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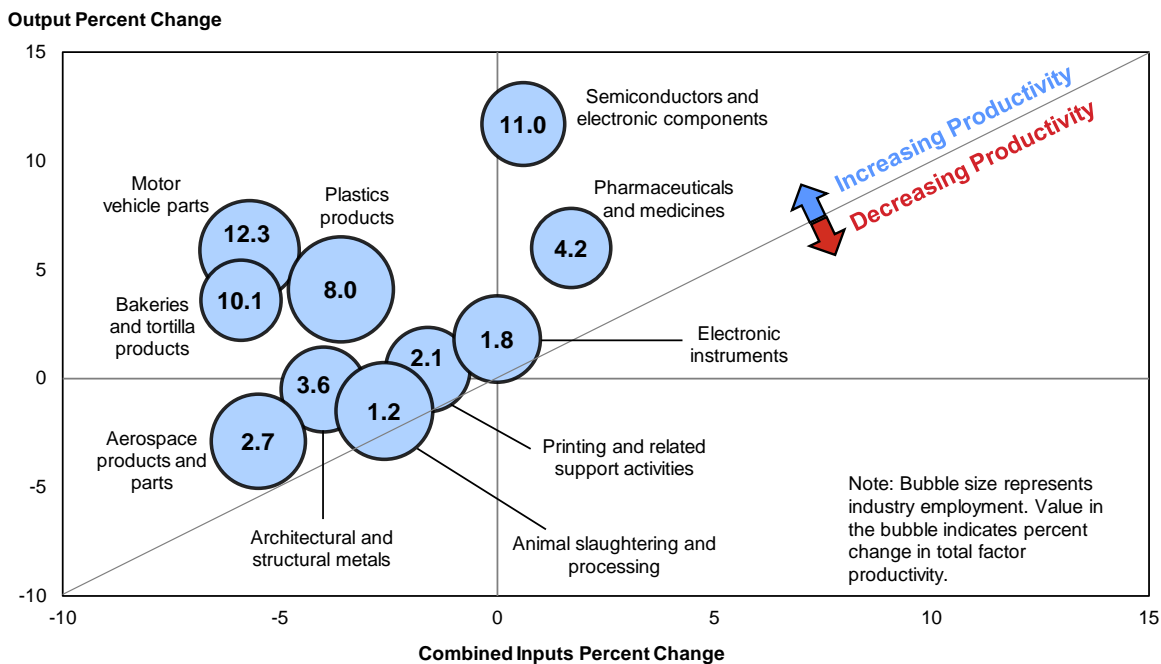
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**TOTAL FACTOR PRODUCTIVITY FOR DETAILED INDUSTRIES – 2021**

**Total factor productivity**—defined as output per unit of combined inputs—rose in 78 of the 86 4-digit NAICS manufacturing industries in 2021, the U.S. Bureau of Labor Statistics reported today. This represents an increase from 2020, when total factor productivity increased in 25 manufacturing industries. Total factor productivity also increased in air transportation and line-haul railroads in 2021.

The ten largest 4-digit NAICS manufacturing industries (those with employment over 350,000) all experienced increasing total factor productivity in 2021. (See chart 1.) Output rose in seven of these industries and declined in three industries: aerospace products and parts (-2.9 percent), animal slaughtering and processing (-1.5 percent), and architectural and structural metals (-0.5 percent). Combined inputs (capital, hours worked, materials, energy, and purchased services) increased in only two of these industries: pharmaceuticals and medicines (+1.7 percent) and semiconductors and electronic components (+0.6 percent).

**Chart 1. Total factor productivity, output, and combined inputs in the largest manufacturing industries, 2021**



Six of the 78 manufacturing industries with rising total factor productivity in 2021 had increases of more than 15.0 percent:

- Coating, engraving, and heat treating metals (+19.9 percent)
- Clay products and refractories (+19.1 percent)
- Cutlery and handtools (+16.2 percent)
- Sugar and confectionery products (+15.9 percent)
- Rubber products (+15.5 percent)
- Petroleum and coal products (+15.3 percent)

Only three manufacturing industries posted total factor productivity declines of more than 5.0 percent (see table 1):

- Iron and steel mills and ferroalloys (-20.8 percent)
- Glass and glass products (-5.9 percent)
- Alumina and aluminum production (-5.3 percent)

Total factor productivity increased in each of the two measured transportation industries:

- Air transportation (+44.2 percent)
- Line-haul railroads (+7.2 percent)

### **Total Factor Productivity: Definition and Concepts**

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

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**

The manufacturing sector rebounded in 2021 as **output** increased in 65 of 86 industries, compared to 17 industries in 2020. (See chart 2.) Among the industries that posted gains, output increased by 15.0 percent or more in the following six industries in 2021:

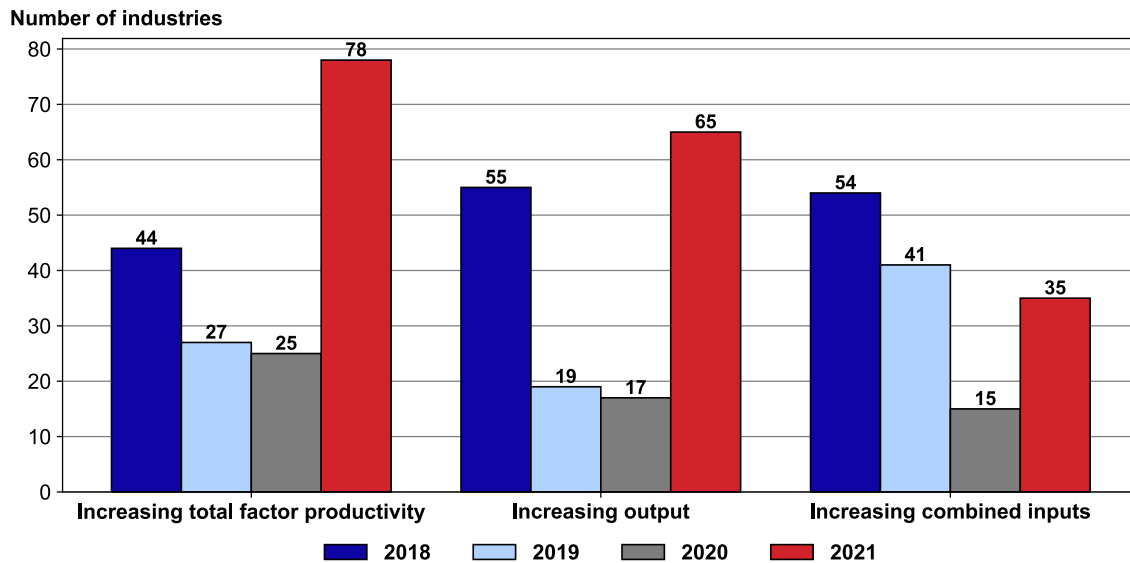
- Magnetic media manufacturing and reproducing (+60.9 percent)
- Motor vehicle bodies and trailers (+24.5 percent)
- Other leather products (+21.9 percent)
- Clay products and refractories (+18.0 percent)
- Coating, engraving, and heat treating metals (+17.6 percent)
- Audio and video equipment (+15.2 percent)

**Combined inputs** of capital, labor, and intermediate inputs fell in 50 of 86 manufacturing industries in 2021, compared to 71 in 2020. Thirty-one industries saw declines in hours worked. Intermediate inputs fell in 52 industries. Capital also fell in 64 of the manufacturing industries.

Of the 35 industries with rising combined inputs in 2021, the five with the largest gains were:

- Magnetic media manufacturing and reproducing (+47.3 percent)
- Motor vehicle bodies and trailers (+13.3 percent)
- Other leather products (+8.6 percent)
- Iron and steel mills and ferroalloys (+6.3 percent)
- Accessories and other apparel (+6.3 percent)

**Chart 2. Number of manufacturing industries with increases in total factor productivity, output, and combined inputs, 2018-21**



In industries where combined inputs declined faster than output, **total factor productivity** increased. The greatest productivity gains occurred in:

- Boilers, tanks, and shipping containers (+12.4 percent)
- Railroad rolling stock (+12.0 percent)
- Animal food (+7.4 percent)
- Fruit and vegetable preserving and specialty (+4.8 percent)

Total factor productivity in both measured transportation industries increased because output grew more rapidly than combined input usage. In the air transportation industry, output rose 71.3 percent and combined inputs rose 18.8 percent in 2021. In line-haul railroads, output increased 7.8 percent and combined inputs grew 0.5 percent.

