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## **MULTIFACTOR PRODUCTIVITY TRENDS FOR DETAILED INDUSTRIES, 2006**

Multifactor productivity – defined as output per unit of combined inputs – increased in almost three out of five four-digit NAICS manufacturing industries in 2006. More manufacturing industries experienced an increase in multifactor productivity over a longer period. From 1987 to 2006, multifactor productivity increased in almost two-thirds of manufacturing industries.

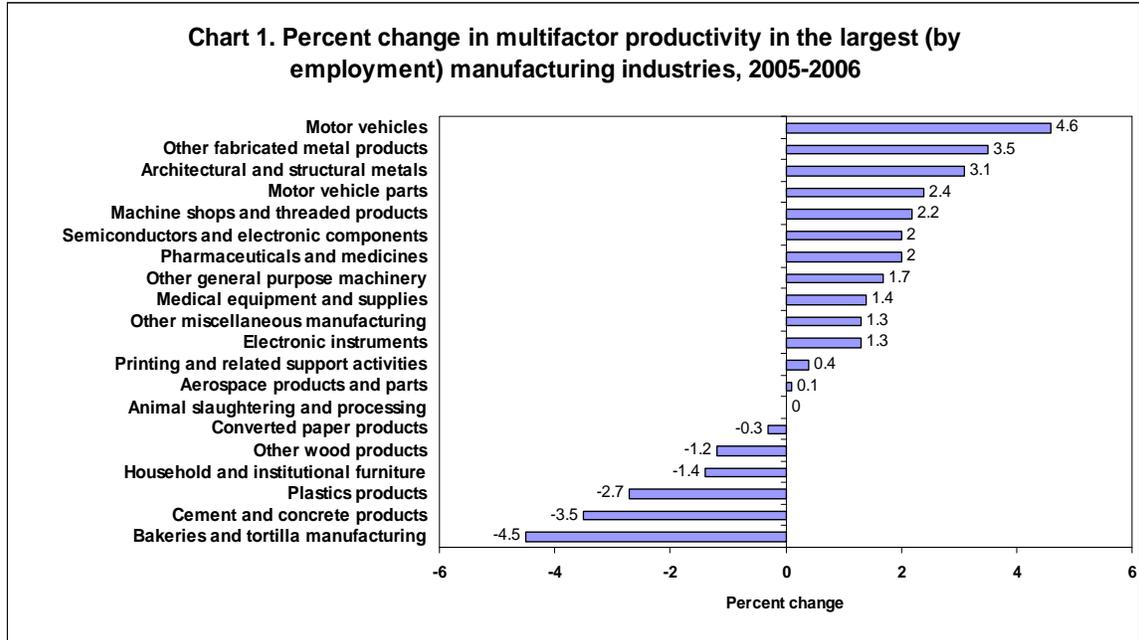
This news release now covers two transportation industries, air transportation (NAICS 481) and line-haul railroads (NAICS 482111), that were previously published in separate reports. Multifactor productivity increased for both of these transportation industries in 2006 and over the longer term.

Multifactor productivity indexes relate the change in output to the change in the combined inputs of labor, capital, and intermediate purchases consumed in producing that output. Multifactor productivity measures the joint influences on economic growth of a variety of factors, including technological change, returns to scale, enhancements in managerial and staff skills, changes in the organization of production, and other efficiency improvements.

