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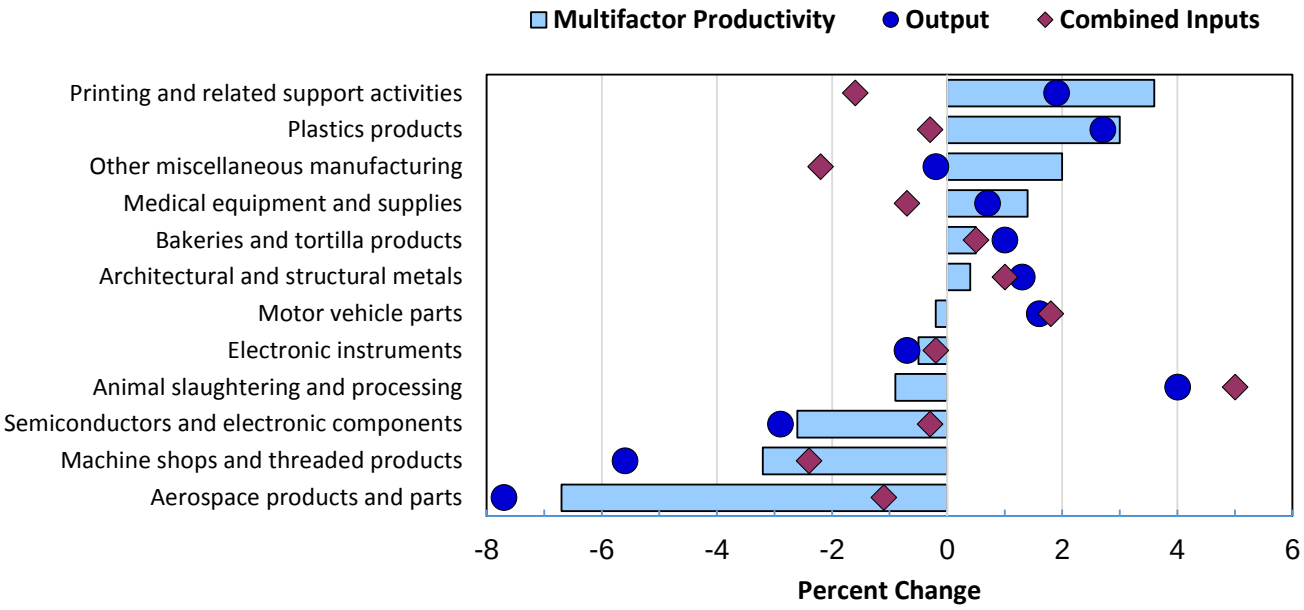
MULTIFACTOR PRODUCTIVITY TRENDS FOR DETAILED INDUSTRIES - 2016

Multifactor productivity – defined as output per unit of combined inputs – rose in 37 of the 86 4-digit NAICS manufacturing industries in 2016, the U.S. Bureau of Labor Statistics reported today. This was up from 2015, when multifactor productivity increased in 21 manufacturing industries. In 2016, multifactor productivity rose in one of the two transportation industries measured (air transportation), the same as in 2015.

Chart 1 shows the percent change in multifactor productivity, output, and combined inputs in 2016 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, 2016



Of the 12 largest industries, multifactor productivity increased the most in printing and related support activities (3.6 percent), as output increased while combined inputs declined. Output growth occurred in 7 out of the 12 industries. In 5 of these, combined inputs fell or grew at a slower rate than output, leading to multifactor productivity growth. However, output fell more than combined inputs in 4 of the 12 industries, leading to declines in multifactor productivity. In the case of 2 industries (animal

slaughtering and processing, and motor vehicle parts), increases in output coincided with larger increases in combined inputs, causing slight declines in multifactor productivity.

Among all 86 manufacturing industries (see table 1), 4 industries posted multifactor productivity gains greater than 4.0 percent:

- Iron and steel mills and ferroalloys (9.4 percent)
- Leather and hide tanning and finishing (7.8 percent)
- Alumina and aluminum production (7.3 percent)
- Clay products and refractories (4.9 percent)

Multifactor productivity declined by 6.0 percent or more in 5 manufacturing industries in 2016. The largest productivity decline occurred in agriculture, construction, and mining machinery (-8.6 percent).

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

- Air transportation (0.6 percent)
- Line-haul railroads (-0.9 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 2016, **output** increased in 32 manufacturing industries, compared to 46 industries in 2015. (See chart 2.) Output increased by 5.0 percent or more in the following 2 industries in 2016:

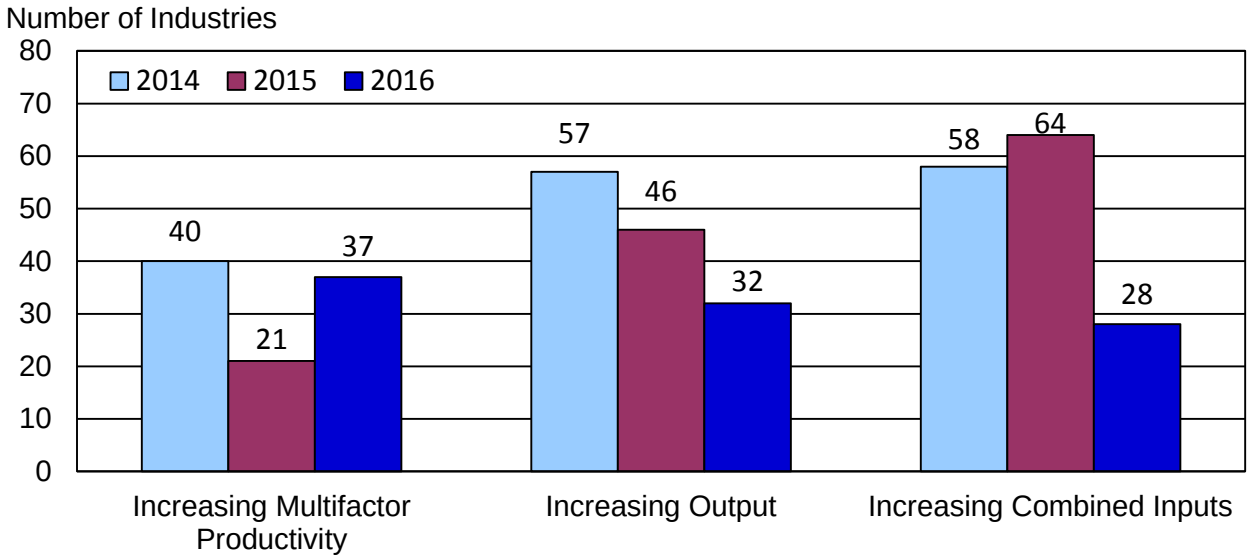
- Other food products (6.6 percent)
- Electric lighting equipment (5.6 percent)

Combined inputs of capital, labor, and intermediate purchases rose in 28 manufacturing industries in 2016, compared to 64 industries in 2015. Just under half of the manufacturing industries saw growth in hours worked (40 industries), while fewer industries had growth in capital services (35 industries) and intermediate purchases (30 industries).

