



# Multifactor Productivity Measures for Three-digit SIC Manufacturing Industries, 1990-99

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Gains in multifactor productivity occurred over the period 1990 to 1999 in more than two-thirds of the 108 three-digit SIC industries in manufacturing for which the Bureau of Labor Statistics (BLS) publishes data.<sup>1</sup> (See table 1.) Multifactor productivity measures the change in output relative to the change in the combination of labor, capital, and intermediate purchases inputs.

This report presents data on multifactor productivity and related series for the years 1990 to 1999 and updates the measures previously published.<sup>2</sup> Some series have been revised for 1996 and prior years. Published indexes for multifactor productivity and related series also are available at <http://stats.bls.gov/mfp/home.htm>. Series for unpublished industries are available upon request. E-mail requests for information may be sent to [dipsweb@bls.gov](mailto:dipsweb@bls.gov).

## Industry developments

Over the study period, 43 industries had multifactor productivity increases of 0.1 percent to 1.0 percent per year, on average. In 25 industries, multifactor productivity growth averaged 1.1 percent to 2.0 percent per year. Nine industries managed to achieve growth rates in multifactor productivity exceeding 2.0 percent. Of these nine, two industries had average annual growth rates far exceeding those of all other manufacturing industries—computer and office equipment (SIC 357), at 22.9 percent, and electronic components and accessories (SIC 367), at 19.8 percent. The manufacturing sector as a whole averaged 1.8-percent growth per year in multifactor productivity over the 1990-99 period.

Communications equipment (SIC 366) also had strong growth—4.0 percent per year, on average. A multifactor productivity series also is available for the railroad transportation industry, SIC 4011. That industry had an average annual gain of 3.0 percent for the 1990-99 period.

Twenty-six industries recorded declines in multifactor productivity, ranging from -0.1 percent to -3.3 percent. Of these, 17 had decreases of less than 1.0 percent per year, on average.

The 10 largest industries by employment size had widely varying rates of multifactor productivity change, although only one of these had a decline for the period as a whole. Motor vehicles and equipment (SIC 371)—the largest industry in manufacturing, with 1,018,000 employees—had an average annual gain of 0.6 percent. The electronic components and accessories industry and the computer and office equipment industry not only had the greatest productivity growth rates, as mentioned above, but were also the third and seventh largest industries, with 641,000 and 368,000 employees as of 1999.

Miscellaneous plastics products n.e.c. (SIC 308)—the second largest industry, with 743,000 employees—increased multifactor productivity at a 1.3-percent average rate over the 1990-99 period, while the same measure for the 567,000-employee commercial printing industry (SIC 275) barely rose, at a 0.1-percent average rate. Aircraft and parts (SIC 372), with 496,000 employees, saw an average gain of 1.6 per year. Multifactor productivity for industrial machinery, n.e.c. (SIC 359), with 366,000 employees, rose 0.9 percent annually, on average. Smaller average gains of 0.3 percent each prevailed in the 484,000-employee fabricated structural metal products industry (SIC 344) and in the 340,000-employee metalworking machinery industry (SIC 354). Millwork, plywood, and structural members (SIC 243)—the tenth largest industry in manufacturing at 325,000 employees—had a slight, 0.1-percent decline in multifactor productivity on average over the period.

In May 2001, BLS noted that a widespread acceleration in *labor productivity* had occurred in manufacturing industries during the latter part of the 1990's, compared with developments during the first half of the decade.<sup>3</sup> For the 1995-99 period, 72 (or about three-fifths) of 119 industries had higher rates of labor productivity growth than they had in the 1990-95 period. This did not hold true, however, for multifactor productivity. (See table 2.) Only 38 (or slightly more than one-third) of the 106 industries for which multifactor productivity measures have been extended through 1999 had higher rates of multifactor productivity growth in the latter period than in the earlier one.<sup>4</sup> More industries

<sup>1</sup> Estimates for two industries (Newspapers, SIC 271 and Greeting cards, SIC 277) were not updated beyond 1996 because there were not adequate data to extend them on an SIC basis.

<sup>2</sup> *Multifactor Productivity Measures for Three-digit Manufacturing Industries*, Report 948 (Bureau of Labor Statistics, December 2000).

<sup>3</sup> "Productivity and Costs: Manufacturing Industries, 1990-99," USDL 01-141 (Bureau of Labor Statistics, May 15, 2001).