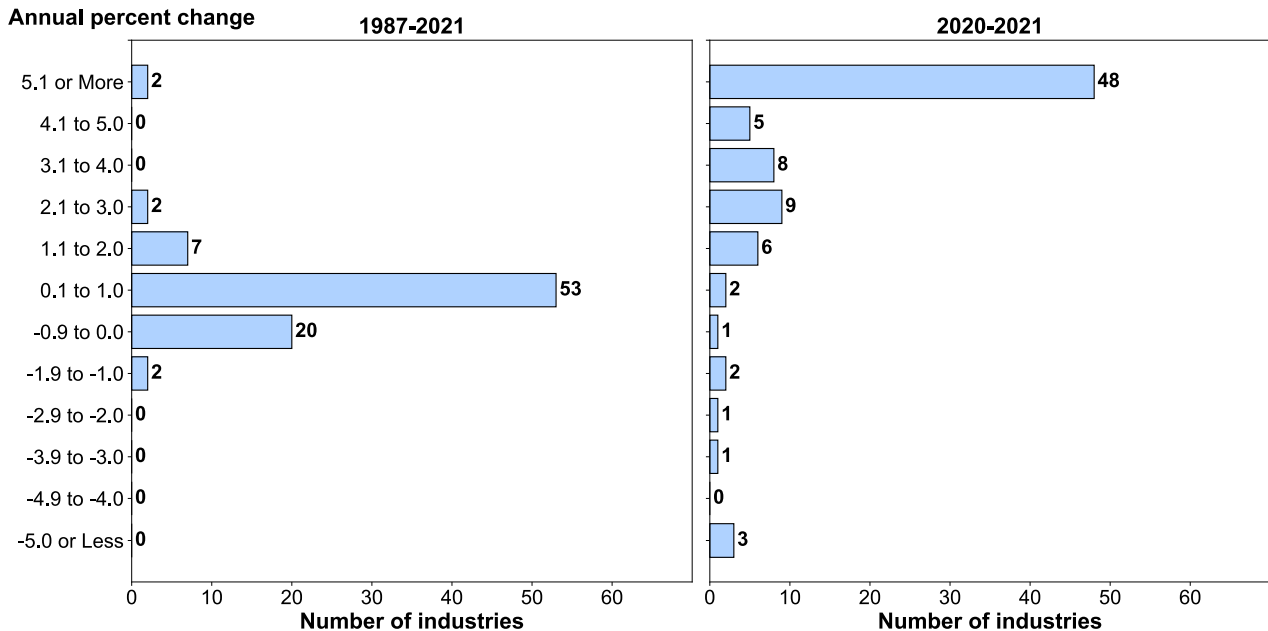
### Trends in Total Factor Productivity for Selected Time Periods

Both year-to-year movements and long-term trends in industry total factor productivity may reflect cyclical changes in the economy. This was particularly true in 2021 due to the continuation of the COVID-19 pandemic. While long-term annual percent changes in total factor productivity are affected by economic conditions such as the pandemic, these historical trends are nevertheless more reliable indicators of industry performance.

More industries saw total factor productivity growth over the short term than the long term. Over the long-term period from 1987 to 2021, total factor productivity grew in 64 manufacturing industries, compared to 78 from 2020 to 2021. (See tables 1 and 2.) Annual rates of change in total factor productivity for nearly all manufacturing industries ranged between -2.0 percent and +2.0 percent per year over the long term. (See chart 3.) In contrast, total factor productivity increased by 2.1 percent or more in 70 industries in 2021. Only four industries saw an annual increase of that magnitude from 1987 to 2021.

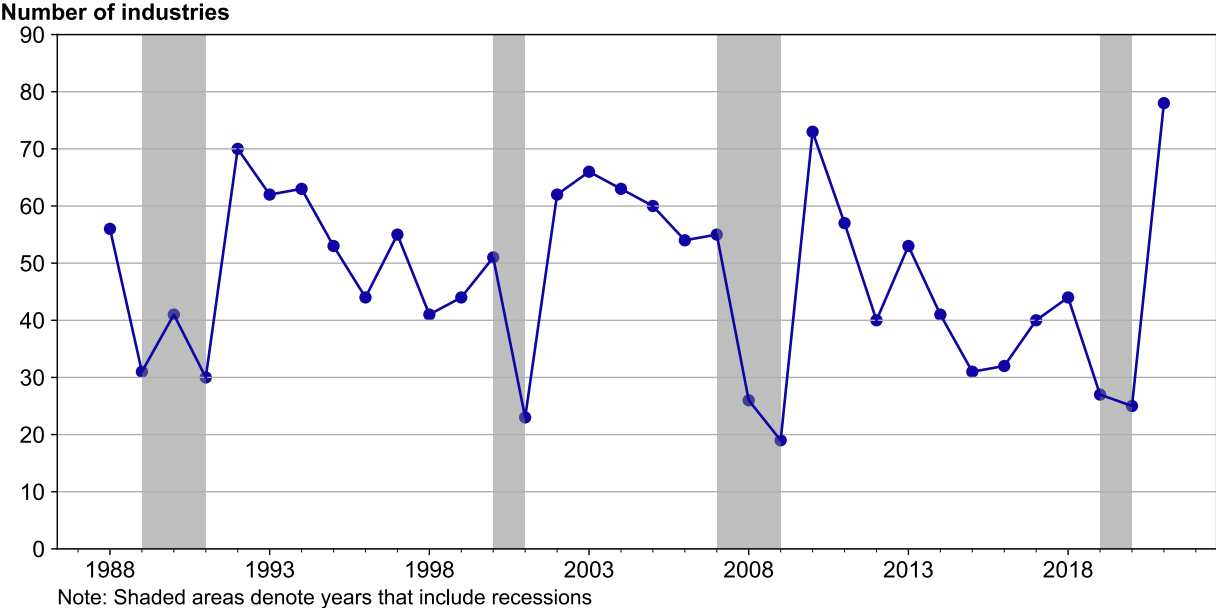
Although the distribution of total factor productivity growth for all the manufacturing industries may change significantly annually, 62 percent of industries are clustered between an increase of 0.1 percent and 1.0 percent in the long run.

**Chart 3. Distribution of total factor productivity growth for all manufacturing industries, 1987-2020 and 2020-2021**



Between 1987 and 2021, 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 saw total factor productivity growth in the recession years of 2001, 2009, and 2020. (See chart 4.)

