -0.3 | -1.4 | -0.5 | 0.3 |
| Cement and concrete products..... | 3273 | -0.3 | 0.3 | 0.5 | 0.4 | -0.2 | 0.8 |
| Lime and gypsum products..... | 3274 | -0.7 | -0.3 | 0.5 | -1.0 | 0.5 | 0.8 |
| Other nonmetallic mineral products..... | 3279 | 0.3 | 0.6 | 0.3 | 0.2 | -0.1 | 0.7 |
| Iron and steel mills and ferroalloys..... | 3311 | 0.7 | -0.2 | -0.8 | -2.0 | -1.9 | -0.1 |
| Steel products from purchased steel..... | 3312 | 0.2 | 0.3 | 0.1 | -0.4 | -1.3 | 0.6 |
| Alumina and aluminum production..... | 3313 | 0.8 | -0.4 | -1.2 | -1.6 | -0.8 | -1.1 |
| Other nonferrous metal production..... | 3314 | 0.6 | -0.7 | -1.3 | -1.4 | -0.2 | -1.7 |
| Foundries..... | 3315 | 0.1 | -0.8 | -0.9 | -1.9 | -0.9 | -0.1 |

Table 2. Long run total factor productivity and related data — Continued

| Industry | 2017 NAICS code | Annual percent change, 1987-2023 | | | | | |
|--|-----------------------|----------------------------------|--------|--------------------|-----------------|---------|------------------------|
| | | Total factor productivity | Output | Combined inputs | Hours worked | Capital | Intermediate inputs |
| Forging and stamping..... | 3321 | 0.2 | 0.0 | -0.2 | -1.4 | 0.8 | 0.1 |
| Cutlery and handtools..... | 3322 | 0.0 | -1.2 | -1.2 | -1.8 | -0.8 | -0.7 |
| Architectural and structural metals..... | 3323 | -0.4 | 0.8 | 1.2 | 0.4 | 0.8 | 1.8 |
| Boilers, tanks, and shipping containers..... | 3324 | -0.2 | -0.1 | 0.1 | -0.4 | -0.1 | 0.4 |
| Hardware..... | 3325 | -0.7 | -2.1 | -1.4 | -2.5 | -1.1 | -1.0 |
| Spring and wire products..... | 3326 | -0.4 | -1.2 | -0.7 | -1.9 | -0.1 | -0.3 |
| Machine shops and threaded products..... | 3327 | 0.6 | 1.8 | 1.2 | 0.3 | 1.6 | 1.9 |
| Coating, engraving, and heat treating metals..... | 3328 | 0.6 | 1.3 | 0.7 | -0.2 | 0.9 | 1.2 |
| Other fabricated metal products..... | 3329 | -0.5 | -0.3 | 0.2 | -0.4 | 0.2 | 0.7 |
| Agriculture, construction, and mining machinery..... | 3331 | 0.1 | 1.5 | 1.4 | 0.1 | 0.2 | 2.2 |
| Industrial machinery..... | 3332 | 0.2 | 0.5 | 0.3 | -0.1 | 0.7 | 0.6 |
| Commercial and service industry machinery..... | 3333 | 0.1 | -0.1 | -0.1 | -1.3 | -0.5 | 0.6 |
| HVAC and commercial refrigeration equipment..... | 3334 | -0.1 | 0.3 | 0.4 | -0.3 | 0.7 | 0.6 |
| Metalworking machinery..... | 3335 | 0.5 | 0.0 | -0.5 | -1.5 | -0.2 | 0.4 |
| Turbine and power transmission equipment..... | 3336 | 0.3 | 0.8 | 0.5 | -0.5 | 0.0 | 1.1 |
| Other general purpose machinery..... | 3339 | 0.0 | 0.9 | 0.9 | -0.3 | 0.4 | 1.7 |
| Computer and peripheral equipment..... | 3341 | 10.3 | 8.9 | -1.3 | -4.1 | -0.7 | -0.7 |
| Communications equipment..... | 3342 | 2.8 | 1.7 | -1.1 | -2.9 | 0.1 | -0.6 |