<sup>4</sup> Multifactor productivity measures are unpublished for 11 indus-

experienced accelerated growth in nonlabor inputs during the second period than saw such growth in labor input: whereas labor input accelerated for only 48 industries, capital growth did so for 83 industries and intermediate purchases growth accelerated for 59 industries.

The computer and office equipment industry and the electronic components and accessories industry again were notable in terms of an acceleration in multifactor productivity growth. The former industry posted a 16.1-percent average rise in multifactor productivity over the 1990-95 period, and an even more impressive 31.9-percent rate thereafter. The latter industry's rate rose from 17.7 percent per year in the earlier period to 22.6 percent after 1995.

Two other large industries, motor vehicles and equipment and aircraft and parts, had major accelerations in multifactor productivity growth rates later in the 1990s. Motor vehicles and equipment manufacturing vaulted from an average decline of 0.7 percent from 1990 to 1995 to a gain of 2.2 percent after 1995. The aircraft and parts industry increased its rate of gain in productivity from 0.6 percent in the earlier period to 2.8 percent after 1995.

## Methods and data sources

Multifactor productivity indexes relate the change in output to the change in the combination of labor, capital, and intermediate purchases inputs consumed in producing that output. Because they incorporate a measure of combined inputs, multifactor productivity measures are not influenced by the substitution of capital and intermediate inputs for labor, as are measures of labor productivity. Multifactor productivity is calculated by dividing a Tornqvist index of output by a Tornqvist index of combined inputs.<sup>5</sup>

*Output.* Output quantities for most industries are based on the value of output adjusted for price change. The value of shipments of primary products, wherever made, for each product class is taken from the U.S. Census Bureau's Annual Surveys of Manufactures (ASM). These product class values are deflated with matching BLS producer price indexes (PPIs) and are Tornqvist-aggregated to the four-digit SIC industry level. For each year, special coverage ratios for each industry are used to adjust the wherever-made indexes to an industry basis. The resultant industry indexes are further adjusted to reflect changes in inventories to yield a measure of production during the given year.

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tries for which labor productivity measures are published. This and the fact that multifactor measures were not updated for the two industries mentioned earlier account for the difference in the total number of industries cited here.

<sup>5</sup> A Tornqvist index of output is developed by computing a weighted average of the growth rates of the various industry products between two periods, with weights based on the products' shares in industry value of production. The weight for each product equals its average value share in the two periods. For a more complete discussion of the Tornqvist methodology see Kent Kunze, Mary Jablonski, and Virginia Klarquist, "BLS modernizes industry labor productivity program," *Monthly Labor Review*, July 1995, pp. 3-12.

Every 5 years, BLS develops benchmark output indexes that incorporate data from the Censuses of Manufactures (CM), which are more detailed than those available in the ASMs. Adjustments are derived from these data to remove resales and intra-industry transactions in order to avoid double counting of output. The annual output indexes based on ASM data are adjusted to the quinquennial benchmark levels by linear interpolation.

Four-digit industry output indexes are Tornqvist-aggregated to the three-digit industry level. In the process of this last aggregation, adjustments are developed to remove a second level of double counting—those transactions between four-digit industries within the same three-digit industry.

*Combined inputs.* The index of combined inputs is a Tornqvist aggregate of separate indexes of labor input, capital input, and intermediate purchases input. The labor share weight is based on the total value of labor compensation, including fringe benefits. The intermediate purchases share weight is based on the total value of materials (adjusted to remove intra-industry transactions), fuels, electricity, and purchased services. The capital share weight is a residual calculated as the value of net production minus the value of labor compensation minus the value of intermediate purchases.

*Labor input.* The labor input indexes are developed by dividing the aggregate employee hours for each year by the base-period aggregate. Because of data limitations, employee hours are treated as homogeneous and additive, with no distinction made between hours of different groups of employees. Annual hours of all employees are derived by summing the aggregate hours for production workers and the estimated hours for nonproduction workers. Data on employment and hours are based on BLS surveys.

*Capital.* The measure of capital input is based on the flow of services derived from the stock of physical assets. Physical capital is composed of equipment, structures, land, and inventories. Capital services are estimated by calculating capital stocks; changes in the stocks are assumed to be proportional to changes in capital services for each asset. Stocks of different asset types are Tornqvist-aggregated using estimated rental prices to construct the weights for assets of different types.

