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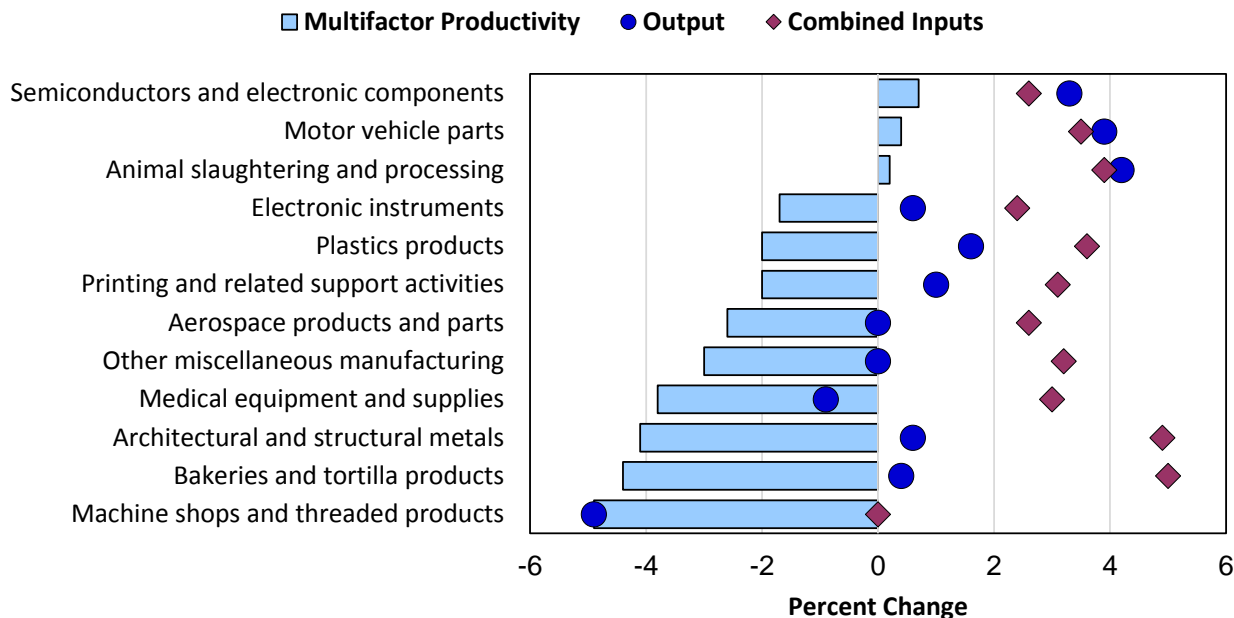
Technical Information: (202) 691-5618 • productivity@bls.gov • www.bls.gov/mfp  
 Media Contact: (202) 691-5902 • PressOffice@bls.gov

## MULTIFACTOR PRODUCTIVITY TRENDS FOR DETAILED INDUSTRIES - 2015

**Multifactor productivity** – defined as output per unit of combined inputs – rose in 21 of the 86 4-digit NAICS manufacturing industries in 2015, as well as in one of the two transportation industries that are measured, the U.S. Bureau of Labor Statistics reported today. This was down from 2014, when multifactor productivity increased in 42 manufacturing industries and in both of the transportation industries.

Chart 1 shows the percent change in multifactor productivity, output, and combined inputs in 2015 for the largest 4-digit manufacturing industries (those with employment over 300,000).

**Chart 1. Multifactor productivity, output, and combined inputs in the largest manufacturing industries, 2015**



### Methodology Change to BLS Productivity Measures

A methodology change has been implemented with the release of these data. BLS has updated the way intrasectoral transactions are estimated. More information about these changes can be found at [www.bls.gov/mfp/sectoraloutputrevisions.htm](http://www.bls.gov/mfp/sectoraloutputrevisions.htm).

Of the 12 largest industries, multifactor productivity increased the most in semiconductors and electronic components (0.7 percent), as output increased more than combined inputs. In 9 of the 12 industries, combined inputs increased while output was unchanged or increased at a slower rate, leading to declines in multifactor productivity. In the case of machine shops and threaded products, combined inputs were unchanged while output dropped, leading to a decline in multifactor productivity (-4.9 percent).

Among all 86 manufacturing industries, 3 industries posted multifactor productivity gains greater than 3.0 percent:

- Leather and hide tanning and finishing (7.5 percent)
- Iron and steel mills and ferroalloys (3.8 percent)
- Basic chemicals (3.5 percent)

Multifactor productivity declined by 6.0 percent or more in 13 manufacturing industries in 2015. This is the largest number of industries that have declined by this magnitude since 2009.

Multifactor productivity moved in opposite directions in the two measured transportation industries:

- Air transportation (0.4 percent)
- Line-haul railroads (-0.1 percent)

#### **Multifactor Productivity: Definition and Concepts**

Multifactor productivity indexes relate the change in real output to the change in the combined inputs of labor, capital, and intermediate purchases (energy, materials, and purchased services) used in producing that output. Multifactor productivity is also known as total factor productivity.

A variety of factors that influence economic growth 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. Multifactor productivity reflects these factors. See the technical note for more information.

#### **Components of Multifactor Productivity Growth: Output and Combined Inputs**

In 2015, **output** increased in 50 manufacturing industries, compared to 57 industries in 2014. (See chart 2.) Output increased by 7.0 percent or more in the following 3 industries in 2015:

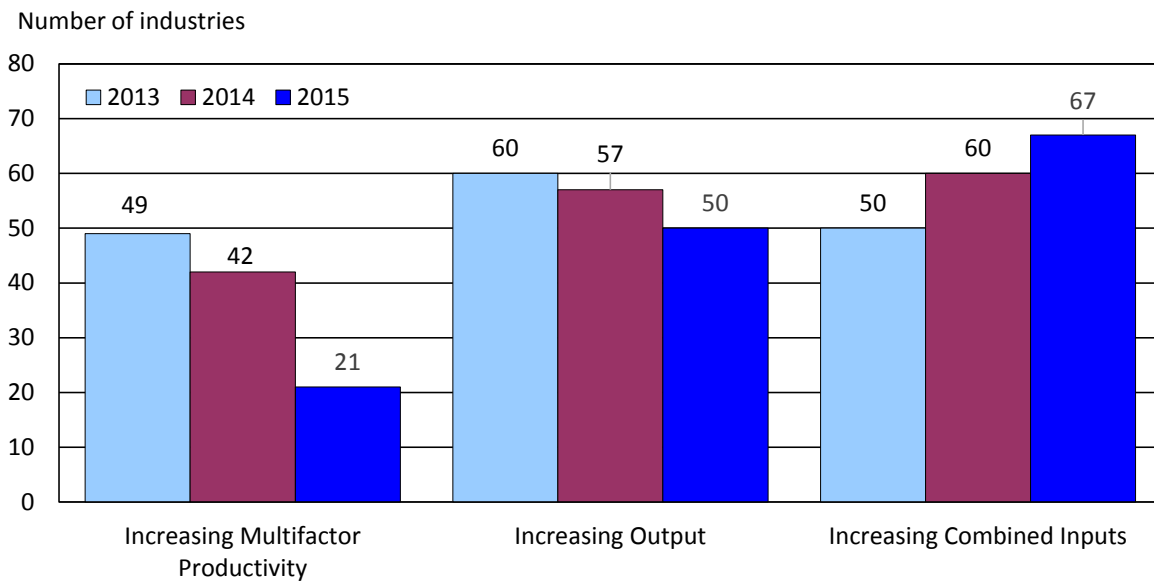
- Other transportation equipment (8.0 percent)
- Sawmills and wood preservation (7.4 percent)
- Household and institutional furniture (7.0 percent)

**Combined inputs** of capital, labor, and intermediate purchases rose in 67 manufacturing industries in 2015, compared to 60 industries in 2014. A majority of industries saw growth in intermediate purchases (71 industries), while approximately half of the industries had growth in hours worked (43 industries) and capital services (46 industries).