| Audio and video equipment..... | 3343 | 2.2 | -0.1 | -2.3 | -2.8 | -1.6 | -2.2 |
| Semiconductors and electronic components..... | 3344 | 7.9 | 9.4 | 1.4 | -1.1 | 3.6 | 1.3 |
| Electronic instruments..... | 3345 | 0.7 | 1.3 | 0.6 | -1.3 | 0.1 | 2.4 |
| Magnetic media manufacturing and reproducing..... | 3346 | 0.3 | -3.6 | -3.9 | -3.0 | -2.2 | -4.9 |
| Electric lighting equipment..... | 3351 | 0.1 | -0.8 | -0.8 | -2.0 | -0.3 | -0.4 |
| Household appliances..... | 3352 | 1.3 | 0.2 | -1.1 | -1.9 | -0.8 | -1.0 |
| Electrical equipment..... | 3353 | -0.1 | -0.3 | -0.2 | -1.5 | -0.9 | 0.8 |
| Other electrical equipment and components..... | 3359 | 0.2 | -0.1 | -0.3 | -0.7 | -0.1 | -0.1 |
| Motor vehicles..... | 3361 | 0.5 | 2.3 | 1.8 | 0.0 | 1.2 | 2.2 |
| Motor vehicle bodies and trailers..... | 3362 | -0.6 | 1.6 | 2.2 | 0.5 | 1.8 | 2.7 |
| Motor vehicle parts..... | 3363 | 1.3 | 2.2 | 0.9 | -0.2 | -0.2 | 1.4 |
| Aerospace products and parts..... | 3364 | 0.1 | -0.1 | -0.2 | -1.2 | 0.2 | 0.4 |
| Railroad rolling stock..... | 3365 | 0.8 | 1.8 | 1.0 | -0.2 | -0.2 | 1.7 |
| Ship and boat building..... | 3366 | 0.5 | 1.1 | 0.6 | -0.5 | 0.3 | 1.4 |
| Other transportation equipment..... | 3369 | 1.5 | 3.0 | 1.5 | 0.6 | 2.2 | 1.5 |
| Household and institutional furniture..... | 3371 | 0.3 | -0.7 | -0.9 | -1.6 | 0.0 | -0.7 |
| Office furniture and fixtures..... | 3372 | -0.3 | -0.6 | -0.3 | -1.2 | 0.4 | 0.0 |
| Other furniture related products..... | 3379 | 0.2 | 0.3 | 0.1 | -1.2 | -0.1 | 0.7 |
| Medical equipment and supplies..... | 3391 | 0.5 | 2.5 | 2.0 | 0.8 | 3.1 | 2.2 |
| Other miscellaneous manufacturing..... | 3399 | 0.2 | -0.3 | -0.5 | -0.8 | 0.1 | -0.5 |

Table 3. Total factor productivity in selected periods

| Industry | 2017 NAICS code | Annual percent change | | | | | |
|---|-----------------------|-----------------------|-----------|-----------|-----------|-----------|-----------|
| | | 1987-2023 | 1987-1990 | 1990-2000 | 2000-2007 | 2007-2019 | 2019-2023 |
| Manufacturing | | | | | | | |
| Animal food..... | 3111 | -0.2 | 0.9 | 0.0 | 1.8 | -1.5 | -1.3 |
| Grain and oilseed milling..... | 3112 | 0.2 | 0.1 | 0.5 | 0.0 | 0.0 | 0.7 |
| Sugar and confectionery products..... | 3113 | 0.1 | 0.2 | 1.6 | 0.2 | -1.5 | 0.7 |
| Fruit and vegetable preserving and specialty..... | 3114 | 0.0 | -1.7 | 0.9 | 0.9 | -0.4 | -1.1 |
| Dairy products..... | 3115 | 0.1 | -0.9 | 0.1 | 1.1 | -0.1 | -0.6 |
| Animal slaughtering and processing..... | 3116 | 0.7 | 0.1 | 1.1 | 1.6 | -0.4 | 2.0 |
| Seafood product preparation and packaging..... | 3117 | 0.0 | -1.4 | 1.0 | 1.9 | -0.1 | -4.5 |
| Bakeries and tortilla products..... | 3118 | -0.8 | -3.6 | 0.2 | 0.6 | -1.6 | -1.0 |
| Other food products..... | 3119 | 0.1 | 0.1 | 0.2 | 1.5 | -0.7 | -0.4 |