The following industries had the largest increases in **combined inputs** in 2016:

- Agricultural chemicals (6.6 percent)
- Footwear (5.6 percent)
- Animal slaughtering and processing (5.0 percent)
- Petroleum and coal products (4.2 percent)

Chart 2. Number of manufacturing industries with increases in multifactor productivity, output, and combined inputs, 2014-2016



In 4 manufacturing industries, **multifactor productivity** rose more than 3.0 percent despite falling output, as combined inputs fell more rapidly. This occurred in:

- Iron and steel mills and ferroalloys (9.4 percent)
- Leather and hide tanning and finishing (7.8 percent)
- Clay products and refractories (4.9 percent)
- Other nonferrous metal production (3.5 percent)

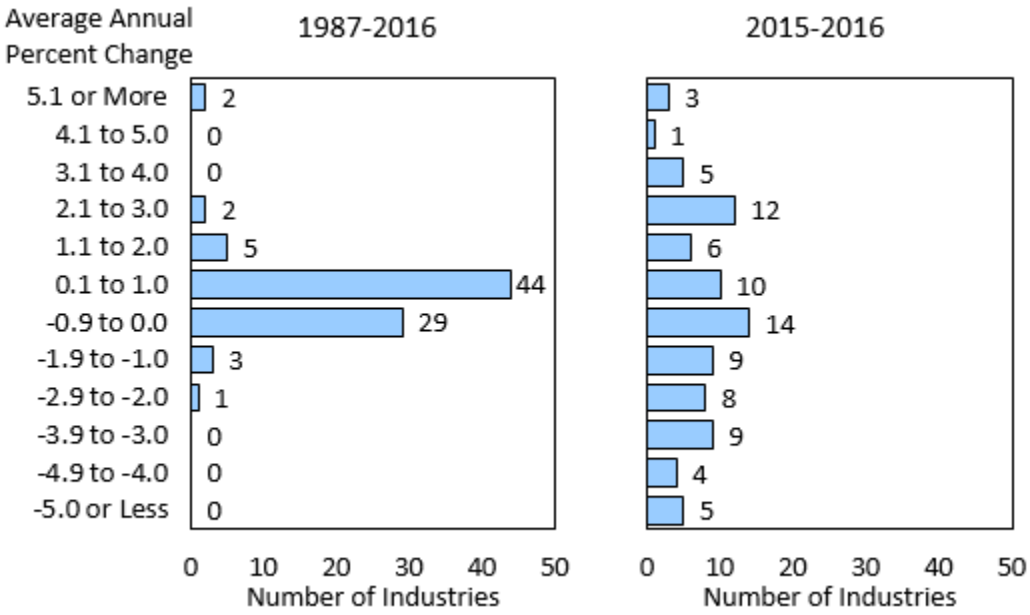
In the air transportation industry, output increased 3.5 percent and combined inputs increased 2.8 percent in 2016. In line-haul railroads, output fell 4.1 percent and combined inputs decreased 3.2 percent.

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 2016, multifactor productivity grew in 53 manufacturing industries, compared to only 37 from 2015 to 2016. (See tables 1 and 2.) Over the long term, average annual rates of change in multifactor productivity ranged between -2.0 percent and 2.0 percent for nearly all manufacturing industries. (See chart 3.)

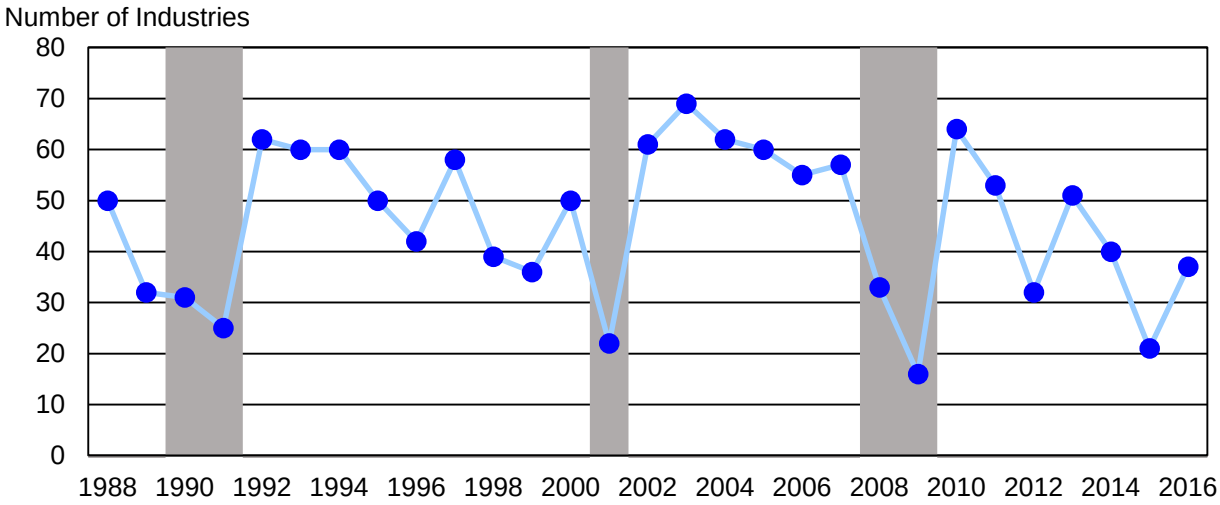
Chart 3. Distribution of multifactor productivity growth for all manufacturing industries, 1987-2016 and 2015-2016



In contrast, multifactor productivity declined by 2.0 percent or more in 26 industries in 2016. Only one industry (pharmaceuticals and medicines) saw an average annual decline of that magnitude from 1987 to 2016.

Between 1987 and 2016, 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, 1988-2016