The following industries had the largest increases in **combined inputs** in 2015:

- Other transportation equipment (10.6 percent)
- Motor vehicles (8.5 percent)
- Other food products (8.2 percent)
- Dairy products (7.8 percent)

**Chart 2. Number of manufacturing industries with increases in multifactor productivity, output, and combined inputs, 2013-2015**



For some manufacturing industries, **multifactor productivity** rose despite falling output, as combined inputs fell more rapidly. This occurred in five industries:

- Iron and steel mills and ferroalloys (3.8 percent)
- Other nonferrous metal production (2.4 percent)
- Turbine and power transmission equipment (1.6 percent)
- Apparel knitting mills (1.4 percent)
- Communications equipment (1.4 percent)

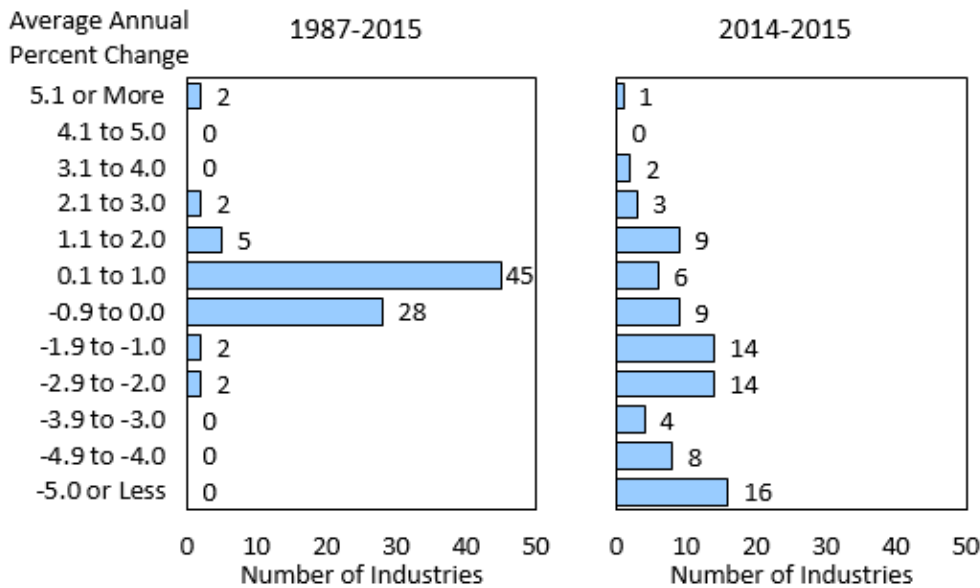
In the air transportation industry, output increased 4.5 percent and combined inputs increased 4.0 percent in 2015. In line-haul railroads, output fell 0.2 percent and combined inputs decreased 0.1 percent.

### Trends in Multifactor Productivity for Selected Time Periods

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

More industries saw multifactor productivity growth over the long term than the short term. Over the long term period from 1987 to 2015, multifactor productivity grew in 54 manufacturing industries, compared to only 21 from 2014 to 2015. (See tables 1 and 2.) Average annual rates of change in multifactor productivity for nearly all manufacturing industries ranged between -2.0 and 2.0 percent over the long term. (See chart 3.)

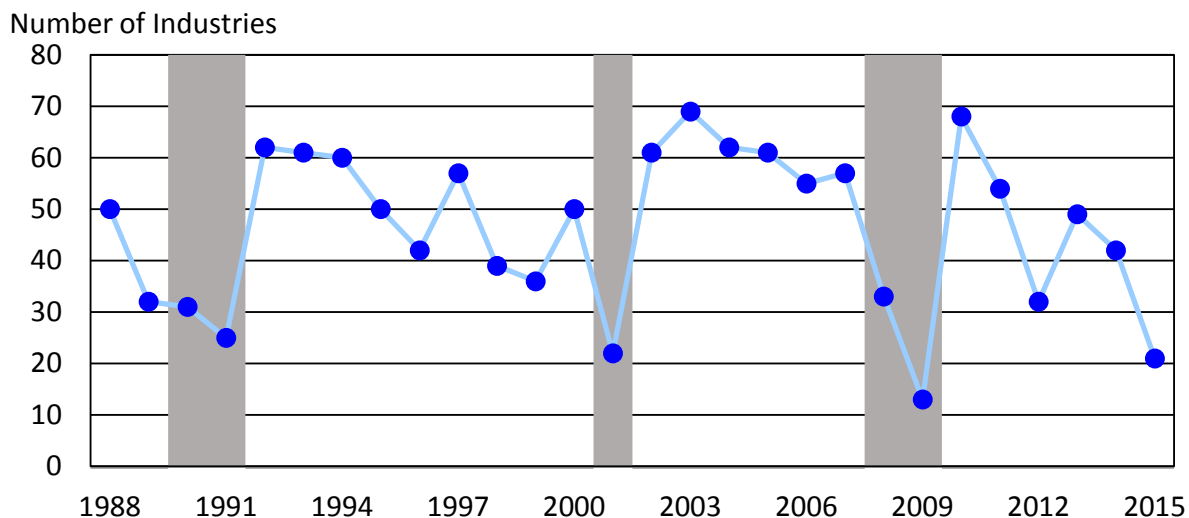
**Chart 3. Distribution of multifactor productivity growth for all manufacturing industries, 1987-2015 and 2014-2015**



In contrast, multifactor productivity declined by 2.0 percent or more in 42 industries in 2015. Only two industries (pharmaceuticals & medicines and accessories & other apparel) saw an average annual decline of that magnitude from 1987 to 2015.

Between 1987 and 2015, the number of manufacturing industries with growth in multifactor productivity was highest in 2003 and 2010. These were years of economic growth following recessions. In contrast, relatively few manufacturing industries saw multifactor productivity growth in the recession years of 2001 and 2009. (See chart 4.)