| Beverages..... | 3121 | 0.1 | 1.0 | 0.4 | 2.1 | -0.6 | -2.9 |
| Tobacco..... | 3122 | -0.6 | 1.6 | 1.2 | -1.0 | -2.5 | -0.3 |
| Fiber, yarn, and thread mills..... | 3131 | 0.9 | 1.3 | 0.4 | 4.2 | -0.4 | 0.0 |
| Fabric mills..... | 3132 | 0.9 | 0.8 | 1.3 | 3.6 | -0.6 | -0.5 |
| Textile and fabric finishing mills..... | 3133 | -0.4 | 0.6 | 0.7 | 0.5 | -0.5 | -5.1 |
| Textile furnishings mills..... | 3141 | 0.1 | 0.0 | 0.2 | 0.7 | -1.3 | 3.1 |
| Other textile product mills..... | 3149 | 0.4 | 0.1 | -0.2 | 1.9 | 0.4 | -0.6 |
| Apparel knitting mills..... | 3151 | 0.4 | 0.5 | -0.3 | -1.5 | 1.0 | 3.4 |
| Cut and sew apparel..... | 3152 | -0.6 | -1.2 | -0.6 | -1.4 | -0.3 | 0.5 |
| Accessories and other apparel..... | 3159 | -1.7 | 1.0 | -3.0 | -1.9 | -1.3 | -1.1 |
| Leather and hide tanning and finishing..... | 3161 | 1.0 | -4.1 | 1.8 | -3.9 | 3.9 | 3.6 |
| Footwear..... | 3162 | -0.4 | -1.4 | -0.3 | 0.0 | -0.2 | -1.5 |
| Other leather products..... | 3169 | 0.4 | 0.3 | -2.0 | 3.0 | 0.7 | 1.4 |
| Sawmills and wood preservation..... | 3211 | 1.0 | 1.5 | -0.1 | 1.8 | 0.8 | 3.0 |
| Plywood and engineered wood products..... | 3212 | 0.0 | -0.8 | -0.2 | 1.0 | 0.3 | -1.6 |
| Other wood products..... | 3219 | -0.4 | -0.6 | -0.7 | 0.6 | 0.0 | -2.6 |
| Pulp, paper, and paperboard mills..... | 3221 | 0.3 | -1.2 | 1.0 | 2.1 | 0.3 | -3.2 |
| Converted paper products..... | 3222 | -0.2 | 0.3 | 0.1 | 0.9 | -0.8 | -1.3 |
| Printing and related support activities..... | 3231 | -0.1 | 0.1 | -0.3 | 1.0 | 0.2 | -2.3 |
| Petroleum and coal products..... | 3241 | 0.1 | -1.9 | 2.5 | -2.0 | -0.3 | 0.8 |
| Basic chemicals..... | 3251 | 0.0 | -0.3 | -2.0 | 3.6 | -0.6 | 0.8 |
| Resin, rubber, and artificial fibers..... | 3252 | 0.4 | -1.5 | 0.8 | 2.4 | -1.1 | 2.1 |
| Agricultural chemicals..... | 3253 | 1.2 | 1.2 | 1.1 | 4.2 | -1.0 | 3.1 |
| Pharmaceuticals and medicines..... | 3254 | -1.0 | -1.9 | -1.9 | 0.4 | -0.8 | -1.7 |
| Paints, coatings, and adhesives..... | 3255 | -0.8 | -2.1 | -0.4 | 2.0 | -1.0 | -5.1 |
| Soaps, cleaning compounds, and toiletries..... | 3256 | -0.3 | -1.1 | -0.1 | 4.8 | -1.3 | -5.9 |
| Other chemical products and preparations..... | 3259 | 0.2 | -1.2 | 1.4 | 0.6 | -0.7 | -0.2 |
| Plastics products..... | 3261 | 0.1 | -0.1 | 1.1 | 1.2 | -0.3 | -2.8 |
| Rubber products..... | 3262 | 0.2 | 1.1 | 1.2 | 0.8 | -0.3 | -2.7 |
| Clay products and refractories..... | 3271 | 0.3 | 1.4 | 1.3 | -0.1 | -0.6 | 0.1 |
| Glass and glass products..... | 3272 | 0.4 | 0.4 | 2.0 | 1.0 | -0.4 | -2.6 |
| Cement and concrete products..... | 3273 | -0.3 | 1.2 | 0.5 | 0.0 | -1.4 | -0.3 |
| Lime and gypsum products..... | 3274 | -0.7 | -1.4 | -0.7 | 0.9 | -1.5 | -0.8 |