Capital stocks are calculated using the perpetual inventory method, which takes into account the continual additions to and subtractions from the stock of capital as new investment and retirement of old capital take place. The perpetual inventory method measures stocks at the end of a year equal to a weighted sum of all past investments, where the weights are the asset's efficiency relative to a new asset. A hyperbolic age-efficiency function is used to calculate the relative efficiency of an asset at different ages. The hyperbolic age-efficiency function can be expressed as:

$$S_t = [L - t]/[L - (B)t]$$

where:

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

The parameter of efficiency decline is assumed to be 0.5 for equipment and 0.75 for structures. These parameters yield a function in which assets lose efficiency more slowly at first, then rapidly later in life.

Price change must be removed from the investment data before stocks are calculated. Industry-specific price deflators for each asset category are constructed by combining detailed price indexes (mostly PPIs) with weights based on the capital flow tables from the U.S. Commerce Department's Bureau of Economic Analysis (BEA).<sup>6</sup> These deflators are used to convert the current-dollar investment to constant dollars. The investment data are broken out annually into 24 categories of equipment and 2 categories of structures. These estimates are based on the 1992 BEA capital flow table and the biproportional matrix method.<sup>7</sup> Service lives for the perpetual inventory are taken from those used for each asset in the two-digit SIC multifactor measures prepared by BLS.

Current-dollar values of inventory stocks are calculated for three separate categories of manufacturers' inventories: Finished goods, work in process, and materials and supplies. Inventory stocks for each year are calculated as the average of the end-of-year stocks in years  $t$  and  $t-1$  to represent the average used during the year as a whole. This also is done with equipment, structures, and land. Inventory values for finished goods and work in process are deflated using an industry output implicit price deflator. The values of materials and supplies inventories are deflated with a deflator prepared by combining price indexes with weights based on detailed materials consumed from the CM. Land stocks are estimated as a function of the movement in constant-dollar gross structures stocks for the given industry.

The various equipment, structure, inventory, and land stock series in constant dollars are aggregated into one capital input measure, with implicit rental prices being used to construct the weights. Rental prices are calculated for each asset as:

$$RP = [(P \times R) + (P \times D) - (P^t - P^{t-1})] \times (1 - uz - k)/(1 - u)$$

where:

- $RP$  = the rental price;
- $P$  = the deflator for the asset;
- $R$  = the internal rate of return;
- $D$  = the rate of depreciation for the asset; and
- $P^t - P^{t-1}$  = the capital gain term for the asset (an average of the current and 2 preceding

<sup>6</sup> The 1992 table is available from the BEA Web site: <http://www.bea.doc.gov/bea/dn2.htm>.

<sup>7</sup> The biproportional matrix method produces estimates of all cells in a matrix for year  $n+1$  when a full matrix is available in year  $n$  and only row and column sums are available in year  $n+1$ .

years' price change).<sup>8</sup>

The term  $(1 - uz - k)/(1 - u)$  reflects the effects of taxation

where:

- $u$  = the corporate tax rate;
- $z$  = the present value of \$1 of depreciation deductions; and
- $k$  = the effective investment tax credit rate.

This method of calculating rental prices is similar to that used in calculating multifactor productivity for major sectors of the economy except that no attempt is made to incorporate the effects of indirect business taxes, for which data are lacking at the industry level. Rental prices are expressed in rates per constant dollar of productive capital stocks. Each rental price is multiplied by its constant-dollar capital stock to obtain current-dollar capital costs, which are then converted to value shares for Tornqvist aggregation.

*Intermediate purchases.* The index of intermediate purchases input is constructed as a Tornqvist aggregate of separate indexes of change in the quantity of materials, services, fuels, and electricity consumed by an industry. Except for electricity, for which direct quantity data are available, quantities are derived by deflating current-dollar values with appropriate price deflators. Annual current dollar values of total materials consumed for each industry come from the ASM and CM.

To avoid double counting, the materials estimates exclude, whenever possible, the value of intra-industry purchases. Estimates of materials purchased from other establishments within the industry are subtracted from the gross measure of materials costs to derive estimates of "net" materials consumed.