**Chart 4. Number of manufacturing industries with increases in total factor productivity, 1988-2021**

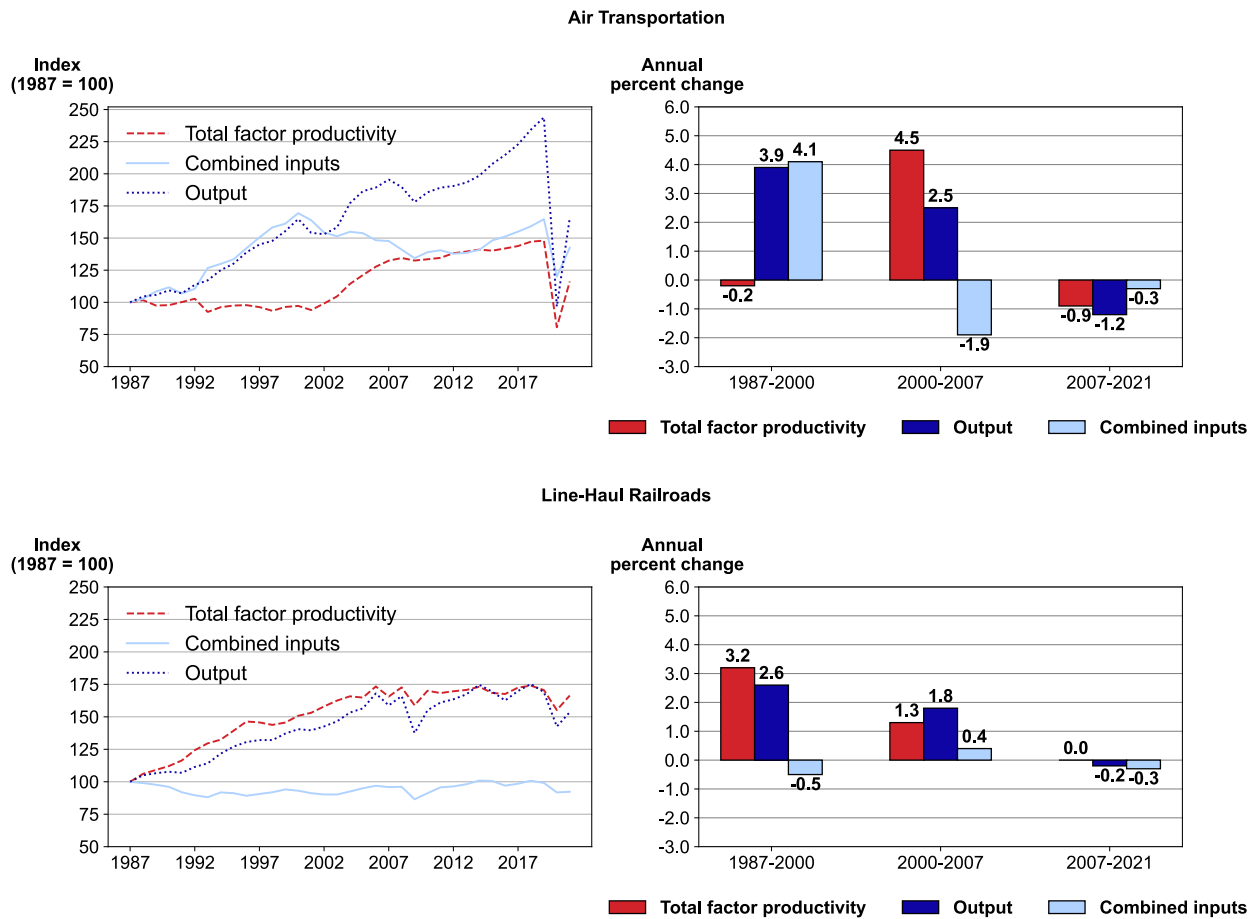


Annual percent changes in total factor productivity by industry for sub periods between 1987 and 2021 are shown in table 3. The sub period from 1990 to 1995 saw the greatest number of manufacturing industries with total factor productivity growth.

Prior to the pandemic, air transportation total factor productivity grew at an annual rate of 1.2 percent for the period 1987-2019. (See table 2 and chart 5.) However, after accounting for the pandemic years, total factor productivity for the industry rose by an annual rate of only 0.4 percent per year. This change in the long-term trend is mainly due to air transportation output decreasing by 17.6 percent annually over the pandemic period (2019-2021). Output increased 4.0 percent in 2019, fell by 60.3 percent in 2020, and then increased 71.3 percent in 2021.

For line-haul railroads, single-year output deepened from a 3.6-percent decline in 2019 to a 15.7-percent decline in 2020, before rebounding in 2021, growing 7.8 percent. This resulted in a 4.7-percent annual output decline between 2019 and 2021. However, this change had a smaller effect on the long-term trend of total factor productivity, which increased 1.7 percent annually in the pre-pandemic 1987-2019 period compared to an increase of 1.5 percent from 1987-2021.

**Chart 5. Total factor productivity, output, and combined inputs for transportation industries, 1987-2021**



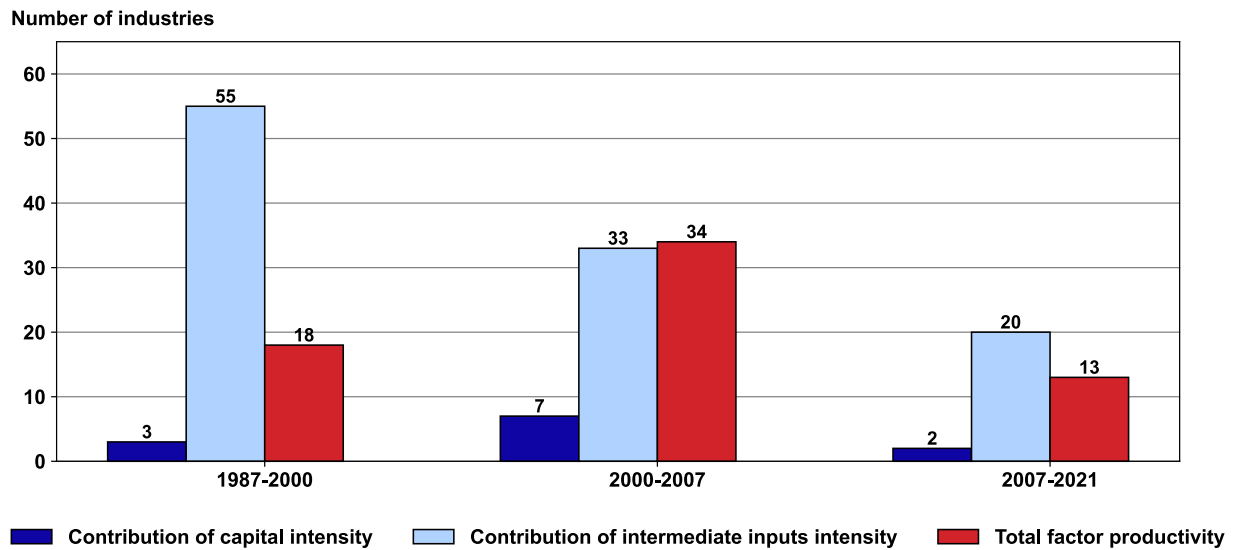
### Total Factor Productivity as a Source of Labor Productivity Growth

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 substitution; that is, the combined effects of changes in weighted capital services relative to hours worked and weighted intermediate inputs relative to hours worked. These factor substitutions are referred to as contribution of capital intensity and contribution of intermediate inputs intensity.

Eighty-two out of the 86 manufacturing industries posted gains in labor productivity from 1987 to 2021. 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.

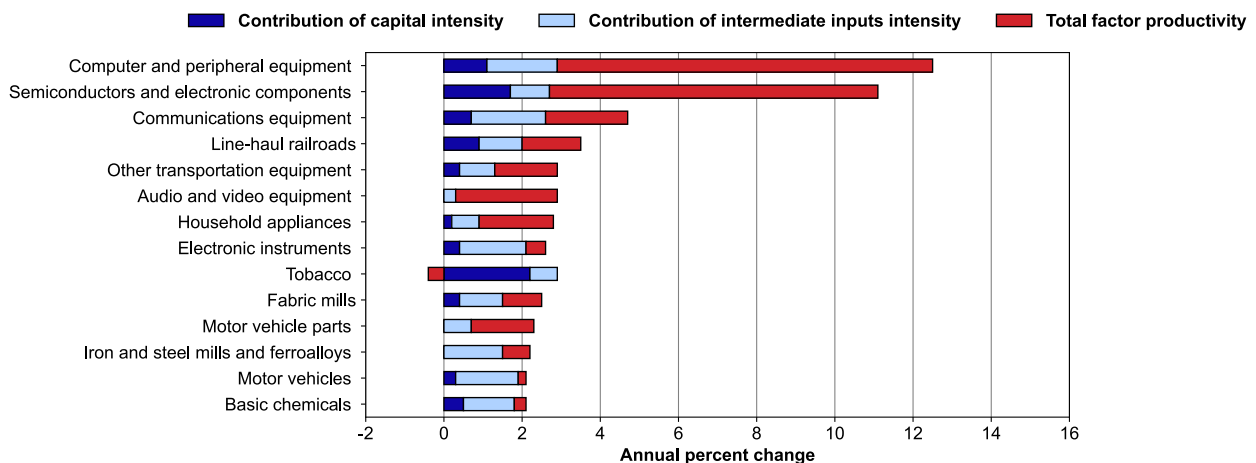
Chart 6 illustrates sources of labor productivity growth for three sub periods occurring between 1987 and 2021. Between 2000 and 2007, total factor productivity growth was as much of a contributor of labor productivity growth as intermediate inputs intensity. In contrast, labor productivity growth was driven mostly by contribution of intermediate inputs intensity in the other two sub periods.

**Chart 6. Greatest sources of labor productivity growth for manufacturing industries with increasing labor productivity**



Industries with the greatest labor productivity growth from 1987 to 2021 are shown in chart 7. These industries recorded annual labor productivity growth of more than 2.0 percent per year. Strong growth in total factor productivity was the dominant source of labor productivity growth in the seven industries with the highest labor productivity growth. This includes four industries that manufacture computers and electronic products (computer and peripheral equipment, semiconductors and electronic components, communication equipment, and audio and video equipment). Uniquely, the tobacco industry’s labor productivity growth was fueled by the contribution of capital intensity.