| Other nonmetallic mineral products..... | 3279 | 0.3 | -0.2 | 0.9 | 2.5 | -0.3 | -2.8 |
| Iron and steel mills and ferroalloys..... | 3311 | 0.7 | 1.3 | 1.7 | 1.2 | 1.0 | -4.0 |
| Steel products from purchased steel..... | 3312 | 0.2 | 1.4 | 0.9 | 0.5 | -0.9 | 0.6 |
| Alumina and aluminum production..... | 3313 | 0.8 | 0.3 | -0.3 | 2.5 | 1.7 | -2.1 |
| Other nonferrous metal production..... | 3314 | 0.6 | -4.2 | 2.9 | -3.0 | 2.0 | 1.1 |
| Foundries..... | 3315 | 0.1 | 0.0 | 1.0 | 1.1 | -0.3 | -2.8 |

Table 3. Total factor productivity in selected periods — Continued

| Industry | 2017 NAICS code | Annual percent change | | | | | |
|--|-----------------------|-----------------------|-----------|-----------|-----------|-----------|-----------|
| | | 1987-2023 | 1987-1990 | 1990-2000 | 2000-2007 | 2007-2019 | 2019-2023 |
| Forging and stamping..... | 3321 | 0.2 | -0.4 | 0.0 | 4.3 | -0.4 | -3.5 |
| Cutlery and handtools..... | 3322 | 0.0 | -1.1 | 0.1 | 0.8 | 0.2 | -1.5 |
| Architectural and structural metals..... | 3323 | -0.4 | -1.0 | -0.5 | 1.8 | -0.7 | -2.6 |
| Boilers, tanks, and shipping containers..... | 3324 | -0.2 | 0.7 | 1.1 | 0.7 | -0.9 | -3.9 |
| Hardware..... | 3325 | -0.7 | -2.1 | 0.2 | -0.6 | -0.6 | -2.8 |
| Spring and wire products..... | 3326 | -0.4 | 0.5 | 0.9 | 1.7 | -0.9 | -6.3 |
| Machine shops and threaded products..... | 3327 | 0.6 | 1.4 | 1.6 | 1.7 | -0.6 | -0.6 |
| Coating, engraving, and heat treating metals..... | 3328 | 0.6 | 1.4 | 0.4 | 3.4 | -0.1 | -2.1 |
| Other fabricated metal products..... | 3329 | -0.5 | -1.5 | -0.5 | 1.9 | -1.5 | -1.1 |
| Agriculture, construction, and mining machinery..... | 3331 | 0.1 | 2.6 | -0.6 | 2.0 | -0.9 | 0.0 |
| Industrial machinery..... | 3332 | 0.2 | 0.4 | 0.9 | 1.7 | -0.4 | -2.9 |
| Commercial and service industry machinery..... | 3333 | 0.1 | 0.9 | -0.6 | -0.3 | 0.3 | 0.9 |
| HVAC and commercial refrigeration equipment..... | 3334 | -0.1 | -0.1 | 0.6 | 1.8 | -0.3 | -4.3 |
| Metalworking machinery..... | 3335 | 0.5 | 0.3 | 0.2 | 2.5 | 0.1 | -0.2 |
| Turbine and power transmission equipment..... | 3336 | 0.3 | -0.5 | 0.4 | 0.0 | 0.3 | 1.6 |
| Other general purpose machinery..... | 3339 | 0.0 | 0.5 | -0.1 | 2.1 | -0.9 | -1.4 |
| Computer and peripheral equipment..... | 3341 | 10.3 | 6.9 | 19.5 | 18.1 | 2.4 | 2.5 |
| Communications equipment..... | 3342 | 2.8 | 3.5 | 5.4 | 5.0 | 0.1 | 0.9 |
| Audio and video equipment..... | 3343 | 2.2 | 4.4 | 2.1 | 3.1 | 1.7 | 1.0 |
| Semiconductors and electronic components..... | 3344 | 7.9 | 6.3 | 19.9 | 6.6 | 1.1 | 3.6 |
| Electronic instruments..... | 3345 | 0.7 | 1.7 | 0.3 | 1.2 | 0.5 | 0.5 |
| Magnetic media manufacturing and reproducing..... | 3346 | 0.3 | 0.3 | 1.7 | 2.2 | -1.6 | -0.5 |