Constant-dollar net materials consumed by each industry are derived by dividing the annual current-dollar values by an industry-specific materials price deflator. To construct the materials price deflator, detailed producer price indexes are combined using weights based on the values of specific materials consumed by each industry. Data to construct these weights come from the CM and the BEA benchmark input-output tables.<sup>9</sup>

With the most recent round of multifactor productivity estimates, the methodology for constructing intermediate purchases input was changed to incorporate import price indexes for industries having significant purchases of imported materials. The inclusion of import prices caused a revision in the materials deflator in 26 industries. The effects of the revision were generally small, however; the revision caused the growth

<sup>8</sup> See Michael J. Harper, Ernst R. Berndt, and David O. Wood, "Rates of Return and Capital Aggregation Using Alternative Rental Prices," in Dale W. Jorgenson and Ralph Landau, eds., *Technology and Capital Formation* (Cambridge, MA, The MIT Press, 1989).

<sup>9</sup> The most recent table is *Benchmark Input-Output Accounts of the United States, 1992* (Washington, U.S. Department of Commerce, Bureau of Economic Analysis, September 1998).

rate of the materials deflator to change by less than 0.1 percent per year over the entire period in all but five industries.

Annual data on the total value of all fuels consumed by industry, also from the ASM and CM, are deflated with industry-specific price deflators. Producer price indexes for specific types of fuel are aggregated, by industry, using weights based on the nominal values of those fuels consumed. Data for estimating the weights are from the ASM, supplemented for some industries with data from the U.S. Department of Energy. Because both the value and the quantity of purchased electricity are available annually by industry from the ASM and CM, electricity is treated as a separate component of intermediate purchases. Estimates of price and quantity of

electricity are derived directly from the ASM and CM data.

The annual cost of materials data do not include the value of purchased services. As a result, current-dollar services purchased by each industry are estimated based on proportions from the BEA benchmark input/output tables. Because of a lack of historical data on price indexes for services, the aggregate, fixed-weight materials deflator is used for deflating current-dollar services as well as materials.

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Table 1. Multifactor productivity and related data for 108 industries, average annual percent change, 1990-99

SIC code	Industry	Employment, 1999 (000's)	Multifactor productivity	Output	Combined inputs	Labor	Capital	Intermediate purchases
202	Dairy products	143	-0.2	0.2	0.3	-0.5	1.5	0.3
203	Preserved fruits and vegetables	224	.5	1.6	1.1	-9	1.7	1.3
204	Grain mill products	125	-.5	2.1	2.6	-3	2.4	3.0
205	Bakery products	204	.7	1.3	.6	-3	2.1	.7
206	Sugar and confectionery products	93	1.4	1.7	.2	-9	1.7	-4
207	Fats and oils	29	-.3	1.9	2.3	-1.2	1.5	2.6
208	Beverages	185	.2	1.6	1.4	.2	.5	2.2
209	Miscellaneous food and kindred products	177	.0	1.4	1.3	-.4	2.0	1.4
221	Broadwoven fabric mills, cotton	66	-1.0	.1	1.1	-3.1	-1.7	3.1
222	Broadwoven fabric mills, manmade	58	1.6	2.0	.4	-2.8	.0	1.8
224	Narrow fabric mills	20	.5	.9	.3	-1.8	1.7	1.1
225	Knitting mills	141	.2	-.6	-.9	-3.9	.2	.3
226	Textile finishing, except wool	61	.8	1.9	1.1	-.3	.3	1.7
227	Carpets and rugs	65	1.0	1.2	.2	.6	-.3	.4
228	Yarn and thread mills	84	-.3	3.0	3.3	-1.8	.6	5.1
229	Miscellaneous textile goods	55	-.1	2.7	2.8	1.0	2.7	3.4
232	Men's and boys' furnishings	154	.4	.6	.2	-6.0	.9	2.5
233	Women's and misses' outerwear	203	.5	1.0	.5	-4.7	1.6	2.3
234	Women's and children's undergarments	27	2.0	1.9	-.1	-9.4	-1.8	3.8
235	Hats, caps, and millinery	15	.4	.8	.4	-1.4	2.7	1.1
238	Miscellaneous apparel and accessories	31	-1.2	-2.2	-1.0	-3.8	-1.4	.4
239	Miscellaneous fabricated textile products	218	.3	3.7	3.4	.8	4.1	4.4
242	Sawmills and planing mills	182	.3	2.0	1.7	-.6	-.1	2.6
243	Millwork, plywood, and structural members	325	-.1	1.9	2.0	2.8	1.9	1.7
244	Wood containers	59	.4	1.9	1.5	2.5	.9	1.3
245	Wood buildings and mobile homes	101	.3	5.5	5.2	6.3	1.5	5.4
249	Miscellaneous wood products	86	.1	3.2	3.1	.1	2.7	4.1
251	Household furniture	289	.9	2.6	1.7	.2	.8	2.5
252	Office furniture	75	1.1	3.3	2.1	1.6	2.0	2.5
253	Public building and related furniture	51	.7	12.0	11.3	5.2	7.0	13.3
254	Partitions and fixtures	91	1.6	5.1	3.5	1.9	2.9	4.5
259	Miscellaneous furniture and fixtures	42	-.1	3.1	3.2	1.2	3.4	4.1
262	Paper mills	146	.2	-.2	-.5	-2.2	.8	-.3
263	Paperboard mills	48	.5	1.8	1.3	-1.1	1.6	1.8
265	Paperboard containers and boxes	219	-.2	2.0	2.1	.7	1.4	2.7
267	Miscellaneous converted paper products	243	1.0	2.7	1.6	.1	2.4	1.8
271	Newspapers	442	NA	-1.3	NA	-.8	NA	NA
275	Commercial printing	567	.1	1.7	1.6	.4	4.3	1.5
276	Manifold business forms	45	-2.6	-4.2	-1.6	-1.7	-1.1	-1.8
277	Greeting cards	27	NA	.7	NA	.3	NA	NA