**Chart 7. Sources of labor productivity growth for industries with greatest growth in labor productivity, 1987-2021**



## **Additional Information**

Measures of hours worked for all industries reflect a change in methods and are revised historically. The new method of determining hours worked uses all-employee hours data from the BLS Current Employment Statistics (CES) survey as the main source of data. This is an improvement upon the prior method which instead used the CES production worker hours data. Another improvement is the use of BLS Current Population Survey (CPS) data to adjust CES all-employee hours paid to account for hours worked but not paid, also known as off-the-clock hours. Hours worked data also now incorporate all employee-based hours-worked-to-hours-paid ratios from the National Compensation Survey, rather than ratios based only on production workers. For more information on the new hours worked methodology, see [www.bls.gov/opub/mlr/2022/article/improving-estimates-of-hours-worked-for-us-productivity-measurement.htm](http://www.bls.gov/opub/mlr/2022/article/improving-estimates-of-hours-worked-for-us-productivity-measurement.htm).

More information about the North American Industry Classification System (NAICS) can be found at [www.census.gov/naics/](http://www.census.gov/naics/).

Access [www.bls.gov/productivity/tables/](http://www.bls.gov/productivity/tables/) for productivity data tables which include:

- Additional industries and sectors
- Detailed data series: indexes of total factor productivity and related measures; rates of change; and levels of industry employment, hours worked, nominal value of production, and labor compensation
- Additional years and long-term data

More information from the BLS productivity program is available at <https://www.bls.gov/productivity/>.

- More detailed capital and intermediate inputs data available upon request

Subscribe to productivity news releases on the BLS website at <https://public.govdelivery.com/accounts/USDOLBLS/subscriber/new>.

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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:** Manufacturing 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. For air transportation and line-haul railroads, output is measured by aggregating passenger-miles and freight ton-miles with weights based on revenues or operating expenses.

Output measures for manufacturing industries 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). Output measures for air transportation and line-haul railroads are constructed using data primarily from the Bureau of Transportation Statistics (BTS) and the Surface Transportation Board (STB), both in the U.S. Department of Transportation (DOT), together with information from the Association of American Railroads (AAR), AMTRAK, and several other sources.

**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.

For manufacturing industries, physical capital is comprised 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.

For air transportation, a weighted index combining 23 categories of airframes and 21 categories of engines is derived from annual carrier operating inventories reported to BTS. For assets other than airframes and engines, capital stocks are calculated similarly to manufacturing industries. For these assets, a more detailed breakdown of annual expenditures on equipment and structures from the BEA is used. Inventories of parts and supplies are also included; the current dollar series is deflated with a weighted cost index based on data from Airlines for America (A4A) and BTS. Indexes for aircraft and engines, non-aircraft assets, and parts and supplies inventories are aggregated using cost share weights to derive an overall measure of capital input.

For line-haul railroads, current dollar investment for 10 categories of equipment and 13 categories of structures, obtained from STB and AMTRAK, are deflated with BLS PPIs and deflators based on BEA data. The capital stocks for each of the items are calculated similarly to manufacturing industries. Inventories of materials and supplies are also included. Estimates of investments in land from STB and AMTRAK are deflated with price indexes from BEA.

**Labor Hours:** For manufacturing industries, 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 to 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.

For air transportation, annual labor input estimates are based on monthly employment data from BTS supplemented by employment and hours from the CES program and hours from the CPS. For line-haul railroads, labor input measures are derived primarily from STB data and supplemented with data from AAR. For the railroad industry, the labor input measure includes an adjustment to remove capitalized labor hours in order to avoid double-counting because some capitalized labor costs are embedded in the railroad investment data.

**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.

For manufacturing industries, 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.

For air transportation, detailed cost of materials, services, fuels, and electricity from the BTS are deflated using cost indexes from A4A. For line-haul railroads, intermediate inputs data from STB are supplemented with data from other sources including AAR and AMTRAK. The nominal values are deflated with producer price indexes from BLS and implicit price deflators calculated from BEA investment data.

**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 compound annual growth rate in an index series over a period of more than one year. The change of an index series varies from year to year. However, the annual percent change is 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	2021 Employment (thousands)	Percent change, 2020-2021					
			Total factor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate inputs
<b>Manufacturing</b>								
Animal food.....	3111	71.4	7.4	-1.3	-8.1	1.6	-1.0	-11.8
Grain and oilseed milling.....	3112	62.7	12.2	0.3	-10.7	-0.3	-0.4	-13.4
Sugar and confectionery products.....	3113	78.2	15.9	11.3	-4.0	9.0	0.5	-8.4
Fruit and vegetable preserving and specialty.....	3114	174.1	4.8	-0.9	-5.5	4.6	-1.0	-10.0
Dairy products.....	3115	154.4	2.4	0.9	-1.5	1.7	0.5	-2.6
Animal slaughtering and processing.....	3116	529.0	1.2	-1.5	-2.6	-2.3	0.4	-3.7
Seafood product preparation and packaging.....	3117	34.8	6.0	0.4	-5.3	17.4	-1.2	-10.3
Bakeries and tortilla products.....	3118	338.1	10.1	3.6	-5.9	3.5	-0.1	-11.9
Other food products.....	3119	240.1	7.4	2.8	-4.3	9.1	0.8	-9.8
Beverages.....	3121	294.3	11.8	8.4	-3.0	11.8	-0.4	-8.7
Tobacco.....	3122	10.7	0.7	-5.4	-6.1	-0.9	-5.4	-10.1
Fiber, yarn, and thread mills.....	3131	26.5	-1.6	-0.5	1.2	12.1	-5.8	-0.5
Fabric mills.....	3132	48.2	3.6	1.5	-1.9	1.4	-2.5	-2.8
Textile and fabric finishing mills.....	3133	26.2	-1.0	-2.5	-1.5	-6.8	-4.1	0.1
Textile furnishings mills.....	3141	47.4	10.0	10.8	0.8	1.2	-2.1	1.5
Other textile product mills.....	3149	65.5	7.6	8.8	1.1	0.2	-2.0	2.1
Apparel knitting mills.....	3151	7.8	8.2	3.5	-4.4	-8.8	-6.3	-1.2
Cut and sew apparel.....	3152	79.7	6.4	10.7	4.0	-2.0	-3.8	7.4
Accessories and other apparel.....	3159	12.7	2.3	8.8	6.3	5.2	-2.1	7.2
Leather and hide tanning and finishing.....	3161	4.2	4.8	9.4	4.4	-15.3	-6.2	15.8
Footwear.....	3162	11.5	2.9	6.8	3.8	0.1	-5.5	6.2
Other leather products.....	3169	13.9	12.3	21.9	8.6	-5.3	-1.5	21.3
Sawmills and wood preservation.....	3211	100.5	2.7	-0.9	-3.5	5.6	-1.8	-6.8
Plywood and engineered wood products.....	3212	83.2	-3.5	1.5	5.2	9.0	-2.2	8.1
Other wood products.....	3219	253.3	2.0	7.1	5.0	7.9	1.3	4.8
Pulp, paper, and paperboard mills.....	3221	88.3	2.9	-1.5	-4.3	-2.1	-2.5	-5.9
Converted paper products.....	3222	261.6	3.5	3.3	-0.2	3.8	0.2	-1.7
Printing and related support activities.....	3231	391.9	2.1	0.4	-1.6	3.2	-3.8	-3.7
Petroleum and coal products.....	3241	105.4	15.3	8.6	-5.8	2.8	-5.2	-6.2
Basic chemicals.....	3251	149.1	8.2	10.1	1.7	-3.6	-1.8	4.7
Resin, rubber, and artificial fibers.....	3252	91.1	3.4	-0.4	-3.7	-4.4	-2.7	-3.8
Agricultural chemicals.....	3253	37.9	-0.7	-4.1	-3.4	3.7	-4.8	-3.5
Pharmaceuticals and medicines.....	3254	339.2	4.2	6.0	1.7	5.9	2.8	-3.7
Paints, coatings, and adhesives.....	3255	63.1	8.6	9.6	1.0	0.3	0.6	1.4
Soaps, cleaning compounds, and toiletries.....	3256	123.7	1.8	-0.1	-1.9	1.7	1.4	-6.2
Other chemical products and preparations.....	3259	80.9	8.7	4.7	-3.7	1.6	-1.1	-6.2
Plastics products.....	3261	603.2	8.0	4.1	-3.6	3.5	-0.2	-7.2
Rubber products.....	3262	132.5	15.5	13.8	-1.5	5.9	-0.6	-5.1
Clay products and refractories.....	3271	36.6	19.1	18.0	-0.9	-10.9	-2.0	5.3
Glass and glass products.....	3272	87.2	-5.9	-5.1	0.8	4.7	-3.1	0.3
Cement and concrete products.....	3273	199.4	4.4	4.5	0.1	0.6	-1.2	0.5
Lime and gypsum products.....	3274	15.3	4.3	4.9	0.6	-1.4	-1.5	2.0
Other nonmetallic mineral products.....	3279	80.5	6.2	7.7	1.4	-1.8	0.8	3.2
Iron and steel mills and ferroalloys.....	3311	80.2	-20.8	-15.9	6.3	-1.4	-4.8	13.3
Steel products from purchased steel.....	3312	54.6	-2.4	-6.1	-3.8	0.2	-3.7	-4.7
Alumina and aluminum production.....	3313	57.7	-5.3	-1.8	3.7	4.8	-2.7	6.4
Other nonferrous metal production.....	3314	56.4	9.0	4.5	-4.1	-4.2	-1.0	-6.0
Foundries.....	3315	103.5	5.1	6.0	0.9	2.5	-2.4	1.2
Forging and stamping.....	3321	90.4	11.1	2.2	-8.1	4.9	-2.2	-14.2
Cutlery and handtools.....	3322	37.8	16.2	9.3	-6.0	5.5	-0.5	-14.2
Architectural and structural metals.....	3323	395.1	3.6	-0.5	-4.0	3.2	0.7	-8.8