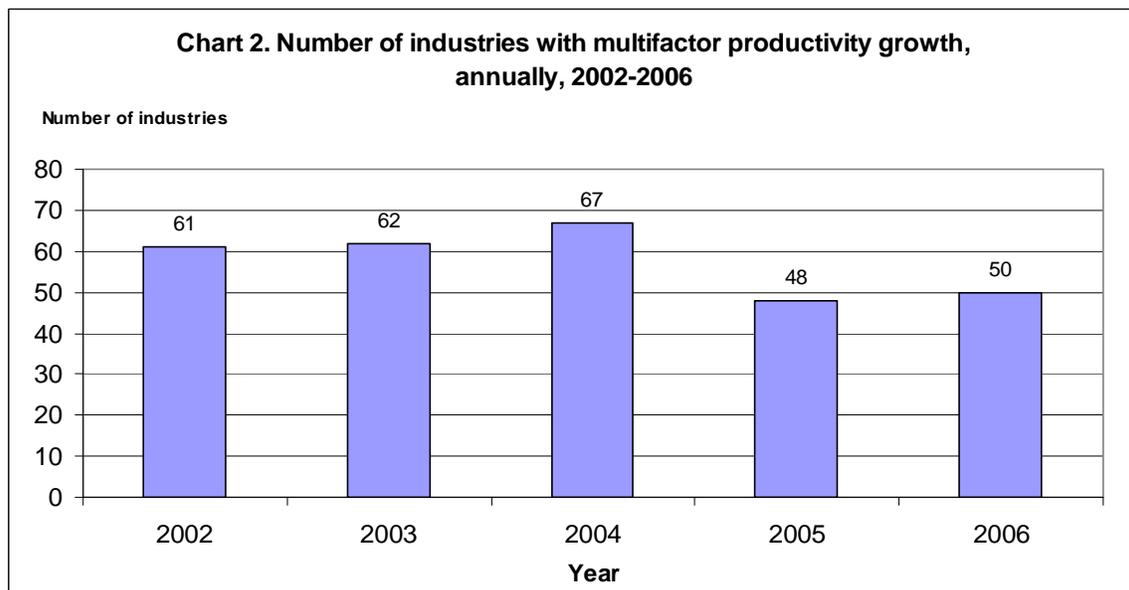
### **2005-06, Manufacturing Industries**

Multifactor productivity rose in 50 of the 86 manufacturing industries in 2006, as output rose in 48 industries and combined inputs declined in 35 industries. Changes in multifactor productivity were broadly distributed and varied greatly across industries, even within 3-digit industry groups. (See Table 1.)

The largest increase in multifactor productivity, 23.9 percent, occurred in computer and peripheral equipment (NAICS 3341), followed by an increase of 13.5 percent in communications equipment (NAICS 3342). Output rose rapidly in those industries, greatly exceeding the growth in combined inputs. Multifactor productivity declined 16.0 percent in other nonferrous metal production (NAICS 3314), where combined inputs rose although output decreased. The largest industries had more moderate movements in multifactor productivity. Changes for the twenty largest manufacturing industries varied from -4.5 percent to 4.6 percent. (See Chart 1.)



The number of manufacturing industries with annual multifactor productivity growth increased slightly in 2006 after dropping from 2004 to 2005. (See Chart 2.) For most industries, input growth in 2006 was led by increases in intermediate purchases. Purchases of intermediates increased in 54 industries, while capital services increased in 36 industries and labor hours rose in 37 industries.