NA - data are not available.

Table 1. Multifactor productivity and related data for 108 industries, average annual percent change, 1990-99—Continued

SIC code	Industry	Employment, 1999 (000's)	Multifactor productivity	Output	Combined inputs	Labor	Capital	Intermediate purchases
278	Blankbooks and bookbinding	63	-0.1	1.2	1.3	-1.2	2.4	3.0
279	Printing trade services	50	.5	-6	-1.1	-2.7	2.3	-9
281	Industrial inorganic chemicals	99	2.9	2.3	-6	-2.9	.1	.1
282	Plastics materials and synthetics	155	.8	2.6	1.8	-1.5	2.8	2.1
283	Drugs	297	-3.3	2.6	6.1	2.5	6.3	7.3
285	Paints and allied products	53	-1.7	.2	2.0	-1.6	.7	3.3
286	Industrial organic chemicals	126	-2.7	-1.1	1.6	-2.1	3.0	1.8
287	Agricultural chemicals	54	-1	.3	.4	.1	.2	.6
289	Miscellaneous chemical products	92	-2	2.2	2.3	-9	2.7	3.0
291	Petroleum refining	89	1.3	1.3	.0	-3.5	1.1	.0
295	Asphalt paving and roofing materials	28	.1	3.3	3.2	1.4	1.6	3.8
299	Miscellaneous petroleum and coal products	15	-6	1.4	2.0	1.9	1.0	2.0
301	Tires and inner tubes	79	2.7	3.2	.5	-7	-4	1.4
305	Hose and belting and gaskets and packing	74	.7	4.3	3.5	2.3	.5	5.2
306	Fabricated rubber products, n.e.c.	108	1.5	3.4	1.9	.5	1.9	2.6
308	Miscellaneous plastics products, n.e.c.	743	1.3	5.3	4.0	2.0	4.8	4.7
314	Footwear, except rubber	34	-7	-5.8	-5.2	-8.5	-3.1	-4.1
321	Flat glass	16	4.5	3.6	-9	-1.1	-1	-1.3
322	Glass and glassware, pressed or blown	65	2.4	.7	-1.7	-2.8	.0	-2.3
323	Products of purchased glass	65	1.4	5.5	4.1	1.3	4.3	5.3
324	Cement, hydraulic	17	2.2	2.4	.2	.0	-1.2	1.4
325	Structural clay products	33	1.7	.6	-1.2	-8	-1.3	-1.3
326	Pottery and related products	39	1.2	2.6	1.4	.3	.9	2.7
327	Concrete, gypsum, and plaster products	240	1.1	3.3	2.3	2.1	.1	2.8
329	Miscellaneous nonmetallic mineral products	75	1.1	1.8	.7	-3	.0	1.5
331	Blast furnace and basic steel products	227	1.2	1.6	.4	-1.8	-1.6	2.0
333	Primary nonferrous metals	37	-4	.5	.9	-2.2	.1	1.7
335	Nonferrous rolling and drawing	170	1.3	3.1	1.8	.0	1.0	2.5
336	Nonferrous foundries (castings)	93	1.6	4.7	3.1	2.1	2.5	3.9
339	Miscellaneous primary metal products	28	.4	3.6	3.2	.5	1.4	5.4
341	Metal cans and shipping containers	36	2.0	.1	-1.9	-3.3	.0	-1.8
342	Cutlery, handtools, and hardware	123	.5	2.1	1.6	-6	1.3	3.0
343	Plumbing and heating, except electric	59	.4	2.8	2.4	.4	1.3	3.8
344	Fabricated structural metal products	484	.3	3.1	2.8	1.6	1.1	3.7
347	Metal services, n.e.c.	145	.7	4.4	3.7	2.1	3.4	4.9
348	Ordnance and accessories, n.e.c.	41	-1.0	-5.1	-4.1	-6.3	-1.7	-3.2
349	Miscellaneous fabricated metal products	271	.2	3.0	2.8	1.6	2.2	3.6
351	Engines and turbines	87	1.4	3.9	2.5	-1	1.7	3.7
352	Farm and garden machinery	98	-1.3	.0	1.3	-8	1.2	2.1
353	Construction and related machinery	243	.3	3.6	3.3	.8	.2	4.8