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

Industry	2017 NAICS code	2021 Employment (thousands)	Percent change, 2020-2021					
			Total factor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate inputs
Boilers, tanks, and shipping containers.....	3324	87.3	12.4	-1.6	-12.4	-0.8	0.6	-19.1
Hardware.....	3325	24.3	3.4	-2.4	-5.6	-0.4	-1.2	-9.2
Spring and wire products.....	3326	40.6	13.4	5.5	-6.9	0.4	-1.3	-11.6
Machine shops and threaded products.....	3327	334.0	14.2	8.9	-4.7	-1.5	0.0	-8.5
Coating, engraving, and heat treating metals.....	3328	129.1	19.9	17.6	-1.9	-2.6	-1.1	-1.9
Other fabricated metal products.....	3329	270.1	10.9	5.0	-5.3	3.6	-2.5	-10.5
Agriculture, construction, and mining machinery....	3331	197.3	10.9	13.5	2.3	0.2	-2.7	4.2
Industrial machinery.....	3332	123.3	0.1	2.1	2.1	5.8	0.3	0.4
Commercial and service industry machinery.....	3333	86.2	10.6	12.6	1.9	-3.9	-0.1	4.7
HVAC and commercial refrigeration equipment.....	3334	138.4	2.3	0.8	-1.5	6.8	0.0	-5.5
Metalworking machinery.....	3335	161.4	13.9	12.7	-1.0	-1.8	-0.4	-0.7
Turbine and power transmission equipment.....	3336	86.7	12.2	13.8	1.4	2.1	-1.6	1.8
Other general purpose machinery.....	3339	269.2	6.9	5.7	-1.1	2.2	-0.4	-2.9
Computer and peripheral equipment.....	3341	158.6	3.6	6.7	3.0	-0.8	-3.6	4.7
Communications equipment.....	3342	85.9	3.4	4.9	1.4	-3.5	-5.1	4.3
Audio and video equipment.....	3343	19.2	11.6	15.2	3.2	-8.5	-6.0	8.6
Semiconductors and electronic components.....	3344	374.4	11.0	11.7	0.6	-1.4	-2.6	2.3
Electronic instruments.....	3345	419.6	1.8	1.8	0.0	2.1	-0.3	-1.1
Magnetic media manufacturing and reproducing. ..	3346	12.6	9.3	60.9	47.3	-2.8	-7.2	84.8
Electric lighting equipment.....	3351	42.2	13.3	10.8	-2.2	-1.2	-1.2	-3.3
Household appliances.....	3352	70.2	10.1	9.1	-0.9	16.4	-2.1	-4.6
Electrical equipment.....	3353	139.3	7.4	4.7	-2.5	2.6	-0.6	-5.7
Other electrical equipment and components.....	3359	145.8	6.7	2.1	-4.3	2.5	-2.6	-7.6
Motor vehicles.....	3361	254.2	1.4	3.9	2.5	23.1	-1.2	1.1
Motor vehicle bodies and trailers.....	3362	166.1	9.9	24.5	13.3	9.0	1.7	16.2
Motor vehicle parts.....	3363	546.4	12.3	5.9	-5.7	3.5	-5.2	-8.1
Aerospace products and parts.....	3364	483.1	2.7	-2.9	-5.5	-2.1	-0.2	-8.2
Railroad rolling stock.....	3365	19.1	12.0	-2.8	-13.1	-10.5	-0.6	-14.7
Ship and boat building.....	3366	148.4	1.7	5.6	3.9	6.5	3.6	2.5
Other transportation equipment.....	3369	41.8	12.0	14.3	2.1	19.1	0.4	-1.3
Household and institutional furniture.....	3371	258.4	6.5	4.2	-2.2	6.3	0.5	-7.1
Office furniture and fixtures.....	3372	100.7	3.4	-3.7	-6.8	-0.7	0.0	-12.9
Other furniture related products.....	3379	37.4	2.9	2.1	-0.8	10.9	2.3	-4.5
Medical equipment and supplies.....	3391	329.2	8.2	9.9	1.6	3.2	0.5	1.2
Other miscellaneous manufacturing.....	3399	319.3	10.9	12.6	1.5	6.3	-2.5	0.4
<b>Transportation</b>								
Air transportation.....	481	450.4	44.2	71.3	18.8	4.3	1.1	63.6
Line-haul railroads.....	482111	131.2	7.2	7.8	0.5	-1.2	-0.3	3.0