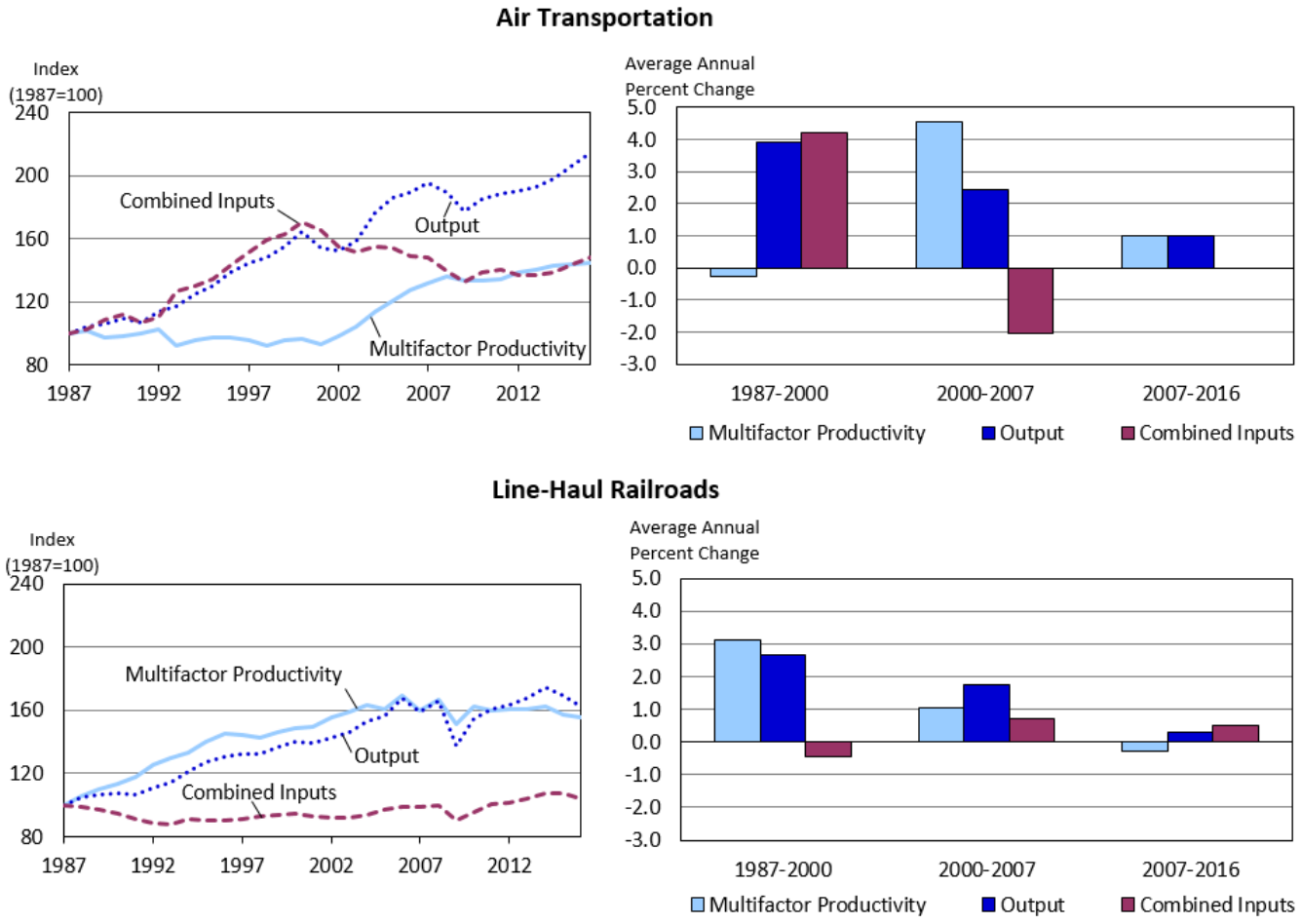


Note: Shaded areas denote years that include recessions

Table 3 displays the average annual percent changes in multifactor productivity by industry for sub periods between 1987 and 2016. The sub period from 2000 to 2007 saw the greatest number of manufacturing industries with multifactor productivity growth.

From 1987 to 2016, multifactor productivity rose in both air transportation and line-haul railroads by an average annual rate of 1.3 percent and 1.5 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, 1987-2016



Multifactor Productivity as a Source of Labor Productivity Growth

Multifactor productivity measures differ from the BLS labor productivity measures because they compare output to the combined inputs of hours worked, capital, and intermediate purchases. Labor productivity relates output only to hours worked. Mathematically, an industry's labor productivity is equal to multifactor 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 purchases relative to hours worked. These factor substitutions are referred to as contribution of capital intensity and contribution of intermediate purchases intensity.

Eighty-one out of the 86 manufacturing industries posted gains in labor productivity from 1987 to 2016. Among these 81 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 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 2016. Between 2000 and 2007, multifactor productivity growth was the predominant source of labor productivity growth in many of the 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

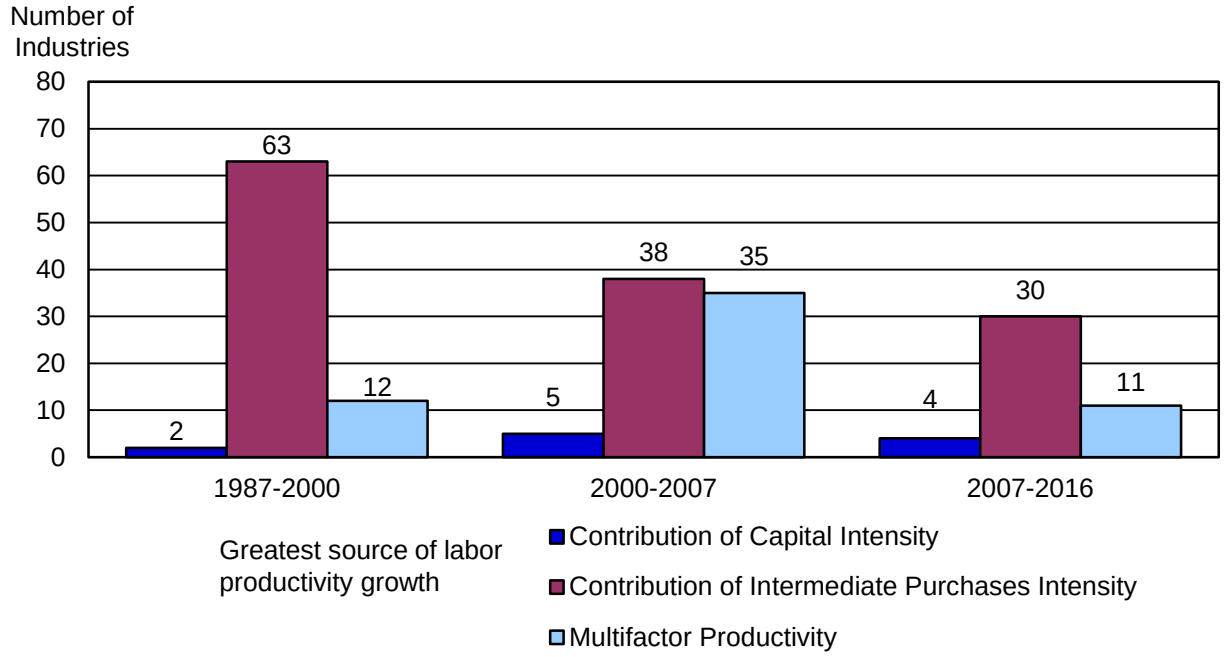
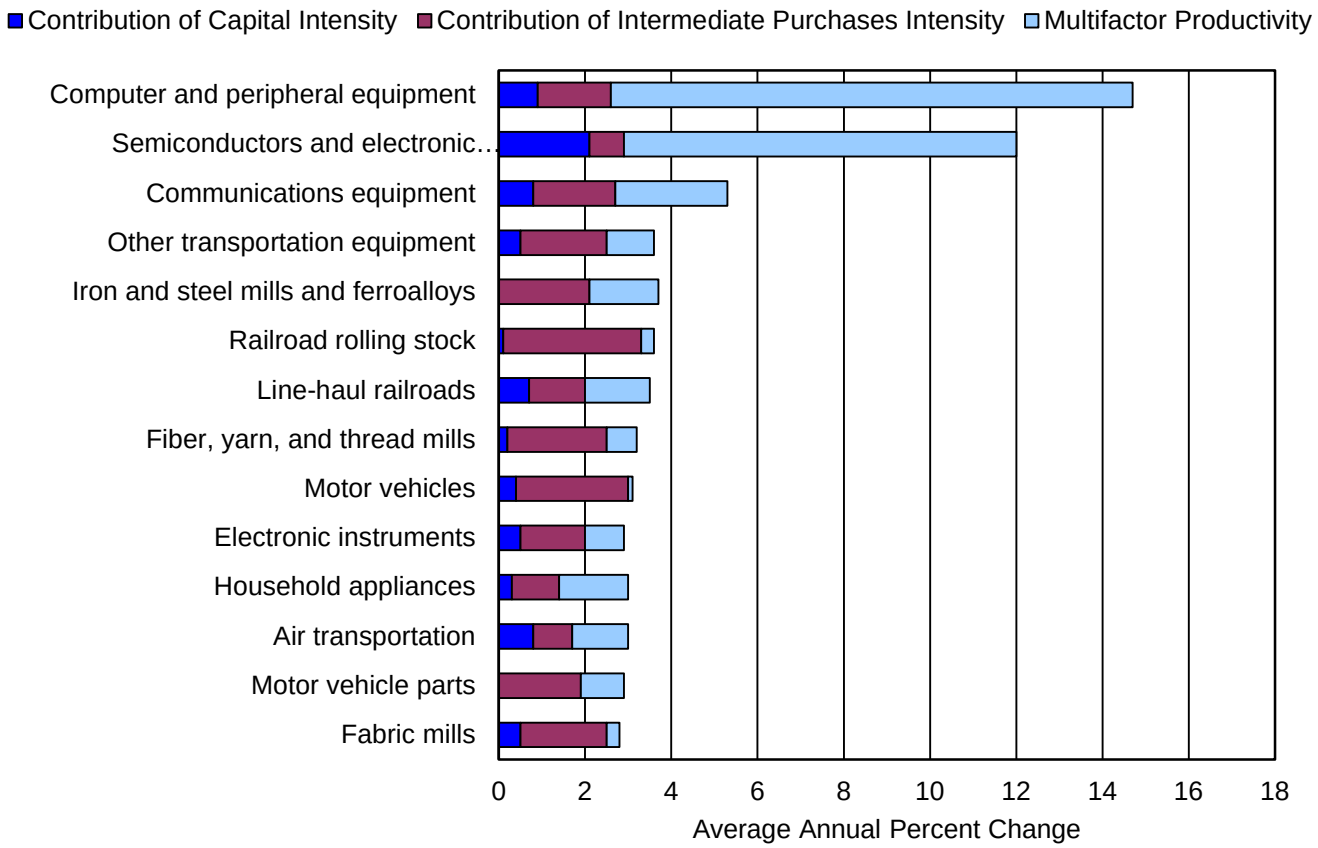