NA - data are not available.

**Table 1. Multifactor productivity and related data for 108 industries, average annual percent change, 1990-99—Continued**

SIC code	Industry	Employment, 1999 (000's)	Multifactor productivity	Output	Combined inputs	Labor	Capital	Intermediate purchases
354	Metalworking machinery	340	0.3	2.6	2.2	0.3	1.5	4.0
355	Special industry machinery	170	.5	3.5	3.0	.6	3.4	4.2
356	General industrial machinery	255	-.8	1.4	2.2	.4	1.5	3.6
357	Computer and office equipment	368	22.9	30.8	6.5	-1.9	6.5	9.3
358	Refrigeration and service machinery	212	.6	4.5	3.9	2.5	2.2	4.9
359	Industrial machinery, n.e.c.	366	.9	4.2	3.2	1.6	3.2	4.8
361	Electric distribution equipment	83	1.1	2.0	.9	-1.6	.2	2.4
362	Electrical industrial apparatus	151	.6	3.4	2.7	-1.3	1.2	5.4
363	Household appliances	117	2.2	3.7	1.5	-.3	.3	2.3
364	Electric lighting and wiring equipment	184	1.1	3.2	2.0	.0	1.0	3.5
366	Communications equipment	269	4.0	11.4	7.1	.0	5.5	11.7
367	Electronic components and accessories	641	19.8	27.5	6.4	1.2	9.9	6.8
369	Miscellaneous electrical equipment & supplies	148	1.8	4.1	2.3	-.8	2.7	3.6
371	Motor vehicles and equipment	1018	.6	6.4	5.8	3.1	3.2	7.0
372	Aircraft and parts	496	1.6	-.1	-1.7	-3.9	1.2	-1.0
373	Ship and boat building and repairing	167	.0	-.3	-.3	-1.2	-1.0	.5
375	Motorcycles, bicycles, and parts	20	1.7	7.7	5.9	4.6	4.6	6.2
376	Guided missiles, space vehicles, parts	87	.4	-4.8	-5.2	-8.0	-2.0	-4.9
381	Search and navigation equipment	164	-.1	-3.5	-3.3	-5.8	-1.8	-1.5
382	Measuring and controlling devices	294	.4	3.0	2.6	-1.1	3.9	4.8
384	Medical instruments and supplies	284	.3	5.3	5.0	1.6	6.5	6.2
385	Ophthalmic goods	34	1.8	4.8	3.0	-2.3	7.7	5.4
386	Photographic equipment & supplies	73	.2	.3	.2	-3.1	.3	1.7
391	Jewelry, silverware, and plated ware	51	.3	3.0	2.7	-.3	1.3	4.3
393	Musical instruments	17	-1.1	1.6	2.8	3.0	-.2	4.1
394	Toys and sporting goods	102	-.2	1.9	2.0	.3	1.8	2.7
395	Pens, pencils, office, and art supplies	31	1.1	-.4	-1.5	-1.4	1.1	-2.2
399	Miscellaneous manufactures	171	.0	3.0	3.1	2.5	2.9	3.4
4011	Railroad transportation	204	3.0	2.7	-.3	-2.1	-.7	2.2

NA - data are not available.