**Table 2. Long run total factor productivity and related data**

Industry	2017 NAICS code	Average annual percent change, 1987-2021					
		Total factor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate inputs
<b>Manufacturing</b>							
Animal food.....	3111	0.1	1.6	1.5	0.3	1.7	1.6
Grain and oilseed milling.....	3112	0.3	1.0	0.7	-0.7	0.2	0.9
Sugar and confectionery products.....	3113	0.2	0.6	0.4	-0.3	0.7	0.4
Fruit and vegetable preserving and specialty.....	3114	0.3	0.8	0.5	0.1	0.7	0.5
Dairy products.....	3115	0.3	1.3	1.0	0.1	1.4	1.0
Animal slaughtering and processing.....	3116	0.5	1.4	1.0	1.1	2.0	0.8
Seafood product preparation and packaging.....	3117	0.5	0.0	-0.5	-0.9	0.9	-0.6
Bakeries and tortilla products.....	3118	-0.4	0.4	0.8	0.2	0.8	1.1
Other food products.....	3119	0.4	2.1	1.7	2.2	1.3	1.8
Beverages.....	3121	0.6	1.1	0.5	0.8	0.6	0.2
Tobacco.....	3122	-0.4	-2.7	-2.2	-5.0	-2.4	-1.2
Fiber, yarn, and thread mills.....	3131	0.8	-2.5	-3.2	-3.8	-2.7	-3.0
Fabric mills.....	3132	1.0	-2.8	-3.8	-5.1	-2.6	-3.5
Textile and fabric finishing mills.....	3133	-0.1	-3.4	-3.2	-4.2	-2.6	-3.0
Textile furnishings mills.....	3141	-0.1	-2.3	-2.2	-2.7	-1.1	-2.5
Other textile product mills.....	3149	0.4	-0.5	-0.9	-1.8	0.2	-0.7
Apparel knitting mills.....	3151	-0.4	-7.2	-6.8	-7.4	-3.2	-7.2
Cut and sew apparel.....	3152	-0.9	-6.0	-5.1	-6.5	-2.9	-5.5
Accessories and other apparel.....	3159	-1.8	-5.6	-3.8	-3.2	-2.4	-4.3
Leather and hide tanning and finishing.....	3161	1.4	-2.8	-4.1	-4.1	-2.4	-4.5
Footwear.....	3162	-0.5	-4.8	-4.3	-6.0	-3.4	-3.7
Other leather products.....	3169	-0.1	-2.7	-2.6	-3.6	-1.9	-2.4
Sawmills and wood preservation.....	3211	1.0	0.2	-0.8	-1.4	-0.9	-0.6
Plywood and engineered wood products.....	3212	-0.1	-0.3	-0.2	-0.6	0.1	0.2
Other wood products.....	3219	-0.1	0.1	0.2	-0.8	0.5	0.7
Pulp, paper, and paperboard mills.....	3221	0.7	-0.9	-1.6	-2.7	-1.3	-1.3
Converted paper products.....	3222	0.0	-0.4	-0.4	-1.1	0.5	-0.5
Printing and related support activities.....	3231	0.2	-1.0	-1.1	-2.1	-0.2	-0.8
Petroleum and coal products.....	3241	0.2	0.9	0.6	-1.0	0.7	0.8
Basic chemicals.....	3251	0.3	0.6	0.3	-1.5	0.4	0.6
Resin, rubber, and artificial fibers.....	3252	0.1	0.0	-0.2	-1.4	0.4	-0.1
Agricultural chemicals.....	3253	1.1	0.6	-0.5	-1.0	0.2	-1.0
Pharmaceuticals and medicines.....	3254	-1.3	1.1	2.4	1.9	3.4	1.2
Paints, coatings, and adhesives.....	3255	-0.1	-0.1	0.0	-0.7	0.1	0.1
Soaps, cleaning compounds, and toiletries.....	3256	0.2	0.8	0.5	-0.1	1.3	0.0
Other chemical products and preparations.....	3259	0.4	0.0	-0.4	-1.9	-0.1	-0.1
Plastics products.....	3261	0.4	1.3	0.9	0.1	1.8	1.1
Rubber products.....	3262	0.8	0.3	-0.5	-1.4	0.1	-0.1
Clay products and refractories.....	3271	0.3	-1.3	-1.6	-2.5	-1.5	-1.1
Glass and glass products.....	3272	0.4	-0.1	-0.5	-1.5	-0.4	0.0
Cement and concrete products.....	3273	-0.1	0.3	0.4	0.1	-0.2	0.6
Lime and gypsum products.....	3274	-0.6	-0.4	0.3	-1.4	0.5	0.6
Other nonmetallic mineral products.....	3279	0.7	1.1	0.3	0.0	-0.2	0.9
Iron and steel mills and ferroalloys.....	3311	0.7	-0.2	-0.9	-2.3	-2.0	0.1
Steel products from purchased steel.....	3312	0.1	-0.2	-0.4	-0.7	-1.5	0.0
Alumina and aluminum production.....	3313	1.0	-0.4	-1.4	-1.8	-0.8	-1.4
Other nonferrous metal production.....	3314	0.9	-0.6	-1.4	-1.9	-0.3	-1.8
Foundries.....	3315	0.4	-0.9	-1.3	-2.1	-0.8	-0.7
Forging and stamping.....	3321	0.7	0.4	-0.3	-1.3	0.9	0.0
Cutlery and handtools.....	3322	0.4	-1.0	-1.3	-2.0	-0.8	-0.9
Architectural and structural metals.....	3323	-0.1	0.8	0.8	0.2	0.7	1.2

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

Industry	2017 NAICS code	Average annual percent change, 1987-2021					
		Total factor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate inputs
Boilers, tanks, and shipping containers.....	3324	0.4	0.2	-0.2	-0.6	-0.2	0.0
Hardware.....	3325	-0.4	-1.9	-1.5	-2.6	-1.1	-1.1
Spring and wire products.....	3326	0.5	-0.4	-0.9	-2.0	0.0	-0.5
Machine shops and threaded products.....	3327	0.9	1.9	1.0	0.2	1.7	1.5
Coating, engraving, and heat treating metals.....	3328	1.2	1.8	0.6	-0.2	0.9	1.0
Other fabricated metal products.....	3329	-0.3	-0.1	0.1	-0.7	0.2	0.6
Agriculture, construction, and mining machinery.....	3331	0.2	1.5	1.2	-0.2	0.2	2.0
Industrial machinery.....	3332	0.5	0.7	0.2	-0.4	0.9	0.4
Commercial and service industry machinery.....	3333	0.0	-0.1	-0.2	-1.5	-0.5	0.6
HVAC and commercial refrigeration equipment.....	3334	0.4	0.5	0.1	-0.3	0.6	0.1
Metalworking machinery.....	3335	1.1	0.4	-0.7	-1.6	0.0	0.1
Turbine and power transmission equipment.....	3336	0.1	0.5	0.4	-0.7	0.2	1.0
Other general purpose machinery.....	3339	0.2	0.9	0.7	-0.6	0.4	1.5
Computer and peripheral equipment.....	3341	9.6	9.2	-0.4	-3.3	-0.3	0.5
Communications equipment.....	3342	2.1	1.6	-0.5	-3.0	0.5	0.2
Audio and video equipment.....	3343	2.6	0.0	-2.5	-2.8	-1.7	-2.4
Semiconductors and electronic components.....	3344	8.4	9.9	1.4	-1.3	4.0	1.1
Electronic instruments.....	3345	0.5	1.2	0.7	-1.4	0.3	2.4
Magnetic media manufacturing and reproducing.....	3346	0.5	-3.2	-3.7	-2.9	-1.9	-4.9
Electric lighting equipment.....	3351	0.7	-0.4	-1.1	-2.0	-0.3	-1.0
Household appliances.....	3352	1.9	0.7	-1.1	-2.0	-0.8	-1.0
Electrical equipment.....	3353	0.5	-0.3	-0.8	-1.8	-0.9	-0.1
Other electrical equipment and components.....	3359	0.6	-0.1	-0.7	-1.1	-0.2	-0.6
Motor vehicles.....	3361	0.2	1.5	1.2	-0.6	0.9	1.6
Motor vehicle bodies and trailers.....	3362	0.0	2.0	1.9	0.5	1.7	2.4
Motor vehicle parts.....	3363	1.6	2.0	0.3	-0.4	0.0	0.7
Aerospace products and parts.....	3364	-0.4	-0.5	-0.1	-1.6	0.5	0.8
Railroad rolling stock.....	3365	0.8	1.5	0.7	-0.6	0.0	1.3
Ship and boat building.....	3366	0.5	1.0	0.5	-0.7	0.3	1.4
Other transportation equipment.....	3369	1.6	3.3	1.8	0.5	2.4	1.9
Household and institutional furniture.....	3371	0.4	-0.6	-1.0	-1.5	0.0	-1.0
Office furniture and fixtures.....	3372	0.1	-0.4	-0.5	-1.3	0.5	-0.4
Other furniture related products.....	3379	0.4	0.8	0.4	-0.7	0.0	1.1
Medical equipment and supplies.....	3391	0.5	2.7	2.2	0.7	3.3	2.5
Other miscellaneous manufacturing.....	3399	0.6	0.1	-0.5	-1.0	0.2	-0.4
<b>Transportation</b>							
Air transportation.....	481	0.4	1.5	1.0	-0.3	3.2	1.2
Line-haul railroads.....	482111	1.5	1.3	-0.2	-2.2	0.6	0.7