Chart 7 displays the industries with the greatest labor productivity growth from 1987 to 2016. Strong growth in multifactor productivity was the dominant source of labor productivity growth in the industries that manufacture computers and electronic products (computer and peripheral equipment, semiconductors 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, 1987-2016



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?

More data are available on the productivity dashboard, www.bls.gov/mfp/mfp_by_industry_dashboard.xlsx.

- Detailed data series: indexes of multifactor productivity and related measures
- Additional years, annual rates of change, and long-term data

More information from the BLS productivity program is available at www.bls.gov/mfp.

- 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 an email to 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	2016 Employment (thousands)	Percent change, 2015-2016					
			Multifactor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate purchases
Manufacturing								
Animal food	3111	58.9	-0.8	0.6	1.4	-2.2	3.5	1.0
Grain and oilseed milling	3112	60.5	1.0	-0.5	-1.5	3.3	-1.8	-1.8
Sugar and confectionery products	3113	77.0	0.5	4.2	3.7	-4.1	1.2	7.1
Fruit and vegetable preserving and specialty	3114	173.5	-1.4	-1.4	0.0	6.1	-0.3	-1.3
Dairy products	3115	141.6	2.7	2.1	-0.6	-0.7	1.9	-1.4
Animal slaughtering and processing	3116	501.2	-0.9	4.0	5.0	4.0	2.5	5.7
Seafood product preparation and packaging	3117	39.9	0.0	-1.0	-1.1	15.9	-3.2	-3.6
Bakeries and tortilla products	3118	328.3	0.5	1.0	0.5	-1.5	0.3	1.3
Other food products	3119	210.5	2.6	6.6	3.9	14.0	2.5	2.9
Beverages	3121	237.2	-2.5	-3.0	-0.5	8.4	1.6	-3.4
Tobacco	3122	13.7	-4.3	-1.7	2.7	-0.1	2.4	4.8
Fiber, yarn, and thread mills	3131	29.9	-3.8	-6.2	-2.5	-4.7	-4.0	-2.0
Fabric mills	3132	56.6	-2.4	-2.4	0.0	-8.1	-4.3	2.4
Textile and fabric finishing mills	3133	33.4	2.4	-3.2	-5.5	-8.6	-4.0	-4.7
Textile furnishings mills	3141	58.9	-0.4	-1.6	-1.2	2.0	-1.7	-1.9
Other textile product mills	3149	75.4	-2.2	0.3	2.5	5.2	-1.8	2.3
Apparel knitting mills	3151	12.6	2.5	-18.4	-20.4	-19.0	-5.6	-22.4
Cut and sew apparel	3152	122.4	2.9	-4.3	-6.9	-11.2	-4.7	-4.8
Accessories and other apparel	3159	13.5	-2.0	-4.3	-2.3	2.5	-4.3	-4.9
Leather and hide tanning and finishing	3161	5.2	7.8	-3.6	-10.5	-5.8	-3.0	-11.2
Footwear	3162	13.7	-3.0	2.4	5.6	-2.5	-3.5	10.1
Other leather products	3169	13.9	2.0	0.2	-1.8	-3.3	-4.1	-0.9
Sawmills and wood preservation	3211	94.3	1.7	4.8	3.1	0.8	1.3	3.9
Plywood and engineered wood products	3212	78.2	2.7	3.9	1.2	2.5	1.2	0.8
Other wood products	3219	242.5	1.5	3.3	1.8	4.7	0.3	0.9
Pulp, paper, and paperboard mills	3221	100.8	0.2	-2.0	-2.2	-5.0	-1.5	-1.9
Converted paper products	3222	270.9	-0.7	0.1	0.8	0.6	0.4	0.9
Printing and related support activities	3231	467.2	3.6	1.9	-1.6	-2.1	-3.7	-0.9
Petroleum and coal products	3241	113.7	-2.6	1.4	4.2	0.3	0.9	4.8
Basic chemicals	3251	149.8	3.7	3.3	-0.4	-0.6	1.9	-1.6
Resin, rubber, and artificial fibers	3252	92.3	2.3	0.6	-1.7	-5.9	2.1	-2.1
Agricultural chemicals	3253	36.0	-3.5	2.8	6.6	-5.6	11.7	5.3
Pharmaceuticals and medicines	3254	286.2	-4.8	-3.4	1.4	0.5	1.6	1.5
Paints, coatings, and adhesives	3255	63.5	0.9	2.0	1.0	-0.9	-0.1	1.9
Soaps, cleaning compounds, and toiletries	3256	111.3	0.3	1.2	0.9	-3.4	1.0	1.7
Other chemical products and preparations	3259	84.3	-3.2	-3.7	-0.6	-1.2	1.2	-1.0
Plastics products	3261	571.5	3.0	2.7	-0.3	1.3	1.2	-1.4
Rubber products	3262	134.6	-1.0	-3.9	-2.9	-0.3	-0.3	-4.8
Clay products and refractories	3271	46.3	4.9	-0.5	-5.1	-8.4	-1.7	-4.6
Glass and glass products	3272	91.4	0.0	-0.3	-0.3	-3.0	0.0	0.9
Cement and concrete products	3273	194.7	1.2	4.1	2.9	7.4	0.3	2.2
Lime and gypsum products	3274	14.5	-1.0	1.8	2.9	-2.0	2.1	4.7
Other nonmetallic mineral products	3279	78.1	-0.2	0.0	0.2	0.6	0.2	0.1
Iron and steel mills and ferroalloys	3311	83.0	9.4	-1.7	-10.1	-6.6	-3.9	-12.1
Steel products from purchased steel	3312	55.7	2.5	-9.1	-11.3	-10.1	-1.8	-12.8
Alumina and aluminum production	3313	58.4	7.3	2.1	-4.8	-0.9	-0.5	-6.4
Other nonferrous metal production	3314	60.6	3.5	-2.4	-5.7	-1.9	-2.7	-7.4
Foundries	3315	118.0	-1.6	-7.5	-6.0	-4.9	-2.0	-8.1
Forging and stamping	3321	98.5	-3.3	-5.6	-2.4	-1.9	0.2	-3.4
Cutlery and handtools	3322	39.5	-6.1	-5.7	0.4	1.3	-1.6	0.9
Architectural and structural metals	3323	376.0	0.4	1.3	1.0	0.2	-0.2	1.5