**Chart 4. Number of manufacturing industries with increases in multifactor productivity, 1988-2015**

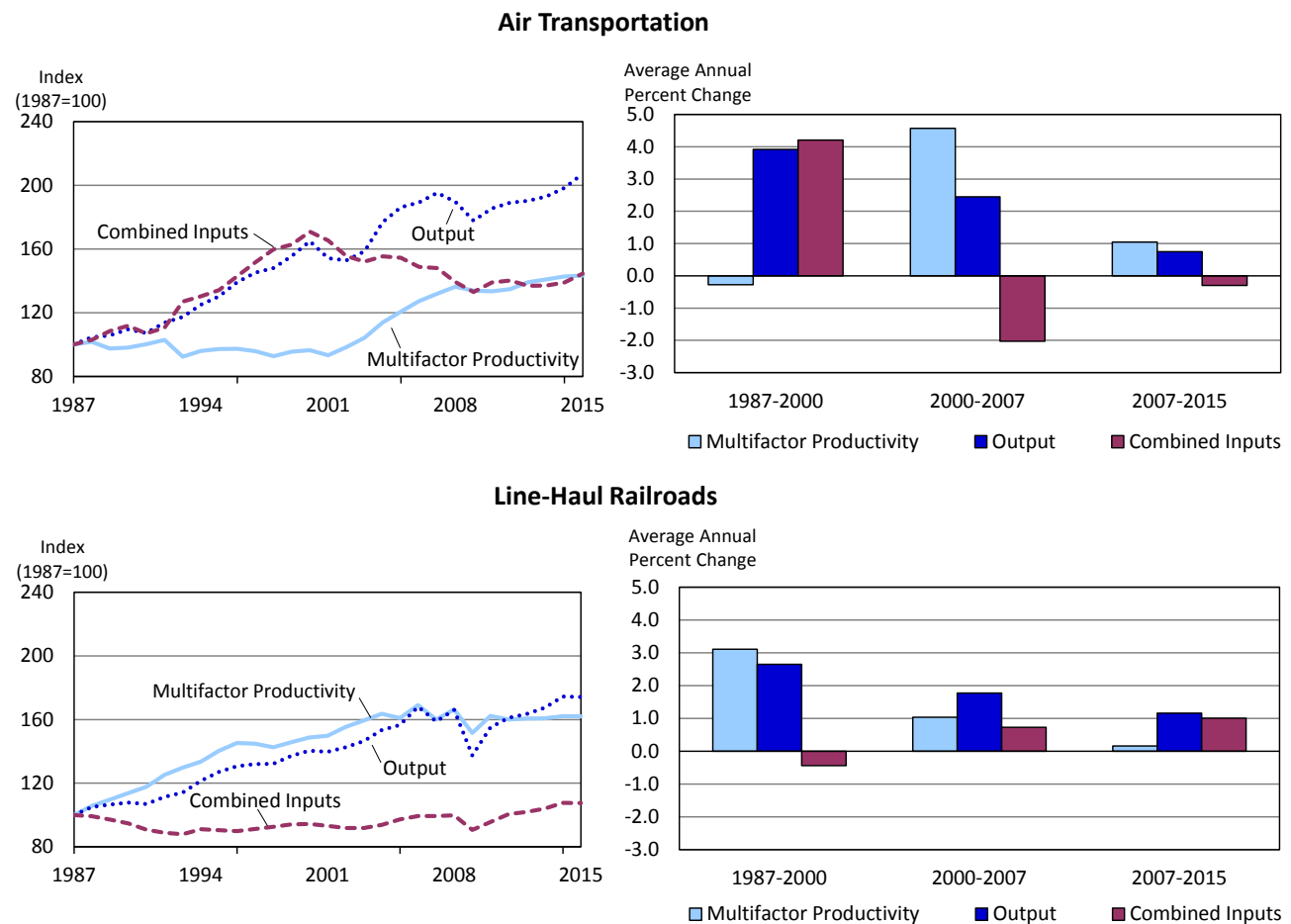


Note: Shaded areas denote years that include recessions

Table 3 displays the average annual percent changes in multifactor productivity by industry for sub periods between 1987 and 2015. The sub period from 2000 to 2007 saw the greatest number of manufacturing industries with multifactor productivity growth.

From 1987 to 2015, multifactor productivity rose in both air transportation and line-haul railroads by an average annual rate of 1.3 percent and 1.7 percent, respectively. While both industries posted gains in output, productivity grew more in line-haul railroads because its combined inputs showed little change over the long term. (See chart 5.)

**Chart 5. Multifactor productivity, output, and combined inputs for transportation industries, 1987-2015**



### Multifactor Productivity as a Source of Labor Productivity Growth

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

Eighty-three out of the 86 manufacturing industries posted gains in labor productivity from 1987 to 2015. Among these 83 industries, substitution of intermediate purchases for labor was the leading source

of labor productivity growth. (See table 4.) Growth in the contribution of intermediate purchases intensity occurs when firms purchase a greater share of materials instead of using their own labor. Contribution of intermediate purchases intensity may also occur when firms substitute contracted labor for payroll labor.

Chart 6 illustrates sources of labor productivity growth for three sub periods occurring between 1987 and 2015. Between 2000 and 2007, multifactor productivity growth was the predominant source of labor productivity growth in a significant number of manufacturing industries. In contrast, labor productivity growth was driven mostly by contribution of intermediate purchases intensity in the other two sub periods.

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

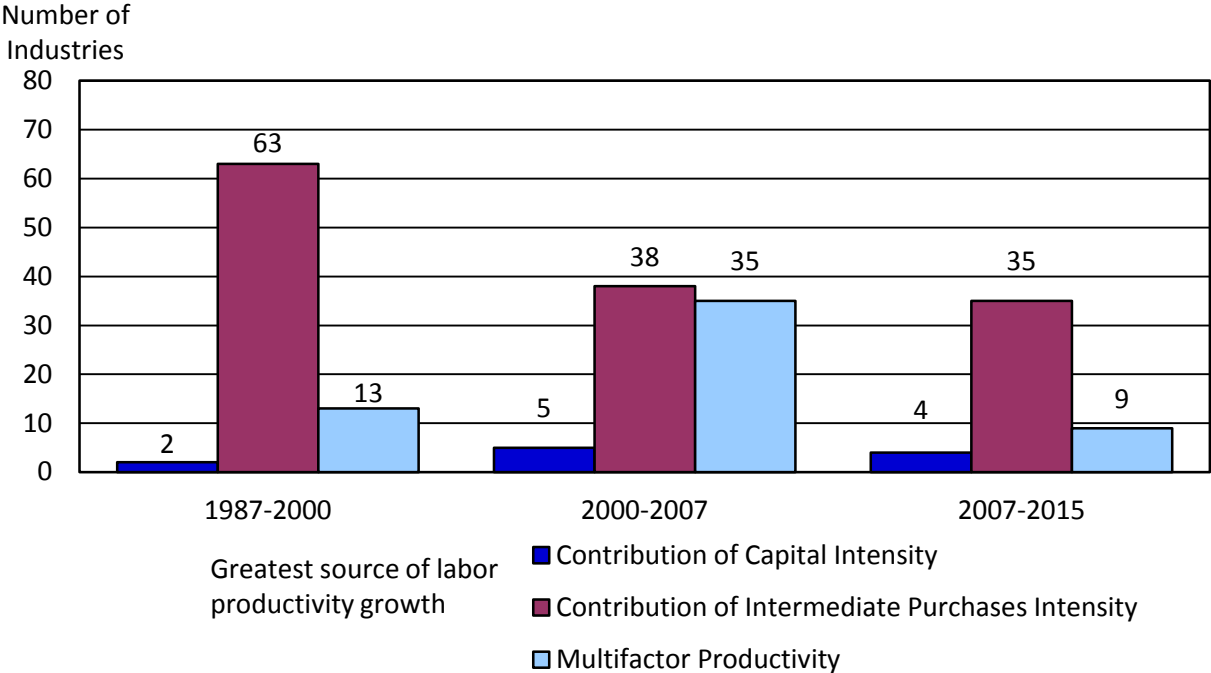
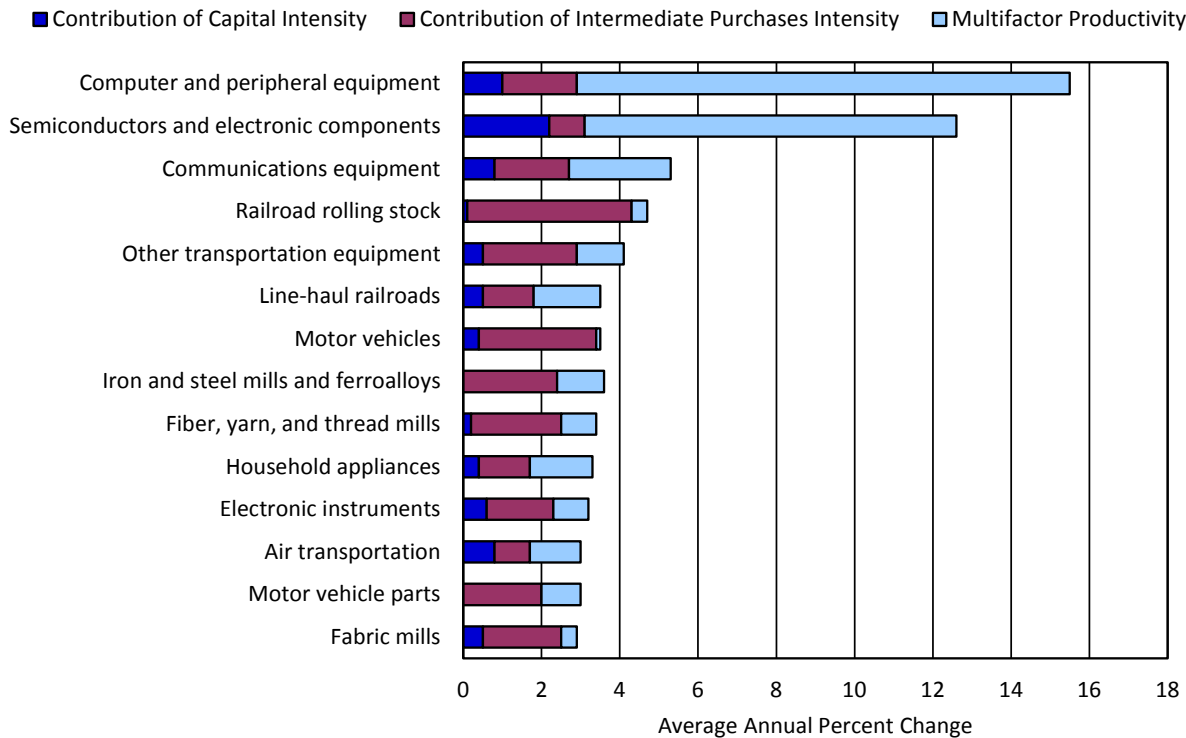


Chart 7 displays the industries with the greatest labor productivity growth from 1987 to 2015. Strong growth in multifactor productivity was the dominant source of labor productivity growth in the industries that manufacture computers and electronic products (computer and peripheral equipment, semiconductors and electronic components, and communications equipment). Labor productivity growth in the measured transportation industries (air transportation and line-haul railroads) was also primarily driven by multifactor productivity growth. The remaining manufacturing industries with high average annual growth in labor productivity mostly saw greater growth in factor substitution of intermediate purchases for labor.