| Electric lighting equipment..... | 3351 | 0.1 | -1.4 | 0.7 | 1.4 | 0.1 | -2.6 |
| Household appliances..... | 3352 | 1.3 | 0.2 | 2.1 | 3.4 | 0.4 | -0.6 |
| Electrical equipment..... | 3353 | -0.1 | 0.9 | 0.5 | 1.1 | -1.0 | -1.8 |
| Other electrical equipment and components..... | 3359 | 0.2 | -1.1 | 1.3 | 0.4 | 0.1 | -1.4 |
| Motor vehicles..... | 3361 | 0.5 | 0.3 | -0.3 | 3.0 | -0.7 | 2.2 |
| Motor vehicle bodies and trailers..... | 3362 | -0.6 | -2.2 | 0.3 | 0.1 | -0.6 | -3.2 |
| Motor vehicle parts..... | 3363 | 1.3 | -0.7 | 2.2 | 2.0 | 0.7 | 1.5 |
| Aerospace products and parts..... | 3364 | 0.1 | -1.5 | -0.1 | 2.4 | -0.4 | -0.2 |
| Railroad rolling stock..... | 3365 | 0.8 | 1.0 | 2.0 | -1.6 | 0.6 | 2.6 |
| Ship and boat building..... | 3366 | 0.5 | 0.3 | -0.2 | -0.7 | 1.8 | 0.3 |
| Other transportation equipment..... | 3369 | 1.5 | -1.4 | 2.5 | 5.5 | -1.0 | 1.7 |
| Household and institutional furniture..... | 3371 | 0.3 | -0.1 | 0.4 | 0.9 | -0.2 | 0.5 |
| Office furniture and fixtures..... | 3372 | -0.3 | -2.4 | 1.4 | 0.6 | -0.3 | -4.6 |
| Other furniture related products..... | 3379 | 0.2 | 0.0 | 0.8 | 1.2 | -0.1 | -2.4 |
| Medical equipment and supplies..... | 3391 | 0.5 | 2.0 | 0.5 | 1.5 | -0.6 | 0.7 |
| Other miscellaneous manufacturing..... | 3399 | 0.2 | 1.0 | 0.5 | 1.2 | -0.4 | -0.9 |

Table 4. Contributions to labor productivity

| Industry | 2017 NAICS code | Annual percent change, 1987-2023 | | | |
|---|-----------------|----------------------------------|-----------------------------------|---|---------------------------|
| | | Labor productivity | Contribution of capital intensity | Contribution of intermediate inputs intensity | Total factor productivity |
| Manufacturing | | | | | |
| Animal food..... | 3111 | 1.3 | 0.3 | 1.2 | -0.2 |
| Grain and oilseed milling..... | 3112 | 1.9 | 0.2 | 1.4 | 0.2 |
| Sugar and confectionery products..... | 3113 | 0.8 | 0.3 | 0.4 | 0.1 |
| Fruit and vegetable preserving and specialty..... | 3114 | 0.8 | 0.2 | 0.5 | 0.0 |
| Dairy products..... | 3115 | 1.0 | 0.2 | 0.7 | 0.1 |
| Animal slaughtering and processing..... | 3116 | 0.5 | 0.2 | -0.3 | 0.7 |
| Seafood product preparation and packaging..... | 3117 | 1.0 | 0.3 | 0.7 | 0.0 |
| Bakeries and tortilla products..... | 3118 | 0.0 | 0.1 | 0.6 | -0.8 |
| Other food products..... | 3119 | -0.4 | -0.3 | -0.1 | 0.1 |
| Beverages..... | 3121 | -0.6 | -0.3 | -0.4 | 0.1 |
| Tobacco..... | 3122 | 2.1 | 1.9 | 0.8 | -0.6 |
| Fiber, yarn, and thread mills..... | 3131 | 1.3 | 0.0 | 0.4 | 0.9 |
| Fabric mills..... | 3132 | 2.3 | 0.3 | 1.1 | 0.9 |
| Textile and fabric finishing mills..... | 3133 | 0.3 | 0.2 | 0.6 | -0.4 |