Table 1. Recent multifactor productivity and related data — Continued

Industry	2012 NAICS code	2016 Employment (thousands)	Percent change, 2015-2016					
			Multifactor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate purchases
Boilers, tanks, and shipping containers	3324	93.2	-3.9	-9.4	-5.7	-10.4	-0.6	-5.3
Hardware	3325	25.4	0.7	1.5	0.8	3.2	-2.0	0.6
Spring and wire products	3326	43.2	0.4	0.0	-0.4	-0.3	-0.1	-0.5
Machine shops and threaded products	3327	368.7	-3.2	-5.6	-2.4	-4.7	0.4	-1.6
Coating, engraving, and heat treating metals	3328	138.2	-3.3	-4.6	-1.3	0.3	-0.9	-2.3
Other fabricated metal products	3329	270.6	-1.0	-2.9	-2.0	-3.8	-0.4	-1.7
Agriculture, construction, and mining machinery	3331	207.7	-8.6	-19.4	-11.8	-14.4	-4.3	-12.7
Industrial machinery	3332	114.2	-4.1	-2.6	1.6	2.1	0.7	1.4
Commercial and service industry machinery	3333	90.8	-0.4	-1.1	-0.8	2.5	-0.3	-2.4
HVAC and commercial refrigeration equipment	3334	129.9	-2.3	-3.3	-1.1	3.5	-1.8	-2.3
Metalworking machinery	3335	183.6	-1.1	-4.6	-3.6	-2.9	-0.3	-5.2
Turbine and power transmission equipment	3336	99.1	-4.4	-11.4	-7.3	-3.4	-3.1	-9.7
Other general purpose machinery	3339	262.5	-1.7	-3.5	-1.8	-1.5	-0.3	-2.4
Computer and peripheral equipment	3341	162.8	-2.6	-4.0	-1.5	1.3	-4.5	-1.1
Communications equipment	3342	88.4	-1.6	-4.0	-2.4	-0.8	-4.8	-2.9
Audio and video equipment	3343	21.1	-6.3	-4.5	1.9	10.8	-4.8	0.9
Semiconductors and electronic components	3344	371.4	-2.6	-2.9	-0.3	-0.5	-0.1	-0.2
Electronic instruments	3345	398.5	-0.5	-0.7	-0.2	-0.4	-0.1	0.0
Magnetic media manufacturing and reproducing	3346	16.6	-8.0	-8.5	-0.6	5.9	-7.0	-3.6
Electric lighting equipment	3351	48.9	2.7	5.6	2.9	8.8	-0.5	1.8
Household appliances	3352	63.2	3.8	3.8	0.0	6.9	-0.9	-1.3
Electrical equipment	3353	140.8	-0.6	-4.0	-3.4	-5.0	-2.7	-3.0
Other electrical equipment and components	3359	133.6	0.2	-1.1	-1.3	2.8	0.0	-3.3
Motor vehicles	3361	212.1	-0.7	0.9	1.7	9.5	1.2	1.1
Motor vehicle bodies and trailers	3362	152.4	-1.3	-1.3	0.0	0.6	3.7	-0.2
Motor vehicle parts	3363	584.7	-0.2	1.6	1.8	3.6	1.7	1.5
Aerospace products and parts	3364	491.5	-6.7	-7.7	-1.1	0.5	1.1	-3.1
Railroad rolling stock	3365	26.4	-3.7	-28.0	-25.3	-7.4	-2.0	-28.8
Ship and boat building	3366	136.3	2.5	-2.8	-5.1	-5.2	1.1	-7.0
Other transportation equipment	3369	34.9	-0.2	-1.4	-1.2	4.3	4.0	-3.5
Household and institutional furniture	3371	261.7	3.1	1.8	-1.3	1.6	-1.3	-2.6
Office furniture and fixtures	3372	110.0	2.4	-0.1	-2.4	-0.2	1.1	-5.1
Other furniture related products	3379	37.8	-0.7	-3.2	-2.5	1.5	0.4	-4.7
Medical equipment and supplies	3391	317.6	1.4	0.7	-0.7	3.4	0.8	-4.0
Other miscellaneous manufacturing	3399	330.2	2.0	-0.2	-2.2	0.7	-1.3	-3.9
Transportation								
Air transportation	481	448.1	0.6	3.5	2.8	3.1	2.0	2.9
Line-haul railroads	482111	173.1	-0.9	-4.1	-3.2	-8.9	3.5	-6.3