**Chart 7. Sources of labor productivity growth for industries with greatest growth in labor productivity, 1987-2015**



Note: The sum of long term rates of change for multifactor productivity, contribution of capital intensity, and contribution of intermediate purchases intensity may differ slightly from the long term rate of change in labor productivity. This is due to the rates being calculated as compound average annual rates as opposed to logarithmic rates.

**Want to know more?**

**Find data** at [www.bls.gov/mfp](http://www.bls.gov/mfp) for:

- Additional years and annual rates of change
- Levels of industry employment, hours worked, nominal value of production, and labor compensation
- More detailed capital and intermediate purchases data available upon request

**Questions?**

Additional information can be obtained by calling the BLS productivity program at (202) 691-5606 or by sending a message to [productivity@bls.gov](mailto:productivity@bls.gov). Information in this release will be made available to sensory impaired individuals upon request. Voice phone: (202) 691-5200; Federal Relay Service: (800) 877-8339.

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## Technical Note

**Multifactor Productivity:** Multifactor productivity measures are derived by dividing an index of real industry output by an index of the combined inputs of labor, capital, and intermediate purchases. The multifactor 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 purchases (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 purchases 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 purchases.

**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 and 2012 Annual Capital Expenditures Survey 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 of 44 types of airframes and 34 types of engines is derived from quantities and purchase prices from 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 were deflated with price indexes from BEA.

**Labor Input:** For manufacturing industries, labor hours reflect 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 nonsupervisory worker jobs held by wage and salary workers in nonfarm establishments are supplemented with CPS self-employed and unpaid family worker data to estimate industry employment. Hours worked estimates are derived using CES and CPS employment, CES data on average weekly hours paid of nonsupervisory workers, CPS data on hours of supervisory, self-employed, and unpaid family workers, and ratios of hours-worked to hours-paid based on data from the BLS 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 DOT 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 DOT 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 Purchases Input:** The index of intermediate purchases 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 purchases data from STB are supplemented with data from other sources including AAR, AMTRAK, EIA, and the Edison Electric Institute. 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 Purchases Intensity:** Intermediate purchases intensity is the ratio of intermediate purchases to hours worked in the production process. Multiplying the change in intermediate purchases intensity times intermediate purchases' share of combined inputs yields the contribution of intermediate purchases intensity.

When positive, both the contribution of capital intensity and the contribution of intermediate purchases 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 purchases intensity indicates that labor productivity growth is being achieved in part through the substitution of intermediate purchases 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 purchases intensity, and multifactor 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 multifactor productivity, the contribution of capital intensity, and the contribution of intermediate purchases intensity may not precisely equal the rate of change of labor productivity.

**Table 1. Recent multifactor productivity and related data**

Industry	2012 NAICS code	2015 Employment (thousands)	Percent change, 2014-2015					
			Multifactor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate purchases
<b>Manufacturing</b>								
Animal food.....	3111	57.9	-1.6	4.7	6.4	6.3	3.5	7.3
Grain and oilseed milling.....	3112	60.0	0.9	4.3	3.3	-0.5	-0.3	4.7
Sugar and confectionery products.....	3113	75.2	-1.4	5.3	6.8	-2.2	0.8	12.4
Fruit and vegetable preserving and specialty.....	3114	173.4	-0.5	1.1	1.7	-5.5	0.6	3.9
Dairy products.....	3115	137.0	-1.9	5.8	7.8	4.2	3.0	9.6
Animal slaughtering and processing.....	3116	486.9	0.2	4.2	3.9	4.2	2.5	4.2
Seafood product preparation and packaging.....	3117	37.8	-6.5	-0.9	6.0	3.3	1.6	7.7
Bakeries and tortilla products.....	3118	329.5	-4.4	0.4	5.0	8.5	0.2	6.0
Other food products.....	3119	198.2	-6.5	1.2	8.2	6.8	2.5	12.0
Beverages.....	3121	218.2	-0.9	2.8	3.8	4.4	1.7	4.9
Tobacco.....	3122	13.7	2.2	6.0	3.7	-2.6	2.8	9.4
Fiber, yarn, and thread mills.....	3131	28.8	-1.3	2.0	3.3	-1.6	-3.5	5.0
Fabric mills.....	3132	61.3	-8.3	-4.9	3.6	4.6	-3.6	4.1
Textile and fabric finishing mills.....	3133	34.3	-4.2	1.3	5.7	2.0	-4.4	6.9
Textile furnishings mills.....	3141	56.4	-2.6	0.9	3.7	0.1	0.3	5.5
Other textile product mills.....	3149	74.2	-2.8	0.6	3.5	4.1	-1.6	4.7
Apparel knitting mills.....	3151	15.3	1.4	-2.9	-4.3	-7.4	-4.1	-2.6
Cut and sew apparel.....	3152	129.4	0.0	-0.1	0.0	-0.1	-4.2	0.1
Accessories and other apparel.....	3159	13.4	-6.2	-3.2	3.2	13.5	-4.1	-1.8
Leather and hide tanning and finishing.....	3161	5.2	7.5	2.0	-5.1	6.9	-4.1	-6.4
Footwear.....	3162	13.9	-0.7	-8.9	-8.3	-0.2	-2.9	-12.0
Other leather products.....	3169	13.4	-6.0	0.8	7.2	7.1	-4.6	7.5
Sawmills and wood preservation.....	3211	93.9	0.6	7.4	6.8	-5.7	1.6	10.9
Plywood and engineered wood products.....	3212	75.0	-2.6	2.1	4.8	5.7	1.3	4.9
Other wood products.....	3219	234.5	-1.7	2.3	4.0	2.3	1.3	5.0
Pulp, paper, and paperboard mills.....	3221	101.6	-2.8	-2.2	0.6	-3.7	-0.9	2.6
Converted paper products.....	3222	271.9	-0.6	0.2	0.8	-0.2	1.1	1.0
Printing and related support activities.....	3231	474.1	-2.0	1.0	3.1	-0.4	-4.1	6.6
Petroleum and coal products.....	3241	113.3	-1.8	0.4	2.2	-3.2	4.9	2.1
Basic chemicals.....	3251	149.9	3.5	1.9	-1.5	1.2	3.9	-4.5
Resin, rubber, and artificial fibers.....	3252	94.5	-7.2	-7.9	-0.8	1.4	1.8	-1.7
Agricultural chemicals.....	3253	36.4	-10.4	-4.0	7.2	-9.8	12.1	6.3
Pharmaceuticals and medicines.....	3254	282.7	-1.4	5.7	7.1	-0.9	1.6	15.0
Paints, coatings, and adhesives.....	3255	61.4	-0.2	2.6	2.8	-5.3	-0.4	5.5
Soaps, cleaning compounds, and toiletries.....	3256	111.6	1.4	3.2	1.8	8.5	-0.9	3.2
Other chemical products and preparations.....	3259	83.4	-4.7	-2.7	2.1	0.5	-0.9	3.3
Plastics products.....	3261	557.5	-2.0	1.6	3.6	2.6	1.3	4.8
Rubber products.....	3262	134.0	-1.1	0.3	1.4	0.6	0.5	2.0
Clay products and refractories.....	3271	48.3	-6.3	-5.7	0.7	1.6	-1.2	1.1
Glass and glass products.....	3272	88.8	0.6	1.4	0.8	-4.0	-1.1	4.4
Cement and concrete products.....	3273	186.0	-2.1	3.5	5.7	7.1	-0.2	7.5
Lime and gypsum products.....	3274	14.5	-3.6	0.0	3.7	-2.0	3.2	5.6
Other nonmetallic mineral products.....	3279	75.9	-2.9	-4.5	-1.6	-2.4	-0.4	-2.2
Iron and steel mills and ferroalloys.....	3311	89.1	3.8	-7.9	-11.2	-6.5	-1.1	-14.1
Steel products from purchased steel.....	3312	60.2	-4.6	-11.4	-7.2	-4.3	-0.6	-8.7
Alumina and aluminum production.....	3313	59.1	-2.4	-1.1	1.3	2.7	0.8	1.2
Other nonferrous metal production.....	3314	62.9	2.4	-5.2	-7.5	-1.4	-0.7	-10.4
Foundries.....	3315	125.5	-1.6	-4.6	-3.1	-4.3	-0.9	-3.3
Forging and stamping.....	3321	100.7	-7.4	-5.4	2.2	2.8	2.2	1.9
Cutlery and handtools.....	3322	39.9	1.1	2.9	1.8	-3.4	-1.5	6.2
Architectural and structural metals.....	3323	371.3	-4.1	0.6	4.9	1.6	0.7	7.3