**Table 2. Multifactor productivity in 108 industries, falloff/advance from 1990-95 to 1995-99**

SIC code	Industry	Employment, 1999 (000's)	Average annual percent change		Falloff/advance from 1990-95 to 1995-99
			1990-95 Multifactor productivity	1995-99 Multifactor productivity	
202	Dairy products	143	0.2	-0.7	-1.0
203	Preserved fruits and vegetables	224	.9	.1	-.8
204	Grain mill products	125	.8	-2.1	-2.8
205	Bakery products	204	.7	.6	-.1
206	Sugar and confectionery products	93	.8	2.2	1.4
207	Fats and oils	29	-.2	-.4	-.2
208	Beverages	185	1.2	-1.0	-2.2
209	Miscellaneous food and kindred products	177	1.2	-1.4	-2.6
221	Broadwoven fabric mills, cotton	66	.3	-2.5	-2.8
222	Broadwoven fabric mills, manmade	58	2.8	.0	-2.9
224	Narrow fabric mills	20	2.0	-1.3	-3.3
225	Knitting mills	141	2.3	-2.3	-4.7
226	Textile finishing, except wool	61	.4	1.3	.9
227	Carpets and rugs	65	2.2	-.6	-2.8
228	Yarn and thread mills	84	.7	-1.5	-2.1
229	Miscellaneous textile goods	55	.2	-.5	-.8
232	Men's and boys' furnishings	154	.2	.6	.4
233	Women's and misses' outerwear	203	.7	.3	-.4
234	Women's and children's undergarments	27	.9	3.3	2.4
235	Hats, caps, and millinery	15	-.3	1.3	1.6
238	Miscellaneous apparel and accessories	31	.5	-3.3	-3.8
239	Miscellaneous fabricated textile products	218	.8	-.4	-1.2
242	Sawmills and planing mills	182	1.5	-1.1	-2.6
243	Millwork, plywood, and structural members	325	-.1	.0	.1
244	Wood containers	59	1.3	-.7	-2.0
245	Wood buildings and mobile homes	101	.0	.7	.7
249	Miscellaneous wood products	86	-.1	.4	.5
251	Household furniture	289	1.0	.8	-.3
252	Office furniture	75	.5	1.9	1.3
253	Public building and related furniture	51	.7	.7	.0
254	Partitions and fixtures	91	.9	2.6	1.7
259	Miscellaneous furniture and fixtures	42	-.5	.5	1.1
262	Paper mills	146	1.4	-1.2	-2.6
263	Paperboard mills	48	.5	.5	.0
265	Paperboard containers and boxes	219	-1.3	1.3	2.6
267	Miscellaneous converted paper products	243	1.2	.8	-.4
271	Newspapers	442	-3.3	NA	NA
275	Commercial printing	567	.8	-.7	-1.5
276	Manifold business forms	45	-3.0	-2.1	.9
277	Greeting cards	27	-2.2	NA	NA

NA - Data are not available.