Table 2. Long run multifactor productivity and related data

Industry	2012 NAICS code	Average annual percent change, 1987-2016					
		Multifactor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate purchases
Manufacturing							
Animal food	3111	-0.2	1.9	2.1	-0.1	1.8	2.5
Grain and oilseed milling	3112	0.1	1.1	1.0	-0.7	0.3	1.4
Sugar and confectionery products	3113	0.1	0.5	0.5	-0.8	0.8	0.5
Fruit and vegetable preserving and specialty	3114	0.2	1.0	0.8	-0.2	0.9	0.9
Dairy products	3115	0.0	1.2	1.2	-0.3	1.5	1.3
Animal slaughtering and processing	3116	0.5	1.6	1.1	1.1	1.9	1.0
Seafood product preparation and packaging	3117	0.4	0.6	0.2	-0.6	0.9	0.3
Bakeries and tortilla products	3118	-0.8	0.4	1.2	0.1	0.9	1.9
Other food products	3119	0.2	2.2	2.0	2.0	1.3	2.4
Beverages	3121	0.3	1.4	1.0	0.6	0.6	1.4
Tobacco	3122	-0.8	-2.9	-2.1	-4.6	-2.1	-1.9
Fiber, yarn, and thread mills	3131	0.7	-1.5	-2.1	-4.6	-2.3	-1.4
Fabric mills	3132	0.3	-2.8	-3.1	-5.5	-2.4	-2.4
Textile and fabric finishing mills	3133	-0.1	-2.9	-2.9	-4.7	-2.3	-2.5
Textile furnishings mills	3141	-0.5	-2.2	-1.7	-2.7	-1.0	-1.8
Other textile product mills	3149	0.1	-0.4	-0.5	-1.7	0.4	-0.1
Apparel knitting mills	3151	-0.5	-8.0	-7.5	-7.2	-2.7	-8.2
Cut and sew apparel	3152	-1.6	-6.5	-5.0	-6.2	-2.7	-5.8
Accessories and other apparel	3159	-1.9	-6.4	-4.6	-3.7	-2.3	-5.4
Leather and hide tanning and finishing	3161	-0.2	-2.9	-2.7	-3.8	-2.4	-2.7
Footwear	3162	-0.6	-5.0	-4.4	-6.0	-3.3	-3.9
Other leather products	3169	-1.0	-3.7	-2.8	-3.9	-2.1	-3.0
Sawmills and wood preservation	3211	0.9	0.3	-0.6	-1.8	-1.1	0.0
Plywood and engineered wood products	3212	-0.1	0.0	0.1	-0.8	0.2	0.5
Other wood products	3219	-0.5	-0.3	0.2	-1.1	0.7	0.8
Pulp, paper, and paperboard mills	3221	0.6	-0.5	-1.0	-3.1	-1.1	-0.4
Converted paper products	3222	-0.2	0.2	0.3	-1.3	0.6	0.7
Printing and related support activities	3231	0.0	-0.6	-0.6	-1.8	0.3	-0.1
Petroleum and coal products	3241	-0.1	1.2	1.3	-1.1	1.1	1.5
Basic chemicals	3251	-0.1	0.8	0.8	-1.5	0.5	1.5
Resin, rubber, and artificial fibers	3252	0.1	0.4	0.3	-1.7	0.2	0.7
Agricultural chemicals	3253	0.3	0.7	0.4	-1.5	0.4	0.6
Pharmaceuticals and medicines	3254	-2.3	1.5	3.8	1.6	3.6	4.8
Paints, coatings, and adhesives	3255	-0.5	-0.1	0.4	-0.9	0.0	0.9
Soaps, cleaning compounds, and toiletries	3256	0.2	1.2	1.0	-0.3	1.4	0.9
Other chemical products and preparations	3259	-0.1	0.0	0.1	-1.9	-0.1	0.9
Plastics products	3261	0.4	1.6	1.2	0.0	2.0	1.5
Rubber products	3262	0.5	0.2	-0.3	-1.4	0.0	0.3
Clay products and refractories	3271	0.3	-1.5	-1.9	-2.5	-1.4	-1.5
Glass and glass products	3272	1.1	0.5	-0.6	-1.7	-0.4	0.0
Cement and concrete products	3273	-0.2	0.2	0.4	0.2	0.0	0.6
Lime and gypsum products	3274	-0.5	-0.4	0.1	-1.9	0.5	0.5
Other nonmetallic mineral products	3279	0.7	0.8	0.1	-0.3	-0.2	0.5
Iron and steel mills and ferroalloys	3311	1.6	1.0	-0.6	-2.6	-2.0	0.5
Steel products from purchased steel	3312	0.1	-0.5	-0.6	-0.7	-1.6	-0.3
Alumina and aluminum production	3313	0.9	0.4	-0.5	-2.0	-0.9	0.0
Other nonferrous metal production	3314	0.6	0.2	-0.4	-1.8	-0.4	-0.1
Foundries	3315	0.4	-0.4	-0.7	-2.0	-0.7	0.3
Forging and stamping	3321	0.5	1.0	0.5	-0.9	1.2	1.2
Cutlery and handtools	3322	-0.2	-1.1	-0.9	-2.3	-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, 1987-2016					
		Multifactor productivity	Output	Combined inputs	Hours worked	Capital	Intermediate purchases
Boilers, tanks, and shipping containers	3324	0.0	0.2	0.2	-0.3	-0.3	0.6
Hardware	3325	-0.8	-2.3	-1.5	-2.9	-1.1	-1.0
Spring and wire products	3326	0.2	-0.1	-0.3	-2.0	0.2	0.4
Machine shops and threaded products	3327	0.6	2.1	1.5	0.6	1.9	2.2
Coating, engraving, and heat treating metals	3328	0.8	1.9	1.1	0.0	1.2	1.7
Other fabricated metal products	3329	-0.5	-0.1	0.4	-0.6	0.4	1.0
Agriculture, construction, and mining machinery	3331	-0.2	1.2	1.4	-0.2	0.5	2.1
Industrial machinery	3332	0.3	0.6	0.3	-0.7	1.0	0.8
Commercial and service industry machinery	3333	0.2	-0.1	-0.3	-1.8	-0.4	0.4
HVAC and commercial refrigeration equipment	3334	0.5	0.9	0.4	-0.7	0.7	0.8
Metalworking machinery	3335	0.8	0.3	-0.4	-1.3	0.1	0.3
Turbine and power transmission equipment	3336	0.0	1.0	1.0	-0.3	0.3	1.8
Other general purpose machinery	3339	0.1	1.2	1.1	-0.6	0.4	2.2
Computer and peripheral equipment	3341	12.1	11.4	-0.6	-3.2	0.6	-0.5
Communications equipment	3342	2.6	1.9	-0.7	-3.3	1.7	-0.2
Audio and video equipment	3343	2.1	-1.5	-3.6	-3.5	-1.0	-4.0
Semiconductors and electronic components	3344	9.1	10.7	1.5	-1.5	5.7	0.1
Electronic instruments	3345	0.9	1.3	0.4	-1.7	0.7	1.9
Magnetic media manufacturing and reproducing	3346	1.7	-2.1	-3.7	-3.0	-0.7	-4.9
Electric lighting equipment	3351	0.5	-0.3	-0.7	-1.8	-0.1	-0.5
Household appliances	3352	1.6	0.4	-1.2	-2.6	-0.7	-0.8
Electrical equipment	3353	-0.1	-0.6	-0.5	-1.9	-1.0	0.7
Other electrical equipment and components	3359	0.4	0.2	-0.2	-1.3	0.1	0.3
Motor vehicles	3361	0.1	2.1	2.0	-1.0	1.3	2.5
Motor vehicle bodies and trailers	3362	-0.4	1.7	2.2	0.5	1.3	2.6
Motor vehicle parts	3363	1.0	2.8	1.8	-0.1	0.3	2.6
Aerospace products and parts	3364	-0.1	0.4	0.5	-1.7	0.5	2.0
Railroad rolling stock	3365	0.3	4.2	3.8	0.5	0.2	5.3
Ship and boat building	3366	0.3	0.7	0.4	-1.1	0.1	1.6
Other transportation equipment	3369	1.1	3.4	2.2	-0.2	2.4	2.8
Household and institutional furniture	3371	0.1	-0.5	-0.6	-1.8	-0.1	-0.1
Office furniture and fixtures	3372	0.1	0.2	0.0	-1.2	0.6	0.6
Other furniture related products	3379	0.7	1.3	0.6	-0.8	-0.2	1.4
Medical equipment and supplies	3391	0.6	3.3	2.7	1.2	3.7	3.1
Other miscellaneous manufacturing	3399	0.4	0.3	-0.1	-1.1	0.6	0.3
Transportation							
Air transportation	481	1.3	2.7	1.4	-0.3	3.2	1.9
Line-haul railroads	482111	1.5	1.7	0.1	-1.8	0.5	1.6