**Table 1. Recent multifactor productivity and related data — Continued**

Industry	2012 NAICS code	2015 Employment (thousands)	Percent change, 2014-2015					
			Multifactor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate purchases
Boilers, tanks, and shipping containers.....	3324	99.1	-7.5	-6.1	1.5	-0.1	-0.1	2.5
Hardware.....	3325	24.7	-2.7	1.1	4.0	1.9	-1.0	6.0
Spring and wire products.....	3326	43.6	-4.4	0.2	4.9	0.1	0.1	7.9
Machine shops and threaded products.....	3327	383.2	-4.9	-4.9	0.0	-2.6	1.2	1.6
Coating, engraving, and heat treating metals.....	3328	142.5	-5.2	-4.8	0.4	-4.5	0.3	3.1
Other fabricated metal products.....	3329	281.3	-4.9	-3.8	1.2	-1.6	0.9	2.8
Agriculture, construction, and mining machinery....	3331	242.7	-11.1	-18.0	-7.8	-8.1	-0.7	-10.7
Industrial machinery.....	3332	114.3	-1.1	-1.6	-0.6	1.5	0.5	-1.7
Commercial and service industry machinery.....	3333	89.9	-1.0	0.2	1.2	-0.7	-0.9	2.8
HVAC and commercial refrigeration equipment.....	3334	130.2	-1.6	2.3	4.0	-0.4	-0.1	7.2
Metalworking machinery.....	3335	186.7	-0.4	-0.8	-0.4	-2.4	0.2	0.9
Turbine and power transmission equipment.....	3336	101.4	1.6	-2.8	-4.4	-5.1	0.4	-5.6
Other general purpose machinery.....	3339	270.0	-6.3	-5.4	0.9	-1.3	1.7	1.6
Computer and peripheral equipment.....	3341	160.5	2.1	0.9	-1.2	-2.5	-3.8	0.3
Communications equipment.....	3342	88.4	1.4	-5.7	-7.0	-5.5	-5.5	-8.2
Audio and video equipment.....	3343	19.9	1.3	1.8	0.5	3.6	-3.8	1.2
Semiconductors and electronic components.....	3344	370.5	0.7	3.3	2.6	0.9	0.6	4.6
Electronic instruments.....	3345	400.6	-1.7	0.6	2.4	3.0	0.5	3.0
Magnetic media manufacturing and reproducing. ..	3346	16.2	-1.2	-1.7	-0.5	-4.4	-7.2	3.5
Electric lighting equipment.....	3351	47.2	1.1	2.8	1.7	0.0	-0.6	3.5
Household appliances.....	3352	62.5	1.1	6.9	5.7	4.0	-0.2	8.7
Electrical equipment.....	3353	143.9	-5.6	-5.2	0.5	1.1	-1.2	0.9
Other electrical equipment and components.....	3359	130.4	-2.6	1.3	4.1	5.6	1.1	4.7
Motor vehicles.....	3361	201.1	-3.1	5.1	8.5	4.4	5.6	9.3
Motor vehicle bodies and trailers.....	3362	149.1	-2.0	3.2	5.3	5.1	3.4	5.4
Motor vehicle parts.....	3363	568.2	0.4	3.9	3.5	6.5	0.7	3.0
Aerospace products and parts.....	3364	491.3	-2.6	0.0	2.6	-0.6	2.4	4.4
Railroad rolling stock.....	3365	29.9	-11.1	-7.6	3.9	8.3	1.2	3.4
Ship and boat building.....	3366	138.9	-0.7	0.7	1.4	-1.9	1.1	3.4
Other transportation equipment.....	3369	34.4	-2.3	8.0	10.6	1.5	2.6	14.3
Household and institutional furniture.....	3371	261.9	1.6	7.0	5.3	-0.9	-1.1	9.7
Office furniture and fixtures.....	3372	111.2	0.0	4.7	4.6	1.0	0.0	8.7
Other furniture related products.....	3379	36.6	-5.0	-1.0	4.3	-3.0	1.5	7.6
Medical equipment and supplies.....	3391	324.8	-3.8	-0.9	3.0	5.9	0.8	2.7
Other miscellaneous manufacturing.....	3399	330.9	-3.0	0.0	3.2	-0.4	-0.9	6.1
<b>Transportation</b>								
Air transportation.....	481	434.9	0.4	4.5	4.0	5.1	0.5	4.5
Line-haul railroads.....	482111	189.8	-0.1	-0.2	-0.1	-1.6	4.4	-3.5

**Table 2. Long run multifactor productivity and related data**

Industry	2012 NAICS code	Average annual percent change, 1987-2015					
		Multifactor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate purchases
<b>Manufacturing</b>							
Animal food.....	3111	-0.3	1.9	2.2	0.0	1.8	2.6
Grain and oilseed milling.....	3112	-0.1	1.1	1.2	-0.8	0.4	1.6
Sugar and confectionery products.....	3113	0.1	0.5	0.4	-0.6	0.8	0.4
Fruit and vegetable preserving and specialty.....	3114	0.2	1.1	0.9	-0.4	1.0	1.1
Dairy products.....	3115	-0.1	1.2	1.4	-0.3	1.5	1.6
Animal slaughtering and processing.....	3116	0.6	1.6	1.0	1.0	1.9	0.9
Seafood product preparation and packaging.....	3117	0.2	0.2	0.0	-1.1	1.0	0.0
Bakeries and tortilla products.....	3118	-0.9	0.4	1.3	0.2	0.9	2.0
Other food products.....	3119	0.1	2.0	1.9	1.6	1.2	2.5
Beverages.....	3121	0.4	1.6	1.1	0.3	0.5	1.6
Tobacco.....	3122	-0.8	-3.0	-2.2	-4.7	-2.2	-2.0
Fiber, yarn, and thread mills.....	3131	0.9	-1.3	-2.1	-4.6	-2.2	-1.4
Fabric mills.....	3132	0.4	-2.7	-3.1	-5.4	-2.3	-2.4
Textile and fabric finishing mills.....	3133	-0.2	-2.8	-2.6	-4.5	-2.3	-2.3
Textile furnishings mills.....	3141	-0.4	-2.1	-1.7	-2.9	-1.0	-1.7
Other textile product mills.....	3149	0.2	-0.3	-0.5	-1.9	0.4	-0.1
Apparel knitting mills.....	3151	-0.6	-7.1	-6.6	-6.7	-2.6	-7.0
Cut and sew apparel.....	3152	-1.8	-6.6	-4.9	-6.1	-2.6	-5.8
Accessories and other apparel.....	3159	-2.0	-6.5	-4.6	-3.9	-2.2	-5.3
Leather and hide tanning and finishing.....	3161	-0.5	-2.9	-2.4	-3.8	-2.4	-2.2
Footwear.....	3162	-0.6	-5.3	-4.8	-6.1	-3.3	-4.3
Other leather products.....	3169	-1.1	-3.9	-2.7	-4.0	-2.1	-3.0
Sawmills and wood preservation.....	3211	0.8	0.2	-0.7	-1.9	-1.1	-0.1
Plywood and engineered wood products.....	3212	-0.1	-0.1	0.0	-0.9	0.1	0.5
Other wood products.....	3219	-0.5	-0.4	0.1	-1.3	0.7	0.7
Pulp, paper, and paperboard mills.....	3221	0.6	-0.4	-1.0	-3.0	-1.0	-0.3
Converted paper products.....	3222	-0.1	0.2	0.3	-1.3	0.6	0.7
Printing and related support activities.....	3231	-0.1	-0.6	-0.5	-1.8	0.4	0.0
Petroleum and coal products.....	3241	0.0	1.2	1.2	-1.1	1.1	1.4
Basic chemicals.....	3251	-0.2	0.7	1.0	-1.6	0.4	1.7
Resin, rubber, and artificial fibers.....	3252	0.0	0.3	0.3	-1.5	0.1	0.8
Agricultural chemicals.....	3253	0.6	1.0	0.4	-1.3	0.0	0.9
Pharmaceuticals and medicines.....	3254	-2.1	1.8	4.0	1.6	3.7	5.2
Paints, coatings, and adhesives.....	3255	-0.6	-0.1	0.4	-0.9	0.0	0.9
Soaps, cleaning compounds, and toiletries.....	3256	0.3	1.3	1.0	-0.2	1.4	1.0
Other chemical products and preparations.....	3259	0.0	0.1	0.2	-2.0	-0.2	1.0
Plastics products.....	3261	0.3	1.6	1.3	0.0	2.1	1.6
Rubber products.....	3262	0.5	0.4	-0.1	-1.4	0.0	0.6
Clay products and refractories.....	3271	0.2	-1.6	-1.8	-2.3	-1.4	-1.5
Glass and glass products.....	3272	1.1	0.5	-0.6	-1.6	-0.4	-0.1
Cement and concrete products.....	3273	-0.2	0.1	0.3	-0.1	0.0	0.4
Lime and gypsum products.....	3274	-0.4	-0.5	-0.2	-2.0	0.4	0.1
Other nonmetallic mineral products.....	3279	0.8	0.8	0.0	-0.3	-0.2	0.4
Iron and steel mills and ferroalloys.....	3311	1.2	1.1	-0.1	-2.4	-1.9	1.1
Steel products from purchased steel.....	3312	0.0	-0.2	-0.1	-0.4	-1.6	0.2
Alumina and aluminum production.....	3313	0.5	0.3	-0.2	-2.0	-0.9	0.4
Other nonferrous metal production.....	3314	0.4	0.3	-0.1	-1.8	-0.3	0.3
Foundries.....	3315	0.4	-0.1	-0.5	-1.9	-0.7	0.6
Forging and stamping.....	3321	0.6	1.2	0.7	-0.9	1.3	1.4
Cutlery and handtools.....	3322	0.1	-0.9	-1.0	-2.5	-0.7	0.0
Architectural and structural metals.....	3323	-0.3	0.9	1.2	0.3	0.7	1.8