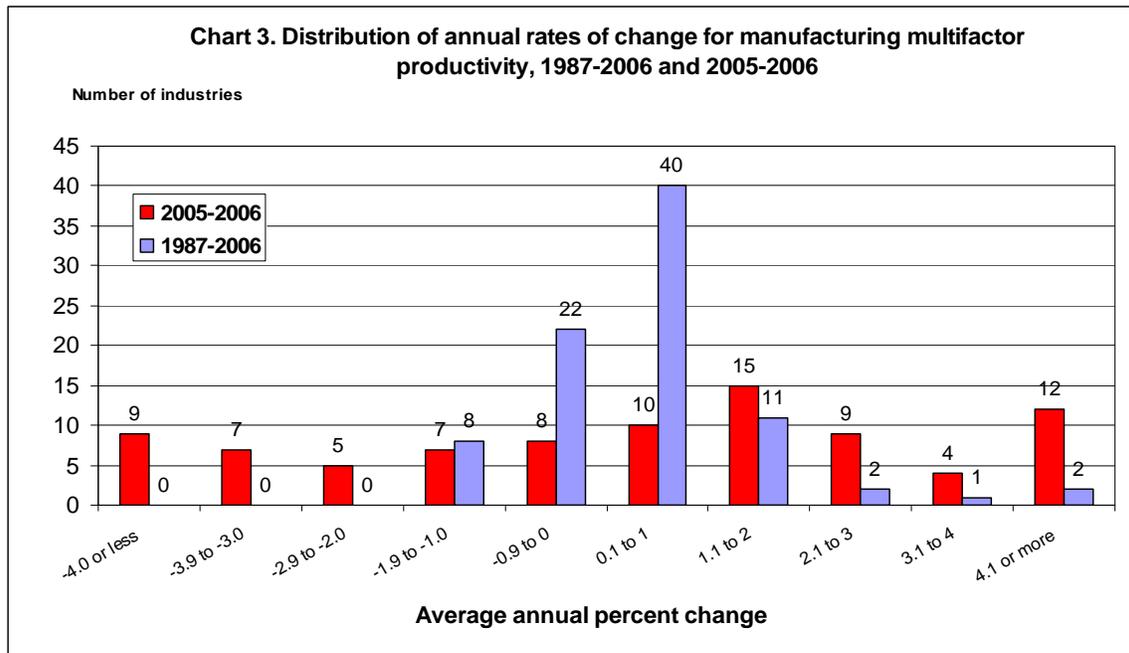


### 2005-06, Transportation Industries

Multifactor productivity rose 3.6 percent in air transportation (NAICS 481) in 2006, as output rose and combined inputs fell. Multifactor productivity rose 2.6 percent in line-haul railroads (NAICS 482111), as output and combined inputs both increased.

## Historical Trends, Manufacturing Industries

From 1987 to 2006, multifactor productivity rose in 56 manufacturing industries. (See Table 2.) Output and combined inputs both rose in 67 industries. (The industries with increasing output were not always the same as those with increasing inputs.) Although more industries registered multifactor productivity growth from 1987 to 2006 than from 2005 to 2006, the average annual change in multifactor productivity was more modest for most industries over the longer term. On average, multifactor productivity grew between 0.1 percent and 3.0 percent per year in 53 industries, and exceeded 3 percent per year in only three industries. (See Chart 3.)

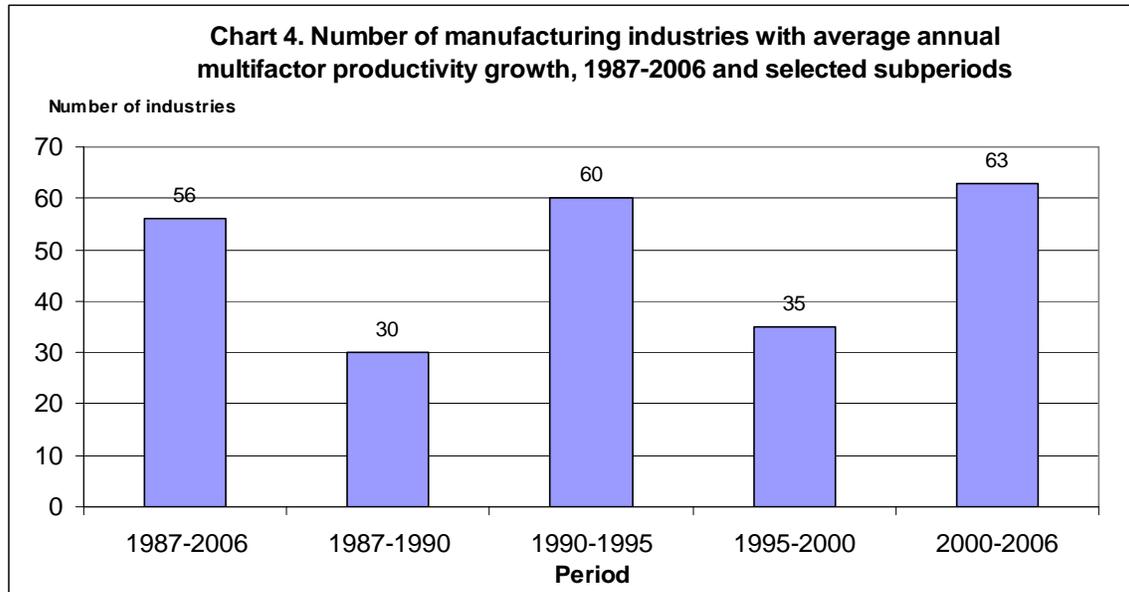


The five manufacturing industries with the fastest growth in multifactor productivity over the longer period were all in the computer and electronic products subsector (NAICS 334). The multifactor productivity growth rates of 17.2 percent per year in computer and peripheral equipment (NAICS 3341) and 14.2 percent in semiconductors and electronic components (NAICS 3344) were much faster than those of any other manufacturing industry.