Table 3. Multifactor productivity in selected periods

Industry	2012 NAICS code	Average annual percent change						
		1987-2016	1987-1990	1990-1995	1995-2000	2000-2007	2007-2016	2015-2016
Manufacturing								
Animal food	3111	-0.2	0.9	0.5	-1.0	1.8	-2.2	-0.8
Grain and oilseed milling	3112	0.1	-0.1	0.5	0.6	0.2	-0.5	1.0
Sugar and confectionery products	3113	0.1	0.6	0.8	1.8	0.2	-1.5	0.5
Fruit and vegetable preserving and specialty	3114	0.2	-2.1	1.2	0.8	1.3	-0.8	-1.4
Dairy products	3115	0.0	-1.1	0.3	-0.5	1.1	-0.4	2.7
Animal slaughtering and processing	3116	0.5	-0.2	0.9	1.0	1.9	-0.9	-0.9
Seafood product preparation and packaging	3117	0.4	-1.5	-0.2	0.9	2.7	-0.8	0.0
Bakeries and tortilla products	3118	-0.8	-4.0	0.4	-0.6	0.7	-1.6	0.5
Other food products	3119	0.2	0.2	1.0	-0.6	1.6	-0.9	2.6
Beverages	3121	0.3	1.0	1.4	-1.1	1.8	-0.7	-2.5
Tobacco	3122	-0.8	1.6	1.4	0.6	-1.0	-3.5	-4.3
Fiber, yarn, and thread mills	3131	0.7	0.6	0.2	1.0	3.6	-1.3	-3.8
Fabric mills	3132	0.3	0.2	1.4	0.8	2.9	-2.6	-2.4
Textile and fabric finishing mills	3133	-0.1	-0.1	0.0	0.9	0.3	-0.9	2.4
Textile furnishings mills	3141	-0.5	-0.4	1.5	-1.2	0.5	-2.0	-0.4
Other textile product mills	3149	0.1	-0.4	0.2	-0.7	1.7	-0.6	-2.2
Apparel knitting mills	3151	-0.5	0.8	1.9	-2.0	-2.7	0.3	2.5
Cut and sew apparel	3152	-1.6	-1.2	0.7	-0.7	-3.4	-2.1	2.9
Accessories and other apparel	3159	-1.9	0.8	0.5	-6.1	-3.5	-0.6	-2.0
Leather and hide tanning and finishing	3161	-0.2	-4.3	0.5	3.6	-3.8	1.7	7.8
Footwear	3162	-0.6	-1.8	-0.1	-1.0	-0.2	-0.5	-3.0
Other leather products	3169	-1.0	0.6	-3.4	3.0	1.8	-4.5	2.0
Sawmills and wood preservation	3211	0.9	1.3	-1.1	0.0	1.7	1.6	1.7
Plywood and engineered wood products	3212	-0.1	-1.0	-0.7	-0.2	0.6	0.1	2.7
Other wood products	3219	-0.5	-0.8	-1.2	-0.8	0.4	-0.5	1.5
Pulp, paper, and paperboard mills	3221	0.6	-1.7	-0.2	1.6	1.7	0.3	0.2
Converted paper products	3222	-0.2	0.0	-0.1	-0.4	0.5	-0.7	-0.7
Printing and related support activities	3231	0.0	-0.1	-0.6	-1.2	0.9	0.4	3.6
Petroleum and coal products	3241	-0.1	-1.5	1.6	2.9	-1.6	-1.1	-2.6
Basic chemicals	3251	-0.1	-1.0	-2.9	-0.6	3.2	-0.4	3.7
Resin, rubber, and artificial fibers	3252	0.1	-1.7	0.6	0.3	1.9	-1.1	2.3
Agricultural chemicals	3253	0.3	1.7	0.8	-0.1	2.9	-2.1	-3.5
Pharmaceuticals and medicines	3254	-2.3	-1.6	-2.7	-2.1	-0.3	-3.8	-4.8
Paints, coatings, and adhesives	3255	-0.5	-2.0	-0.7	-1.0	0.8	-0.6	0.9
Soaps, cleaning compounds, and toiletries	3256	0.2	-1.2	0.2	-1.5	4.2	-1.3	0.3
Other chemical products and preparations	3259	-0.1	-1.2	0.5	0.8	-0.3	-0.5	-3.2
Plastics products	3261	0.4	-0.6	1.0	0.8	0.8	-0.1	3.0
Rubber products	3262	0.5	0.8	0.9	1.5	0.6	-0.4	-1.0
Clay products and refractories	3271	0.3	0.8	1.1	1.0	-0.5	0.0	4.9
Glass and glass products	3272	1.1	-0.2	1.6	2.0	0.6	1.0	0.0
Cement and concrete products	3273	-0.2	0.8	0.3	0.3	0.0	-1.3	1.2
Lime and gypsum products	3274	-0.5	-2.0	-2.2	1.3	0.3	-0.7	-1.0
Other nonmetallic mineral products	3279	0.7	-0.7	2.1	-0.6	2.7	-0.3	-0.2
Iron and steel mills and ferroalloys	3311	1.6	1.1	1.9	1.6	0.6	2.2	9.4
Steel products from purchased steel	3312	0.1	1.3	2.3	-0.1	-0.5	-0.9	2.5
Alumina and aluminum production	3313	0.9	-0.6	-0.6	0.3	1.2	2.2	7.3
Other nonferrous metal production	3314	0.6	-2.6	1.8	2.7	-3.3	2.9	3.5
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						
		1987-2016	1987-1990	1990-1995	1995-2000	2000-2007	2007-2016	2015-2016
Forging and stamping	3321	0.5	-0.7	0.5	0.1	3.8	-1.4	-3.3
Cutlery and handtools	3322	-0.2	-1.6	1.0	-0.4	0.5	-0.8	-6.1
Architectural and structural metals	3323	-0.3	-1.2	0.8	-0.7	1.4	-1.6	0.4
Boilers, tanks, and shipping containers	3324	0.0	0.3	1.7	0.8	0.8	-2.1	-3.9
Hardware	3325	-0.8	-2.3	0.7	-0.1	-0.6	-1.6	0.7
Spring and wire products	3326	0.2	0.0	1.5	0.1	1.7	-1.6	0.4
Machine shops and threaded products	3327	0.6	0.9	3.2	0.2	1.5	-1.4	-3.2
Coating, engraving, and heat treating metals	3328	0.8	0.9	2.1	-0.7	3.6	-1.2	-3.3
Other fabricated metal products	3329	-0.5	-1.8	0.3	-1.1	1.8	-2.0	-1.0
Agriculture, construction, and mining machinery	3331	-0.2	2.5	0.0	-1.0	2.0	-2.5	-8.6
Industrial machinery	3332	0.3	0.2	1.5	0.1	1.4	-1.1	-4.1
Commercial and service industry machinery	3333	0.2	0.8	-0.2	-1.2	-0.2	1.3	-0.4
HVAC and commercial refrigeration equipment	3334	0.5	-0.2	0.7	0.3	1.7	-0.3	-2.3
Metalworking machinery	3335	0.8	0.1	1.4	-1.0	2.8	0.1	-1.1
Turbine and power transmission equipment	3336	0.0	-0.7	-0.1	0.5	-0.2	0.1	-4.4
Other general purpose machinery	3339	0.1	0.3	0.0	-0.1	1.9	-1.2	-1.7
Computer and peripheral equipment	3341	12.1	7.1	14.9	24.0	19.1	1.2	-2.6
Communications equipment	3342	2.6	3.9	5.2	5.5	3.8	-1.7	-1.6
Audio and video equipment	3343	2.1	3.1	2.5	1.9	3.7	0.5	-6.3
Semiconductors and electronic components	3344	9.1	7.1	18.1	21.9	7.7	-0.2	-2.6
Electronic instruments	3345	0.9	1.8	1.0	-0.4	1.3	1.0	-0.5
Magnetic media manufacturing and reproducing	3346	1.7	0.5	5.5	-3.0	3.7	1.3	-8.0
Electric lighting equipment	3351	0.5	-2.0	0.3	0.4	2.0	0.3	2.7
Household appliances	3352	1.6	-0.2	2.8	0.9	3.5	0.6	3.8
Electrical equipment	3353	-0.1	0.7	2.2	-1.8	1.4	-1.7	-0.6
Other electrical equipment and components	3359	0.4	-1.6	1.2	0.6	0.7	0.3	0.2
Motor vehicles	3361	0.1	0.5	-1.3	0.0	2.8	-1.2	-0.7
Motor vehicle bodies and trailers	3362	-0.4	-3.0	2.2	-1.5	0.6	-1.3	-1.3
Motor vehicle parts	3363	1.0	-0.6	2.4	0.9	1.9	0.1	-0.2
Aerospace products and parts	3364	-0.1	-2.2	-1.0	-1.0	2.7	-0.6	-6.7
Railroad rolling stock	3365	0.3	2.1	-1.4	4.9	-1.8	-0.1	-3.7
Ship and boat building	3366	0.3	0.0	-1.5	-0.1	0.3	1.5	2.5
Other transportation equipment	3369	1.1	-2.1	4.3	-0.4	6.0	-2.3	-0.2
Household and institutional furniture	3371	0.1	-0.4	0.7	-0.5	1.1	-0.5	3.1
Office furniture and fixtures	3372	0.1	-2.7	0.3	1.8	1.0	-0.6	2.4
Other furniture related products	3379	0.7	-0.2	0.8	-0.4	2.3	0.5	-0.7
Medical equipment and supplies	3391	0.6	2.3	0.2	1.5	1.2	-0.5	1.4
Other miscellaneous manufacturing	3399	0.4	1.1	0.7	0.4	0.8	-0.3	2.0
Transportation								
Air transportation	481	1.3	-0.6	-0.2	-0.1	4.6	1.0	0.6
Line-haul railroads	482111	1.5	4.4	4.3	1.2	1.0	-0.3	-0.9