**Table 3. Total factor productivity in selected periods**

Industry	2017 NAICS code	Annual percent change						
		1987-2021	1987-1990	1990-1995	1995-2000	2000-2007	2007-2019	2019-2021
<b>Manufacturing</b>								
Animal food.....	3111	0.1	0.6	0.8	-0.7	1.6	-1.5	3.6
Grain and oilseed milling.....	3112	0.3	0.4	0.9	0.2	0.3	-0.4	3.7
Sugar and confectionery products.....	3113	0.2	0.2	1.3	1.9	0.1	-1.5	3.9
Fruit and vegetable preserving and specialty.....	3114	0.3	-1.8	1.4	0.6	0.7	-0.3	2.6
Dairy products.....	3115	0.3	-1.1	0.6	-0.3	1.1	0.0	1.4
Animal slaughtering and processing.....	3116	0.5	0.0	1.2	0.9	1.7	-0.3	-1.0
Seafood product preparation and packaging.....	3117	0.5	-1.6	0.5	1.0	2.1	-0.3	0.5
Bakeries and tortilla products.....	3118	-0.4	-3.7	0.8	-0.5	0.3	-1.2	4.3
Other food products.....	3119	0.4	0.2	1.3	-0.6	1.3	-0.5	3.1
Beverages.....	3121	0.6	1.4	2.2	-1.2	2.2	-0.5	1.7
Tobacco.....	3122	-0.4	1.8	1.9	0.4	-1.1	-2.2	1.7
Fiber, yarn, and thread mills.....	3131	0.8	1.2	0.7	0.7	3.8	-0.7	-1.1
Fabric mills.....	3132	1.0	0.8	2.0	1.0	3.1	-1.0	3.0
Textile and fabric finishing mills.....	3133	-0.1	0.5	0.5	1.3	0.4	-0.9	-3.8
Textile furnishings mills.....	3141	-0.1	-0.1	1.8	-1.1	0.6	-1.8	5.7
Other textile product mills.....	3149	0.4	0.1	0.7	-0.6	1.6	-0.2	2.9
Apparel knitting mills.....	3151	-0.4	0.9	2.2	-2.3	-3.0	0.1	2.2
Cut and sew apparel.....	3152	-0.9	-1.2	0.9	-0.9	-3.1	-0.2	-1.3
Accessories and other apparel.....	3159	-1.8	1.4	0.7	-6.8	-3.1	-1.6	2.8
Leather and hide tanning and finishing.....	3161	1.4	-4.0	-0.1	4.3	-4.3	6.1	-1.4
Footwear.....	3162	-0.5	-1.9	0.2	-0.4	-0.3	-0.7	0.6
Other leather products.....	3169	-0.1	0.2	-3.4	3.6	-0.2	-0.8	3.5
Sawmills and wood preservation.....	3211	1.0	1.5	-0.1	0.0	2.0	0.7	4.6
Plywood and engineered wood products.....	3212	-0.1	-0.7	0.0	-0.1	1.2	0.1	-4.9
Other wood products.....	3219	-0.1	-0.7	-0.7	-0.8	0.9	-0.8	4.6
Pulp, paper, and paperboard mills.....	3221	0.7	-1.2	0.1	1.8	2.1	0.1	1.2
Converted paper products.....	3222	0.0	0.3	0.3	-0.3	0.9	-0.7	1.4
Printing and related support activities.....	3231	0.2	0.1	-0.1	-1.0	1.0	0.3	0.2
Petroleum and coal products.....	3241	0.2	-1.9	1.9	3.0	-1.9	-0.9	7.4
Basic chemicals.....	3251	0.3	-0.6	-2.4	-1.0	3.7	-0.5	5.5
Resin, rubber, and artificial fibers.....	3252	0.1	-1.4	0.9	0.6	2.2	-1.1	-0.4
Agricultural chemicals.....	3253	1.1	1.0	1.4	0.4	3.1	-0.8	7.9
Pharmaceuticals and medicines.....	3254	-1.3	-1.5	-1.8	-1.4	0.6	-2.7	2.3
Paints, coatings, and adhesives.....	3255	-0.1	-1.9	-0.3	-0.5	1.3	-0.8	3.5
Soaps, cleaning compounds, and toiletries.....	3256	0.2	-1.2	0.6	-0.7	4.5	-1.1	-3.1
Other chemical products and preparations.....	3259	0.4	-1.2	0.8	1.9	0.0	-0.4	4.8
Plastics products.....	3261	0.4	-0.1	1.5	0.6	0.8	-0.6	2.2
Rubber products.....	3262	0.8	1.0	1.5	0.9	1.0	-0.2	3.3
Clay products and refractories.....	3271	0.3	1.3	1.6	1.1	-0.4	-1.0	3.5
Glass and glass products.....	3272	0.4	0.4	2.0	2.0	0.6	0.0	-5.1
Cement and concrete products.....	3273	-0.1	1.3	0.8	0.4	0.1	-1.6	3.1
Lime and gypsum products.....	3274	-0.6	-1.5	-1.8	0.9	0.7	-1.4	0.6
Other nonmetallic mineral products.....	3279	0.7	-0.2	2.5	-0.6	2.4	-0.3	1.2
Iron and steel mills and ferroalloys.....	3311	0.7	0.9	2.1	2.3	0.3	0.9	-6.5
Steel products from purchased steel.....	3312	0.1	1.3	2.7	0.0	-0.4	-0.9	0.7
Alumina and aluminum production.....	3313	1.0	-0.3	-0.3	0.7	1.2	1.7	1.3
Other nonferrous metal production.....	3314	0.9	-3.7	1.7	3.9	-3.2	1.6	8.4
Foundries.....	3315	0.4	-0.1	2.0	0.7	0.7	-0.5	1.0

**Table 3. Total factor productivity in selected periods — Continued**

Industry	2017 NAICS code	Annual percent change						
		1987-2021	1987-1990	1990-1995	1995-2000	2000-2007	2007-2019	2019-2021
Forging and stamping.....	3321	0.7	-0.4	0.5	-0.3	4.1	-0.4	0.8
Cutlery and handtools.....	3322	0.4	-1.1	1.0	-0.7	0.6	0.1	4.5
Architectural and structural metals.....	3323	-0.1	-0.9	0.8	-1.0	1.4	-0.8	1.1
Boilers, tanks, and shipping containers.....	3324	0.4	0.7	1.6	0.7	0.8	-1.1	3.6
Hardware.....	3325	-0.4	-1.9	0.7	-0.2	-0.7	-0.8	1.8
Spring and wire products.....	3326	0.5	0.5	1.5	0.0	1.7	-1.0	4.5
Machine shops and threaded products.....	3327	0.9	1.4	3.2	0.0	1.6	-0.7	3.6
Coating, engraving, and heat treating metals.....	3328	1.2	1.3	2.1	-0.9	3.6	-0.2	4.4
Other fabricated metal products.....	3329	-0.3	-1.4	0.3	-1.3	1.9	-1.8	4.5
Agriculture, construction, and mining machinery.....	3331	0.2	2.6	0.2	-1.0	1.6	-1.2	3.4
Industrial machinery.....	3332	0.5	0.3	1.8	0.0	1.4	0.0	-1.0
Commercial and service industry machinery.....	3333	0.0	1.0	0.0	-1.3	-0.5	0.0	3.9
HVAC and commercial refrigeration equipment.....	3334	0.4	0.0	0.9	0.4	1.6	-0.4	0.3
Metalworking machinery.....	3335	1.1	0.3	1.7	-1.3	2.7	0.2	7.4
Turbine and power transmission equipment.....	3336	0.1	-0.5	0.2	0.6	-0.3	0.2	0.6
Other general purpose machinery.....	3339	0.2	0.5	0.3	-0.2	1.9	-0.9	1.6
Computer and peripheral equipment.....	3341	9.6	6.6	14.0	22.4	17.0	0.7	4.1
Communications equipment.....	3342	2.1	3.2	5.6	5.6	2.8	-1.2	0.3
Audio and video equipment.....	3343	2.6	3.2	2.9	3.0	2.9	1.6	5.2
Semiconductors and electronic components.....	3344	8.4	6.4	18.4	22.0	7.4	0.7	6.2
Electronic instruments.....	3345	0.5	1.7	1.1	-0.3	1.2	0.0	-0.1
Magnetic media manufacturing and reproducing.....	3346	0.5	0.7	6.0	-2.7	2.2	-1.7	2.8
Electric lighting equipment.....	3351	0.7	-1.7	0.9	0.6	1.4	0.3	4.6
Household appliances.....	3352	1.9	0.2	3.3	0.9	3.4	0.6	6.2
Electrical equipment.....	3353	0.5	1.0	2.8	-1.5	1.1	-0.7	4.1
Other electrical equipment and components.....	3359	0.6	-1.2	1.9	1.1	0.3	0.1	3.7
Motor vehicles.....	3361	0.2	0.4	-0.9	0.3	2.8	-0.8	0.2
Motor vehicle bodies and trailers.....	3362	0.0	-2.3	2.3	-1.2	0.2	-0.4	3.6
Motor vehicle parts.....	3363	1.6	-0.8	3.2	1.7	2.1	0.6	5.3
Aerospace products and parts.....	3364	-0.4	-1.5	0.0	-0.2	2.1	-0.5	-8.1
Railroad rolling stock.....	3365	0.8	0.7	0.3	4.7	-1.6	0.4	3.2
Ship and boat building.....	3366	0.5	0.3	-0.3	0.5	-0.4	1.4	1.3
Other transportation equipment.....	3369	1.6	-2.2	6.3	-0.5	5.6	-1.0	2.5
Household and institutional furniture.....	3371	0.4	-0.1	1.3	-0.2	1.0	-0.3	2.8
Office furniture and fixtures.....	3372	0.1	-2.4	0.9	2.1	0.9	-0.3	-3.0
Other furniture related products.....	3379	0.4	0.0	1.4	0.3	1.7	-0.5	-1.0
Medical equipment and supplies.....	3391	0.5	2.0	0.1	1.1	1.6	-0.8	1.6
Other miscellaneous manufacturing.....	3399	0.6	0.9	0.6	0.7	1.3	-0.4	3.0
<b>Transportation</b>								
Air transportation.....	481	0.4	-0.7	-0.1	-0.1	4.5	0.9	-11.4
Line-haul railroads.....	482111	1.5	3.9	4.4	1.6	1.3	0.2	-1.2