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

Industry	2012 NAICS code	Average annual percent change, 1987-2015					
		Multifactor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate purchases
Boilers, tanks, and shipping containers.....	3324	0.1	0.6	0.5	0.0	-0.3	0.9
Hardware.....	3325	-0.8	-2.4	-1.5	-3.2	-1.1	-0.9
Spring and wire products.....	3326	0.1	-0.2	-0.3	-2.0	0.2	0.4
Machine shops and threaded products.....	3327	0.7	2.4	1.7	0.8	1.9	2.4
Coating, engraving, and heat treating metals.....	3328	1.0	2.2	1.2	0.0	1.2	1.9
Other fabricated metal products.....	3329	-0.5	0.0	0.5	-0.5	0.5	1.2
Agriculture, construction, and mining machinery.....	3331	0.2	2.3	2.0	0.4	0.8	2.8
Industrial machinery.....	3332	0.4	0.7	0.2	-0.8	1.0	0.7
Commercial and service industry machinery.....	3333	0.2	-0.1	-0.3	-1.9	-0.4	0.6
HVAC and commercial refrigeration equipment.....	3334	0.5	1.1	0.5	-0.8	0.8	1.0
Metalworking machinery.....	3335	0.8	0.5	-0.3	-1.3	0.1	0.5
Turbine and power transmission equipment.....	3336	0.1	1.5	1.3	-0.2	0.5	2.3
Other general purpose machinery.....	3339	0.2	1.4	1.2	-0.6	0.4	2.4
Computer and peripheral equipment.....	3341	12.6	12.0	-0.5	-3.3	0.8	-0.4
Communications equipment.....	3342	2.6	1.9	-0.7	-3.4	2.0	-0.2
Audio and video equipment.....	3343	2.4	-1.4	-3.7	-4.0	-0.9	-4.1
Semiconductors and electronic components.....	3344	9.5	11.2	1.6	-1.5	5.9	0.3
Electronic instruments.....	3345	0.9	1.4	0.5	-1.7	0.8	2.2
Magnetic media manufacturing and reproducing.....	3346	2.0	-1.8	-3.8	-3.3	-0.5	-4.8
Electric lighting equipment.....	3351	0.4	-0.3	-0.8	-2.1	-0.1	-0.4
Household appliances.....	3352	1.6	0.3	-1.2	-2.9	-0.7	-0.8
Electrical equipment.....	3353	0.0	-0.4	-0.4	-1.8	-0.9	0.8
Other electrical equipment and components.....	3359	0.4	0.3	-0.1	-1.4	0.1	0.4
Motor vehicles.....	3361	0.1	2.2	2.1	-1.3	1.3	2.6
Motor vehicle bodies and trailers.....	3362	-0.4	1.8	2.3	0.5	1.2	2.7
Motor vehicle parts.....	3363	1.0	2.8	1.8	-0.2	0.2	2.7
Aerospace products and parts.....	3364	0.1	0.7	0.6	-1.8	0.4	2.3
Railroad rolling stock.....	3365	0.4	5.6	5.1	0.8	0.3	6.9
Ship and boat building.....	3366	0.1	0.8	0.7	-0.9	0.0	2.0
Other transportation equipment.....	3369	1.2	3.6	2.4	-0.4	2.3	3.1
Household and institutional furniture.....	3371	0.0	-0.6	-0.6	-1.9	0.0	-0.1
Office furniture and fixtures.....	3372	0.1	0.2	0.1	-1.2	0.6	0.8
Other furniture related products.....	3379	0.8	1.4	0.6	-0.9	-0.2	1.5
Medical equipment and supplies.....	3391	0.6	3.4	2.8	1.1	3.8	3.3
Other miscellaneous manufacturing.....	3399	0.3	0.3	0.0	-1.2	0.7	0.5
<b>Transportation</b>							
Air transportation.....	481	1.3	2.6	1.3	-0.4	3.2	1.9
Line-haul railroads.....	482111	1.7	2.0	0.3	-1.5	0.4	1.9