| Textile furnishings mills..... | 3141 | 0.5 | 0.4 | 0.0 | 0.1 |
| Other textile product mills..... | 3149 | 0.8 | 0.1 | 0.3 | 0.4 |
| Apparel knitting mills..... | 3151 | 0.8 | 0.3 | 0.2 | 0.4 |
| Cut and sew apparel..... | 3152 | 0.3 | 0.6 | 0.3 | -0.6 |
| Accessories and other apparel..... | 3159 | -2.8 | 0.0 | -1.1 | -1.7 |
| Leather and hide tanning and finishing..... | 3161 | 0.8 | 0.1 | -0.3 | 1.0 |
| Footwear..... | 3162 | 0.8 | 0.4 | 0.9 | -0.4 |
| Other leather products..... | 3169 | 0.7 | 0.0 | 0.3 | 0.4 |
| Sawmills and wood preservation..... | 3211 | 1.6 | -0.1 | 0.6 | 1.0 |
| Plywood and engineered wood products..... | 3212 | 0.5 | -0.1 | 0.7 | 0.0 |
| Other wood products..... | 3219 | 0.5 | 0.1 | 0.8 | -0.4 |
| Pulp, paper, and paperboard mills..... | 3221 | 1.6 | 0.4 | 0.9 | 0.3 |
| Converted paper products..... | 3222 | 0.5 | 0.3 | 0.4 | -0.2 |
| Printing and related support activities..... | 3231 | 0.8 | 0.3 | 0.6 | -0.1 |
| Petroleum and coal products..... | 3241 | 2.0 | 0.2 | 1.7 | 0.1 |
| Basic chemicals..... | 3251 | 1.7 | 0.4 | 1.4 | 0.0 |
| Resin, rubber, and artificial fibers..... | 3252 | 1.5 | 0.4 | 0.7 | 0.4 |
| Agricultural chemicals..... | 3253 | 1.6 | 0.3 | 0.0 | 1.2 |
| Pharmaceuticals and medicines..... | 3254 | -0.9 | 0.4 | -0.3 | -1.0 |
| Paints, coatings, and adhesives..... | 3255 | -0.2 | 0.1 | 0.5 | -0.8 |
| Soaps, cleaning compounds, and toiletries..... | 3256 | 0.1 | 0.4 | 0.0 | -0.3 |
| Other chemical products and preparations..... | 3259 | 1.6 | 0.4 | 1.0 | 0.2 |
| Plastics products..... | 3261 | 0.8 | 0.2 | 0.5 | 0.1 |
| Rubber products..... | 3262 | 1.4 | 0.2 | 1.0 | 0.2 |
| Clay products and refractories..... | 3271 | 1.1 | 0.2 | 0.6 | 0.3 |
| Glass and glass products..... | 3272 | 1.4 | 0.2 | 0.8 | 0.4 |
| Cement and concrete products..... | 3273 | -0.1 | -0.1 | 0.2 | -0.3 |
| Lime and gypsum products..... | 3274 | 0.7 | 0.4 | 1.1 | -0.7 |
| Other nonmetallic mineral products..... | 3279 | 0.4 | -0.1 | 0.2 | 0.3 |
| Iron and steel mills and ferroalloys..... | 3311 | 1.9 | -0.1 | 1.3 | 0.7 |
| Steel products from purchased steel..... | 3312 | 0.7 | -0.2 | 0.7 | 0.2 |
| Alumina and aluminum production..... | 3313 | 1.2 | 0.1 | 0.3 | 0.8 |
| Other nonferrous metal production..... | 3314 | 0.8 | 0.2 | -0.1 | 0.6 |
| Foundries..... | 3315 | 1.0 | 0.1 | 0.9 | 0.1 |

Table 4. Contributions to labor productivity — Continued

| Industry | 2017 NAICS code | Annual percent change, 1987-2023 | | | |
|--|-----------------|----------------------------------|-----------------------------------|---|---------------------------|
| | | Labor productivity | Contribution of capital intensity | Contribution of intermediate inputs intensity | Total factor productivity |