Table 4. Contributions to labor productivity

Industry	2012 NAICS code	Average annual percent change, 1987-2016			
		Labor productivity	Contribution of capital intensity	Contribution of intermediate purchases intensity	Multifactor productivity
Manufacturing					
Animal food	3111	2.0	0.4	1.8	-0.2
Grain and oilseed milling	3112	1.8	0.2	1.5	0.1
Sugar and confectionery products	3113	1.3	0.5	0.7	0.1
Fruit and vegetable preserving and specialty	3114	1.2	0.4	0.6	0.2
Dairy products	3115	1.5	0.3	1.2	0.0
Animal slaughtering and processing	3116	0.5	0.1	-0.1	0.5
Seafood product preparation and packaging	3117	1.1	0.1	0.6	0.4
Bakeries and tortilla products	3118	0.3	0.2	0.9	-0.8
Other food products	3119	0.2	-0.3	0.2	0.2
Beverages	3121	0.8	0.0	0.5	0.3
Tobacco	3122	1.7	2.0	0.6	-0.8
Fiber, yarn, and thread mills	3131	3.3	0.2	2.3	0.7
Fabric mills	3132	2.8	0.5	2.0	0.3
Textile and fabric finishing mills	3133	1.8	0.3	1.6	-0.1
Textile furnishings mills	3141	0.5	0.4	0.6	-0.5
Other textile product mills	3149	1.3	0.2	1.0	0.1
Apparel knitting mills	3151	-0.8	0.5	-0.9	-0.5
Cut and sew apparel	3152	-0.3	1.0	0.3	-1.6
Accessories and other apparel	3159	-2.9	0.2	-1.2	-1.9
Leather and hide tanning and finishing	3161	1.0	0.1	1.0	-0.2
Footwear	3162	1.0	0.5	1.1	-0.6
Other leather products	3169	0.2	0.8	0.4	-1.0
Sawmills and wood preservation	3211	2.1	-0.1	1.3	0.9
Plywood and engineered wood products	3212	0.8	0.0	0.9	-0.1
Other wood products	3219	0.8	0.1	1.2	-0.5
Pulp, paper, and paperboard mills	3221	2.7	0.6	1.5	0.6
Converted paper products	3222	1.4	0.3	1.3	-0.2
Printing and related support activities	3231	1.2	0.4	0.9	0.0
Petroleum and coal products	3241	2.3	0.3	2.2	-0.1
Basic chemicals	3251	2.3	0.5	1.9	-0.1
Resin, rubber, and artificial fibers	3252	2.1	0.4	1.6	0.1
Agricultural chemicals	3253	2.2	0.7	1.2	0.3
Pharmaceuticals and medicines	3254	-0.1	0.9	1.2	-2.3
Paints, coatings, and adhesives	3255	0.8	0.2	1.1	-0.5
Soaps, cleaning compounds, and toiletries	3256	1.5	0.7	0.6	0.2
Other chemical products and preparations	3259	2.0	0.5	1.6	-0.1
Plastics products	3261	1.6	0.4	0.8	0.4
Rubber products	3262	1.7	0.2	1.0	0.5
Clay products and refractories	3271	1.0	0.2	0.5	0.3
Glass and glass products	3272	2.2	0.3	0.8	1.1
Cement and concrete products	3273	0.0	0.0	0.2	-0.2
Lime and gypsum products	3274	1.5	0.6	1.4	-0.5
Other nonmetallic mineral products	3279	1.1	0.0	0.4	0.7
Iron and steel mills and ferroalloys	3311	3.6	0.0	2.1	1.6
Steel products from purchased steel	3312	0.3	-0.2	0.3	0.1
Alumina and aluminum production	3313	2.4	0.2	1.4	0.9
Other nonferrous metal production	3314	2.0	0.3	1.2	0.6
Foundries	3315	1.7	0.1	1.2	0.4

Table 4. Contributions to labor productivity — Continued

Industry	2012 NAICS code	Average annual percent change, 1987-2016			
		Labor productivity	Contribution of capital intensity	Contribution of intermediate purchases intensity	Multifactor productivity
Forging and stamping	3321	2.0	0.2	1.3	0.5
Cutlery and handtools	3322	1.3	0.4	1.1	-0.2
Architectural and structural metals	3323	0.6	0.0	0.8	-0.3
Boilers, tanks, and shipping containers	3324	0.6	0.0	0.6	0.0
Hardware	3325	0.7	0.4	1.1	-0.8
Spring and wire products	3326	1.9	0.3	1.3	0.2
Machine shops and threaded products	3327	1.5	0.2	0.7	0.6
Coating, engraving, and heat treating metals	3328	1.8	0.1	0.9	0.8
Other fabricated metal products	3329	0.5	0.2	0.8	-0.5
Agriculture, construction, and mining machinery	3331	1.4	0.1	1.5	-0.2
Industrial machinery	3332	1.3	0.2	0.8	0.3
Commercial and service industry machinery	3333	1.7	0.2	1.2	0.2
HVAC and commercial refrigeration equipment	3334	1.6	0.2	0.9	0.5
Metalworking machinery	3335	1.7	0.1	0.7	0.8
Turbine and power transmission equipment	3336	1.3	0.2	1.2	0.0
Other general purpose machinery	3339	1.8	0.1	1.6	0.1
Computer and peripheral equipment	3341	15.0	0.9	1.7	12.1
Communications equipment	3342	5.3	0.8	1.9	2.6
Audio and video equipment	3343	2.1	0.2	-0.2	2.1
Semiconductors and electronic components	3344	12.4	2.1	0.8	9.1
Electronic instruments	3345	3.0	0.5	1.5	0.9
Magnetic media manufacturing and reproducing	3346	1.0	0.5	-1.2	1.7
Electric lighting equipment	3351	1.5	0.4	0.7	0.5
Household appliances	3352	3.0	0.3	1.1	1.6
Electrical equipment	3353	1.4	0.2	1.3	-0.1
Other electrical equipment and components	3359	1.5	0.2	0.9	0.4
Motor vehicles	3361	3.1	0.4	2.6	0.1
Motor vehicle bodies and trailers	3362	1.2	0.1	1.6	-0.4
Motor vehicle parts	3363	2.9	0.0	1.9	1.0
Aerospace products and parts	3364	2.1	0.5	1.7	-0.1
Railroad rolling stock	3365	3.6	0.1	3.2	0.3
Ship and boat building	3366	1.8	0.1	1.4	0.3
Other transportation equipment	3369	3.7	0.5	2.0	1.1
Household and institutional furniture	3371	1.3	0.2	1.0	0.1
Office furniture and fixtures	3372	1.3	0.3	0.9	0.1
Other furniture related products	3379	2.1	0.1	1.3	0.7
Medical equipment and supplies	3391	2.2	0.8	0.7	0.6
Other miscellaneous manufacturing	3399	1.4	0.3	0.7	0.4
Transportation					
Air transportation	481	3.0	0.8	0.9	1.3
Line-haul railroads	482111	3.6	0.7	1.3	1.5