**Table 3. Multifactor productivity in selected periods**

Industry	2012 NAICS code	Average annual percent change						
		1987-2015	1987-1990	1990-1995	1995-2000	2000-2007	2007-2015	2014-2015
<b>Manufacturing</b>								
Animal food.....	3111	-0.3	0.9	0.5	-1.0	1.8	-2.6	-1.6
Grain and oilseed milling.....	3112	-0.1	-0.1	0.5	0.6	0.2	-1.0	0.9
Sugar and confectionery products.....	3113	0.1	0.6	0.8	1.8	0.2	-1.7	-1.4
Fruit and vegetable preserving and specialty.....	3114	0.2	-2.1	1.2	0.8	1.3	-0.8	-0.5
Dairy products.....	3115	-0.1	-1.1	0.3	-0.5	1.1	-0.9	-1.9
Animal slaughtering and processing.....	3116	0.6	-0.2	0.9	1.0	1.9	-0.8	0.2
Seafood product preparation and packaging.....	3117	0.2	-1.5	-0.2	0.9	2.7	-1.4	-6.5
Bakeries and tortilla products.....	3118	-0.9	-4.0	0.4	-0.6	0.7	-1.9	-4.4
Other food products.....	3119	0.1	0.2	1.0	-0.6	1.6	-1.4	-6.5
Beverages.....	3121	0.4	1.0	1.4	-1.1	1.8	-0.5	-0.9
Tobacco.....	3122	-0.8	1.6	1.4	0.6	-1.0	-3.5	2.2
Fiber, yarn, and thread mills.....	3131	0.9	0.6	0.2	1.0	3.6	-1.0	-1.3
Fabric mills.....	3132	0.4	0.2	1.4	0.8	2.9	-2.4	-8.3
Textile and fabric finishing mills.....	3133	-0.2	-0.1	0.0	0.9	0.3	-1.3	-4.2
Textile furnishings mills.....	3141	-0.4	-0.4	1.5	-1.2	0.5	-2.1	-2.6
Other textile product mills.....	3149	0.2	-0.4	0.2	-0.7	1.7	-0.2	-2.8
Apparel knitting mills.....	3151	-0.6	0.8	1.9	-2.0	-2.7	0.0	1.4
Cut and sew apparel.....	3152	-1.8	-1.2	0.7	-0.7	-3.4	-2.8	0.0
Accessories and other apparel.....	3159	-2.0	0.8	0.5	-6.1	-3.4	-0.8	-6.2
Leather and hide tanning and finishing.....	3161	-0.5	-4.3	0.5	3.6	-3.8	0.7	7.5
Footwear.....	3162	-0.6	-1.8	-0.1	-1.0	-0.2	-0.4	-0.7
Other leather products.....	3169	-1.1	0.6	-3.4	3.0	1.8	-5.3	-6.0
Sawmills and wood preservation.....	3211	0.8	1.3	-1.1	0.0	1.7	1.5	0.6
Plywood and engineered wood products.....	3212	-0.1	-1.0	-0.7	-0.2	0.7	-0.1	-2.6
Other wood products.....	3219	-0.5	-0.8	-1.2	-0.8	0.4	-0.6	-1.7
Pulp, paper, and paperboard mills.....	3221	0.6	-1.7	-0.2	1.5	1.7	0.4	-2.8
Converted paper products.....	3222	-0.1	0.0	-0.1	-0.4	0.5	-0.7	-0.6
Printing and related support activities.....	3231	-0.1	-0.2	-0.6	-1.2	0.9	0.0	-2.0
Petroleum and coal products.....	3241	0.0	-1.5	1.6	2.9	-1.6	-0.9	-1.8
Basic chemicals.....	3251	-0.2	-1.0	-2.9	-0.6	3.2	-0.9	3.5
Resin, rubber, and artificial fibers.....	3252	0.0	-1.7	0.6	0.3	1.9	-1.7	-7.2
Agricultural chemicals.....	3253	0.6	1.7	0.8	-0.1	2.9	-1.6	-10.4
Pharmaceuticals and medicines.....	3254	-2.1	-1.6	-2.7	-2.1	-0.3	-3.6	-1.4
Paints, coatings, and adhesives.....	3255	-0.6	-2.0	-0.7	-1.0	0.8	-0.9	-0.2
Soaps, cleaning compounds, and toiletries.....	3256	0.3	-1.2	0.2	-1.6	4.2	-1.3	1.4
Other chemical products and preparations.....	3259	0.0	-1.2	0.5	0.8	-0.3	-0.2	-4.7
Plastics products.....	3261	0.3	-0.6	1.0	0.8	0.8	-0.6	-2.0
Rubber products.....	3262	0.5	0.7	0.9	1.5	0.6	-0.5	-1.1
Clay products and refractories.....	3271	0.2	0.8	1.1	1.1	-0.5	-0.6	-6.3
Glass and glass products.....	3272	1.1	-0.1	1.6	2.0	0.6	1.2	0.6
Cement and concrete products.....	3273	-0.2	0.8	0.3	0.3	0.0	-1.4	-2.1
Lime and gypsum products.....	3274	-0.4	-1.9	-2.2	1.3	0.3	-0.3	-3.6
Other nonmetallic mineral products.....	3279	0.8	-0.7	2.1	-0.6	2.7	-0.1	-2.9
Iron and steel mills and ferroalloys.....	3311	1.2	1.1	1.9	1.6	0.6	1.1	3.8
Steel products from purchased steel.....	3312	0.0	1.3	2.3	-0.1	-0.5	-1.5	-4.6
Alumina and aluminum production.....	3313	0.5	-0.6	-0.6	0.4	1.2	1.3	-2.4
Other nonferrous metal production.....	3314	0.4	-2.6	1.8	2.7	-3.3	2.6	2.4
Foundries.....	3315	0.4	-0.2	1.6	0.0	1.2	-0.6	-1.6



**Table 3. Multifactor productivity in selected periods — Continued**

Industry	2012 NAICS code	Average annual percent change						
		1987-2015	1987-1990	1990-1995	1995-2000	2000-2007	2007-2015	2014-2015
Forging and stamping.....	3321	0.6	-0.7	0.5	0.1	3.8	-1.4	-7.4
Cutlery and handtools.....	3322	0.1	-1.6	1.0	-0.4	0.5	-0.1	1.1
Architectural and structural metals.....	3323	-0.3	-1.2	0.8	-0.7	1.4	-2.0	-4.1
Boilers, tanks, and shipping containers.....	3324	0.1	0.3	1.7	0.8	0.8	-2.0	-7.5
Hardware.....	3325	-0.8	-2.3	0.7	-0.1	-0.6	-1.9	-2.7
Spring and wire products.....	3326	0.1	0.0	1.5	0.1	1.7	-2.1	-4.4
Machine shops and threaded products.....	3327	0.7	0.9	3.2	0.2	1.5	-1.2	-4.9
Coating, engraving, and heat treating metals.....	3328	1.0	0.9	2.1	-0.7	3.6	-0.6	-5.2
Other fabricated metal products.....	3329	-0.5	-1.8	0.3	-1.1	1.8	-2.1	-4.9
Agriculture, construction, and mining machinery.....	3331	0.2	2.5	0.0	-1.0	2.0	-1.1	-11.1
Industrial machinery.....	3332	0.4	0.2	1.5	0.2	1.4	-0.8	-1.1
Commercial and service industry machinery.....	3333	0.2	0.8	-0.2	-1.2	-0.2	1.4	-1.0
HVAC and commercial refrigeration equipment.....	3334	0.5	-0.2	0.7	0.3	1.7	-0.3	-1.6
Metalworking machinery.....	3335	0.8	0.1	1.4	-1.0	2.8	0.2	-0.4
Turbine and power transmission equipment.....	3336	0.1	-0.7	-0.1	0.5	-0.2	0.6	1.6
Other general purpose machinery.....	3339	0.2	0.3	0.0	0.0	1.9	-1.1	-6.3
Computer and peripheral equipment.....	3341	12.6	7.0	14.9	23.9	19.1	1.5	2.1
Communications equipment.....	3342	2.6	3.9	5.2	5.3	3.8	-2.0	1.4
Audio and video equipment.....	3343	2.4	3.1	2.5	1.9	3.7	1.4	1.3
Semiconductors and electronic components.....	3344	9.5	7.1	18.0	21.7	7.7	0.0	0.7
Electronic instruments.....	3345	0.9	1.9	1.0	-0.5	1.3	1.2	-1.7
Magnetic media manufacturing and reproducing.....	3346	2.0	0.5	5.5	-3.1	3.7	2.4	-1.2
Electric lighting equipment.....	3351	0.4	-2.0	0.3	0.4	2.0	0.2	1.1
Household appliances.....	3352	1.6	-0.2	2.8	0.9	3.5	0.2	1.1
Electrical equipment.....	3353	0.0	0.6	2.2	-1.8	1.4	-1.8	-5.6
Other electrical equipment and components.....	3359	0.4	-1.6	1.2	0.7	0.7	0.3	-2.6
Motor vehicles.....	3361	0.1	0.5	-1.3	0.0	2.8	-1.4	-3.1
Motor vehicle bodies and trailers.....	3362	-0.4	-3.0	2.2	-1.5	0.6	-1.4	-2.0
Motor vehicle parts.....	3363	1.0	-0.6	2.4	0.9	1.9	-0.1	0.4
Aerospace products and parts.....	3364	0.1	-2.2	-1.0	-1.0	2.7	0.0	-2.6
Railroad rolling stock.....	3365	0.4	2.1	-1.3	4.9	-1.8	0.0	-11.1
Ship and boat building.....	3366	0.1	0.0	-1.5	-0.1	0.3	1.1	-0.7
Other transportation equipment.....	3369	1.2	-2.2	4.3	-0.4	6.0	-2.6	-2.3
Household and institutional furniture.....	3371	0.0	-0.4	0.7	-0.5	1.1	-0.8	1.6
Office furniture and fixtures.....	3372	0.1	-2.7	0.3	1.8	1.0	-0.9	0.0
Other furniture related products.....	3379	0.8	-0.2	0.8	-0.4	2.3	0.6	-5.0
Medical equipment and supplies.....	3391	0.6	2.3	0.2	1.5	1.2	-0.9	-3.8
Other miscellaneous manufacturing.....	3399	0.3	1.1	0.6	0.4	0.8	-0.7	-3.0
<b>Transportation</b>								
Air transportation.....	481	1.3	-0.6	-0.2	-0.1	4.6	1.0	0.4
Line-haul railroads.....	482111	1.7	4.4	4.3	1.2	1.0	0.2	-0.1