**Table 4. Contributions to labor productivity**

Industry	2017 NAICS code	Annual percent change, 1987-2021			
		Labor productivity	Contribution of capital intensity	Contribution of intermediate inputs intensity	Total factor productivity
<b>Manufacturing</b>					
Animal food.....	3111	1.3	0.3	0.9	0.1
Grain and oilseed milling.....	3112	1.7	0.2	1.2	0.3
Sugar and confectionery products.....	3113	0.9	0.3	0.4	0.2
Fruit and vegetable preserving and specialty.....	3114	0.8	0.2	0.2	0.3
Dairy products.....	3115	1.2	0.2	0.7	0.3
Animal slaughtering and processing.....	3116	0.4	0.1	-0.2	0.5
Seafood product preparation and packaging.....	3117	0.8	0.2	0.2	0.5
Bakeries and tortilla products.....	3118	0.2	0.1	0.5	-0.4
Other food products.....	3119	-0.1	-0.3	-0.2	0.4
Beverages.....	3121	0.2	-0.2	-0.2	0.6
Tobacco.....	3122	2.5	2.2	0.7	-0.4
Fiber, yarn, and thread mills.....	3131	1.3	0.0	0.5	0.8
Fabric mills.....	3132	2.4	0.4	1.1	1.0
Textile and fabric finishing mills.....	3133	0.9	0.2	0.8	-0.1
Textile furnishings mills.....	3141	0.4	0.3	0.2	-0.1
Other textile product mills.....	3149	1.3	0.2	0.8	0.4
Apparel knitting mills.....	3151	0.2	0.6	0.1	-0.4
Cut and sew apparel.....	3152	0.6	0.8	0.6	-0.9
Accessories and other apparel.....	3159	-2.5	0.1	-0.8	-1.8
Leather and hide tanning and finishing.....	3161	1.3	0.2	-0.2	1.4
Footwear.....	3162	1.3	0.4	1.3	-0.5
Other leather products.....	3169	0.9	0.4	0.6	-0.1
Sawmills and wood preservation.....	3211	1.6	-0.1	0.7	1.0
Plywood and engineered wood products.....	3212	0.3	-0.2	0.5	-0.1
Other wood products.....	3219	0.9	0.1	0.9	-0.1
Pulp, paper, and paperboard mills.....	3221	1.9	0.4	0.8	0.7
Converted paper products.....	3222	0.7	0.3	0.4	0.0
Printing and related support activities.....	3231	1.1	0.3	0.6	0.2
Petroleum and coal products.....	3241	1.9	0.2	1.4	0.2
Basic chemicals.....	3251	2.1	0.5	1.3	0.3
Resin, rubber, and artificial fibers.....	3252	1.4	0.4	0.9	0.1
Agricultural chemicals.....	3253	1.6	0.4	0.1	1.1
Pharmaceuticals and medicines.....	3254	-0.8	0.6	-0.1	-1.3
Paints, coatings, and adhesives.....	3255	0.6	0.1	0.6	-0.1
Soaps, cleaning compounds, and toiletries.....	3256	0.8	0.5	0.1	0.2
Other chemical products and preparations.....	3259	2.0	0.5	1.0	0.4
Plastics products.....	3261	1.2	0.3	0.5	0.4
Rubber products.....	3262	1.7	0.2	0.8	0.8
Clay products and refractories.....	3271	1.3	0.2	0.7	0.3
Glass and glass products.....	3272	1.4	0.3	0.7	0.4
Cement and concrete products.....	3273	0.2	0.0	0.2	-0.1
Lime and gypsum products.....	3274	1.0	0.5	1.2	-0.6
Other nonmetallic mineral products.....	3279	1.1	-0.1	0.4	0.7
Iron and steel mills and ferroalloys.....	3311	2.2	0.0	1.5	0.7
Steel products from purchased steel.....	3312	0.5	-0.2	0.5	0.1
Alumina and aluminum production.....	3313	1.4	0.1	0.3	1.0
Other nonferrous metal production.....	3314	1.4	0.3	0.2	0.9
Foundries.....	3315	1.3	0.2	0.7	0.4

**Table 4. Contributions to labor productivity — Continued**

Industry	2017 NAICS code	Annual percent change, 1987-2021			
		Labor productivity	Contribution of capital intensity	Contribution of intermediate inputs intensity	Total factor productivity
Forging and stamping.....	3321	1.7	0.2	0.8	0.7
Cutlery and handtools.....	3322	1.0	0.2	0.4	0.4
Architectural and structural metals.....	3323	0.5	0.0	0.5	-0.1
Boilers, tanks, and shipping containers.....	3324	0.8	0.1	0.4	0.4
Hardware.....	3325	0.7	0.3	0.8	-0.4
Spring and wire products.....	3326	1.6	0.3	0.8	0.5
Machine shops and threaded products.....	3327	1.7	0.2	0.6	0.9
Coating, engraving, and heat treating metals.....	3328	2.0	0.1	0.7	1.2
Other fabricated metal products.....	3329	0.5	0.2	0.6	-0.3
Agriculture, construction, and mining machinery.....	3331	1.7	0.1	1.4	0.2
Industrial machinery.....	3332	1.0	0.1	0.5	0.5
Commercial and service industry machinery.....	3333	1.4	0.2	1.2	0.0
HVAC and commercial refrigeration equipment.....	3334	0.8	0.1	0.3	0.4
Metalworking machinery.....	3335	2.0	0.1	0.8	1.1
Turbine and power transmission equipment.....	3336	1.2	0.2	0.9	0.1
Other general purpose machinery.....	3339	1.5	0.1	1.2	0.2
Computer and peripheral equipment.....	3341	12.9	1.1	1.8	9.6
Communications equipment.....	3342	4.7	0.7	1.9	2.1
Audio and video equipment.....	3343	2.9	0.0	0.3	2.6
Semiconductors and electronic components.....	3344	11.4	1.7	1.0	8.4
Electronic instruments.....	3345	2.6	0.4	1.7	0.5
Magnetic media manufacturing and reproducing.....	3346	-0.3	0.3	-1.1	0.5
Electric lighting equipment.....	3351	1.7	0.4	0.6	0.7
Household appliances.....	3352	2.7	0.2	0.7	1.9
Electrical equipment.....	3353	1.5	0.2	0.9	0.5
Other electrical equipment and components.....	3359	1.0	0.1	0.3	0.6
Motor vehicles.....	3361	2.1	0.3	1.6	0.2
Motor vehicle bodies and trailers.....	3362	1.5	0.1	1.4	0.0
Motor vehicle parts.....	3363	2.4	0.0	0.7	1.6
Aerospace products and parts.....	3364	1.2	0.4	1.2	-0.4
Railroad rolling stock.....	3365	2.0	0.1	1.1	0.8
Ship and boat building.....	3366	1.8	0.1	1.1	0.5
Other transportation equipment.....	3369	2.8	0.4	0.9	1.6
Household and institutional furniture.....	3371	0.9	0.2	0.3	0.4
Office furniture and fixtures.....	3372	0.9	0.4	0.4	0.1
Other furniture related products.....	3379	1.5	0.1	1.0	0.4
Medical equipment and supplies.....	3391	2.0	0.8	0.7	0.5
Other miscellaneous manufacturing.....	3399	1.1	0.2	0.3	0.6
<b>Transportation</b>					
Air transportation.....	481	1.8	0.7	0.6	0.4
Line-haul railroads.....	482111	3.5	0.9	1.1	1.5