**Table 2. Multifactor productivity in 108 industries, falloff/advance from 1990-95 to 1995-99—Continued**

SIC code	Industry	Employment, 1999 (000's)	Average annual percent change		Falloff/advance from 1990-95 to 1995-99
			1990-95 Multifactor productivity	1995-99 Multifactor productivity	
278	Blankbooks and bookbinding	63	0.1	-0.4	-0.5
279	Printing trade services	50	1.6	-.9	-2.4
281	Industrial inorganic chemicals	99	.6	5.8	5.3
282	Plastics materials and synthetics	155	.9	.7	-.2
283	Drugs	297	-2.6	-4.1	-1.5
285	Paints and allied products	53	-1.3	-2.3	-1.0
286	Industrial organic chemicals	126	-2.9	-2.3	.6
287	Agricultural chemicals	54	-.4	.2	.6
289	Miscellaneous chemical products	92	-.8	.7	1.5
291	Petroleum refining	89	.7	2.1	1.4
295	Asphalt paving and roofing materials	28	.7	-.7	-1.4
299	Miscellaneous petroleum and coal products	15	-2.5	1.9	4.3
301	Tires and inner tubes	79	3.2	2.0	-1.3
305	Hose and belting and gaskets and packing	74	.9	.5	-.4
306	Fabricated rubber products, n.e.c.	108	1.9	1.0	-.9
308	Miscellaneous plastics products, n.e.c.	743	1.3	1.2	.0
314	Footwear, except rubber	34	.5	-2.1	-2.6
321	Flat glass	16	3.8	5.5	1.7
322	Glass and glassware, pressed or blown	65	2.1	2.9	.8
323	Products of purchased glass	65	1.5	1.3	-.2
324	Cement, hydraulic	17	2.9	1.4	-1.5
325	Structural clay products	33	.6	3.2	2.5
326	Pottery and related products	39	1.5	.9	-.7
327	Concrete, gypsum, and plaster products	240	.3	2.1	1.8
329	Miscellaneous nonmetallic mineral products	75	2.0	-.1	-2.1
331	Blast furnace and basic steel products	227	1.6	.6	-1.1
333	Primary nonferrous metals	37	-2.7	2.6	5.3
335	Nonferrous rolling and drawing	170	.9	1.9	1.0
336	Nonferrous foundries (castings)	93	3.1	-.3	-3.5
339	Miscellaneous primary metal products	28	1.7	-1.1	-2.9
341	Metal cans and shipping containers	36	2.5	1.4	-1.2
342	Cutlery, handtools, and hardware	123	.3	.8	.5
343	Plumbing and heating, except electric	59	1.0	-.3	-1.3
344	Fabricated structural metal products	484	1.2	-.7	-1.9
347	Metal services, n.e.c.	145	1.7	-.6	-2.3
348	Ordnance and accessories, n.e.c.	41	-.8	-1.3	-.6
349	Miscellaneous fabricated metal products	271	.6	-.3	-1.0
351	Engines and turbines	87	.3	2.7	2.3
352	Farm and garden machinery	98	-.2	-2.7	-2.5
353	Construction and related machinery	243	.6	-.2	-.9

NA - Data are not available.

**Table 2. Multifactor productivity in 108 industries, falloff/advance from 1990-95 to 1995-99—Continued**

SIC code	Industry	Employment, 1999 (000's)	Average annual percent change		Falloff/advance from 1990-95 to 1995-99
			1990-95 Multifactor productivity	1995-99 Multifactor productivity	
354	Metalworking machinery	340	1.4	-1.0	-2.3
355	Special industry machinery	170	2.1	-1.4	-3.5
356	General industrial machinery	255	-.1	-1.7	-1.6
357	Computer and office equipment	368	16.1	31.9	15.9
358	Refrigeration and service machinery	212	.9	.3	-.6
359	Industrial machinery, n.e.c.	366	3.4	-2.1	-5.5
361	Electric distribution equipment	83	2.7	-.8	-3.4
362	Electrical industrial apparatus	151	2.4	-1.5	-3.9
363	Household appliances	117	2.5	1.8	-.7
364	Electric lighting and wiring equipment	184	1.0	1.3	.3
366	Communications equipment	269	5.5	2.1	-3.4
367	Electronic components and accessories	641	17.7	22.6	4.9
369	Miscellaneous electrical equipment & supplies	148	2.7	.6	-2.1
371	Motor vehicles and equipment	1018	-.7	2.2	2.9
372	Aircraft and parts	496	.6	2.8	2.3
373	Ship and boat building and repairing	167	-1.2	1.5	2.7
375	Motorcycles, bicycles, and parts	20	3.1	.0	-3.1
376	Guided missiles, space vehicles, parts	87	-2.8	4.4	7.2
381	Search and navigation equipment	164	1.9	-2.6	-4.5
382	Measuring and controlling devices	294	1.9	-1.4	-3.2
384	Medical instruments and supplies	284	-.8	1.6	2.5
385	Ophthalmic goods	34	1.4	2.3	.8
386	Photographic equipment & supplies	73	1.4	-1.4	-2.8
391	Jewelry, silverware, and plated ware	51	-3.0	4.6	7.5
393	Musical instruments	17	-1.6	-.6	1.0
394	Toys and sporting goods	102	.6	-1.1	-1.6
395	Pens, pencils, office, and art supplies	31	3.8	-2.1	-5.9
399	Miscellaneous manufactures	171	.6	-.8	-1.4
4011	Railroad transportation	204	4.2	1.4	-2.8

NA - Data are not available.