**Table 4. Contributions to Labor Productivity**

Industry	2012 NAICS code	Average annual percent change, 1987-2015			
		Labor productivity	Contribution of capital intensity	Contribution of intermediate purchases intensity	Multifactor productivity
<b>Manufacturing</b>					
Animal food.....	3111	2.0	0.4	1.9	-0.3
Grain and oilseed milling.....	3112	1.9	0.3	1.7	-0.1
Sugar and confectionery products.....	3113	1.1	0.5	0.6	0.1
Fruit and vegetable preserving and specialty.....	3114	1.5	0.4	0.9	0.2
Dairy products.....	3115	1.5	0.3	1.3	-0.1
Animal slaughtering and processing.....	3116	0.6	0.1	-0.1	0.6
Seafood product preparation and packaging.....	3117	1.3	0.3	0.9	0.2
Bakeries and tortilla products.....	3118	0.2	0.2	0.9	-0.9
Other food products.....	3119	0.4	-0.1	0.5	0.1
Beverages.....	3121	1.2	0.0	0.7	0.4
Tobacco.....	3122	1.8	2.0	0.6	-0.8
Fiber, yarn, and thread mills.....	3131	3.5	0.2	2.3	0.9
Fabric mills.....	3132	2.9	0.5	2.0	0.4
Textile and fabric finishing mills.....	3133	1.8	0.3	1.7	-0.2
Textile furnishings mills.....	3141	0.8	0.4	0.8	-0.4
Other textile product mills.....	3149	1.7	0.3	1.2	0.2
Apparel knitting mills.....	3151	-0.4	0.5	-0.3	-0.6
Cut and sew apparel.....	3152	-0.6	1.0	0.2	-1.8
Accessories and other apparel.....	3159	-2.8	0.2	-1.0	-2.0
Leather and hide tanning and finishing.....	3161	1.0	0.2	1.3	-0.5
Footwear.....	3162	0.9	0.6	0.9	-0.6
Other leather products.....	3169	0.1	0.9	0.4	-1.1
Sawmills and wood preservation.....	3211	2.1	-0.1	1.3	0.8
Plywood and engineered wood products.....	3212	0.8	0.0	1.0	-0.1
Other wood products.....	3219	0.9	0.1	1.3	-0.5
Pulp, paper, and paperboard mills.....	3221	2.7	0.6	1.5	0.6
Converted paper products.....	3222	1.5	0.3	1.4	-0.1
Printing and related support activities.....	3231	1.2	0.4	0.9	-0.1
Petroleum and coal products.....	3241	2.4	0.3	2.1	0.0
Basic chemicals.....	3251	2.3	0.5	2.1	-0.2
Resin, rubber, and artificial fibers.....	3252	1.8	0.3	1.5	0.0
Agricultural chemicals.....	3253	2.3	0.5	1.3	0.6
Pharmaceuticals and medicines.....	3254	0.1	0.9	1.4	-2.1
Paints, coatings, and adhesives.....	3255	0.7	0.2	1.2	-0.6
Soaps, cleaning compounds, and toiletries.....	3256	1.5	0.6	0.6	0.3
Other chemical products and preparations.....	3259	2.1	0.5	1.7	0.0
Plastics products.....	3261	1.6	0.4	0.9	0.3
Rubber products.....	3262	1.9	0.2	1.2	0.5
Clay products and refractories.....	3271	0.7	0.2	0.4	0.2
Glass and glass products.....	3272	2.2	0.3	0.7	1.1
Cement and concrete products.....	3273	0.1	0.1	0.3	-0.2
Lime and gypsum products.....	3274	1.4	0.6	1.2	-0.4
Other nonmetallic mineral products.....	3279	1.2	0.0	0.4	0.8
Iron and steel mills and ferroalloys.....	3311	3.6	0.0	2.4	1.2
Steel products from purchased steel.....	3312	0.2	-0.2	0.4	0.0
Alumina and aluminum production.....	3313	2.4	0.2	1.7	0.5
Other nonferrous metal production.....	3314	2.1	0.3	1.4	0.4
Foundries.....	3315	1.8	0.1	1.3	0.4

**Table 4. Contributions to Labor Productivity — Continued**

Industry	2012 NAICS code	Average annual percent change, 1987-2015			
		Labor productivity	Contribution of capital intensity	Contribution of intermediate purchases intensity	Multifactor productivity
Forging and stamping.....	3321	2.2	0.2	1.4	0.6
Cutlery and handtools.....	3322	1.6	0.4	1.1	0.1
Architectural and structural metals.....	3323	0.6	0.0	0.8	-0.3
Boilers, tanks, and shipping containers.....	3324	0.6	-0.1	0.5	0.1
Hardware.....	3325	0.9	0.4	1.3	-0.8
Spring and wire products.....	3326	1.8	0.3	1.4	0.1
Machine shops and threaded products.....	3327	1.6	0.2	0.7	0.7
Coating, engraving, and heat treating metals.....	3328	2.2	0.1	1.0	1.0
Other fabricated metal products.....	3329	0.5	0.2	0.8	-0.5
Agriculture, construction, and mining machinery.....	3331	1.9	0.1	1.6	0.2
Industrial machinery.....	3332	1.5	0.2	0.8	0.4
Commercial and service industry machinery.....	3333	1.8	0.3	1.4	0.2
HVAC and commercial refrigeration equipment.....	3334	1.9	0.3	1.1	0.5
Metalworking machinery.....	3335	1.8	0.1	0.8	0.8
Turbine and power transmission equipment.....	3336	1.7	0.2	1.4	0.1
Other general purpose machinery.....	3339	2.0	0.1	1.7	0.2
Computer and peripheral equipment.....	3341	15.8	1.0	1.9	12.6
Communications equipment.....	3342	5.5	0.8	1.9	2.6
Audio and video equipment.....	3343	2.7	0.3	0.0	2.4
Semiconductors and electronic components.....	3344	12.9	2.2	0.9	9.5
Electronic instruments.....	3345	3.2	0.6	1.7	0.9
Magnetic media manufacturing and reproducing.....	3346	1.6	0.5	-1.0	2.0
Electric lighting equipment.....	3351	1.8	0.5	0.9	0.4
Household appliances.....	3352	3.3	0.4	1.3	1.6
Electrical equipment.....	3353	1.4	0.2	1.2	0.0
Other electrical equipment and components.....	3359	1.7	0.2	1.1	0.4
Motor vehicles.....	3361	3.6	0.4	3.0	0.1
Motor vehicle bodies and trailers.....	3362	1.3	0.1	1.7	-0.4
Motor vehicle parts.....	3363	3.1	0.0	2.0	1.0
Aerospace products and parts.....	3364	2.5	0.5	1.9	0.1
Railroad rolling stock.....	3365	4.7	0.1	4.2	0.4
Ship and boat building.....	3366	1.7	0.1	1.6	0.1
Other transportation equipment.....	3369	4.0	0.5	2.4	1.2
Household and institutional furniture.....	3371	1.3	0.2	1.1	0.0
Office furniture and fixtures.....	3372	1.4	0.3	1.0	0.1
Other furniture related products.....	3379	2.4	0.1	1.4	0.8
Medical equipment and supplies.....	3391	2.3	0.8	0.8	0.6
Other miscellaneous manufacturing.....	3399	1.5	0.4	0.9	0.3
<b>Transportation</b>					
Air transportation.....	481	3.1	0.8	0.9	1.3
Line-haul railroads.....	482111	3.6	0.5	1.3	1.7