| Forging and stamping..... | 3321 | 1.4 | 0.2 | 0.9 | 0.2 |
| Cutlery and handtools..... | 3322 | 0.7 | 0.2 | 0.5 | 0.0 |
| Architectural and structural metals..... | 3323 | 0.4 | 0.0 | 0.8 | -0.4 |
| Boilers, tanks, and shipping containers..... | 3324 | 0.3 | 0.0 | 0.5 | -0.2 |
| Hardware..... | 3325 | 0.3 | 0.3 | 0.8 | -0.7 |
| Spring and wire products..... | 3326 | 0.8 | 0.3 | 0.9 | -0.4 |
| Machine shops and threaded products..... | 3327 | 1.5 | 0.2 | 0.7 | 0.6 |
| Coating, engraving, and heat treating metals..... | 3328 | 1.5 | 0.1 | 0.8 | 0.6 |
| Other fabricated metal products..... | 3329 | 0.2 | 0.1 | 0.6 | -0.5 |
| Agriculture, construction, and mining machinery..... | 3331 | 1.4 | 0.0 | 1.3 | 0.1 |
| Industrial machinery..... | 3332 | 0.6 | 0.0 | 0.4 | 0.2 |
| Commercial and service industry machinery..... | 3333 | 1.2 | 0.1 | 1.0 | 0.1 |
| HVAC and commercial refrigeration equipment..... | 3334 | 0.6 | 0.1 | 0.5 | -0.1 |
| Metalworking machinery..... | 3335 | 1.5 | 0.1 | 0.9 | 0.5 |
| Turbine and power transmission equipment..... | 3336 | 1.4 | 0.1 | 0.9 | 0.3 |
| Other general purpose machinery..... | 3339 | 1.2 | 0.1 | 1.1 | 0.0 |
| Computer and peripheral equipment..... | 3341 | 13.5 | 1.0 | 1.9 | 10.3 |
| Communications equipment..... | 3342 | 4.7 | 0.3 | 1.5 | 2.8 |
| Audio and video equipment..... | 3343 | 2.7 | 0.1 | 0.4 | 2.2 |
| Semiconductors and electronic components..... | 3344 | 10.7 | 1.7 | 0.9 | 7.9 |
| Electronic instruments..... | 3345 | 2.7 | 0.3 | 1.6 | 0.7 |
| Magnetic media manufacturing and reproducing..... | 3346 | -0.6 | 0.2 | -1.1 | 0.3 |
| Electric lighting equipment..... | 3351 | 1.2 | 0.3 | 0.8 | 0.1 |
| Household appliances..... | 3352 | 2.1 | 0.2 | 0.6 | 1.3 |
| Electrical equipment..... | 3353 | 1.1 | 0.1 | 1.1 | -0.1 |
| Other electrical equipment and components..... | 3359 | 0.7 | 0.0 | 0.4 | 0.2 |
| Motor vehicles..... | 3361 | 2.3 | 0.2 | 1.6 | 0.5 |
| Motor vehicle bodies and trailers..... | 3362 | 1.0 | 0.0 | 1.6 | -0.6 |
| Motor vehicle parts..... | 3363 | 2.4 | 0.0 | 1.1 | 1.3 |
| Aerospace products and parts..... | 3364 | 1.2 | 0.3 | 0.7 | 0.1 |
| Railroad rolling stock..... | 3365 | 2.1 | 0.1 | 1.2 | 0.8 |
| Ship and boat building..... | 3366 | 1.6 | 0.1 | 1.0 | 0.5 |
| Other transportation equipment..... | 3369 | 2.4 | 0.2 | 0.6 | 1.5 |
| Household and institutional furniture..... | 3371 | 1.0 | 0.2 | 0.5 | 0.3 |
| Office furniture and fixtures..... | 3372 | 0.6 | 0.3 | 0.6 | -0.3 |
| Other furniture related products..... | 3379 | 1.5 | 0.2 | 1.1 | 0.2 |
| Medical equipment and supplies..... | 3391 | 1.7 | 0.7 | 0.6 | 0.5 |
| Other miscellaneous manufacturing..... | 3399 | 0.5 | 0.1 | 0.2 | 0.2 |