Multifactor productivity declined in 28 industries from 1987 to 2006. However, the average decline over the period was less than 1 percent per year for all but eight industries. The largest decline in multifactor productivity over the longer period was 1.9 percent per year in accessories and other apparel (NAICS 3159).

Table 3 shows average annual multifactor productivity growth by industry between 1987 and 2006 and for various subperiods. From 2000 to 2006, multifactor productivity grew in 63 manufacturing industries, more than in any of the other periods shown. (See Chart 4.) By comparison, 35 manufacturing industries had multifactor productivity growth from 1995 to 2000. However, multifactor productivity growth from 2000 to 2006 was slower in the two industries that led manufacturing productivity growth

from 1995 to 2000: computer and peripheral equipment (NAICS 3341) and semiconductors and electronic components (NAICS 3344).



### Historical Trends, Transportation Industries

From 1987 to 2006, multifactor productivity increased 2.6 percent per year in line-haul railroads, as output rose 2.6 percent and combined inputs remained unchanged. Multifactor productivity rose more slowly in air transportation, 1.2 percent per year, as output gains averaging 3.4 percent per year were offset by a 2.3 percent average annual increase in combined inputs.

### Revised Measures

Revisions to industry multifactor productivity measures in this release mainly reflect revisions to trends in intermediate inputs, including materials and purchased services. Those revisions mostly result from the incorporation of data from the 2002 Benchmark Input-Output (IO) Tables (April, 2008) published by the Bureau of Economic Analysis (BEA), U.S. Department of Commerce. For some industries, the 2002 IO data caused large revisions to nominal values of purchased services after 1997. Revisions also reflect the adoption of chain-weighted price indexes for deflating cost of materials, purchased services, and materials and supplies inventories, and changes to commodity weights for those price indexes based on the 2002 IO data. For most industries, the new data reflect more rapid growth in industry purchases of intermediates, especially services, and a resulting slower growth in multifactor productivity.

The measures for manufacturing industries in this news release incorporate data from the 2006 Annual Survey of Manufactures of the Bureau of the Census, U.S. Department of Commerce. The output and labor input measures included in this release

are the same as those used in the labor productivity measures, most recently updated on August 21, 2008.

### **Additional Information**

Tables containing multifactor productivity and related indexes for the industries included in this release are accessible on the Multifactor Productivity website at <http://www.bls.gov/mfp/home.htm>. More detailed data and information are available upon request by sending an email to [dipsweb@bls.gov](mailto:dipsweb@bls.gov) or by calling the Division of Industry Productivity Studies (202-691-5618). Information in this report will be made available to sensory-impaired individuals upon request. Voice phone: 202-691-5618; TDD message referral phone number: 1-800-877-8339.

## Technical Note

**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 a few detailed industries physical quantities of output are measured. 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).

For air transportation and line-haul railroads, annual real output is measured by aggregating freight ton-miles and passenger-miles. For air transportation, data on passenger-miles and freight ton-miles from the Bureau of Transportation Statistics (BTS), U.S. Department of Transportation (DOT), are combined using revenue weights from that source. For line-haul railroads, data on freight ton-miles and passenger miles from the Surface Transportation Board (STB) of DOT, the Association of American Railroads (AAR), and AMTRAK are aggregated using operating expenses from those sources as weights.

Wherever possible, the indexes of industry output are calculated with a Törnqvist formula. This formula aggregates the growth rates of the various industry outputs between two periods, using their relative shares in industry value of production, averaged over the two periods, as weights.

**Combined Inputs:** The index of combined inputs is a Törnqvist index of separate quantity indexes of labor, capital, and intermediate purchases. The annual growth rates of the various inputs are aggregated using their relative cost shares in total industry value of production 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 the value of net production minus the values 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 capital stocks; changes in the stocks are assumed to be proportional to changes in capital services for each asset. For the manufacturing industries, physical capital is composed of 26 categories of equipment, 2 categories of structures, 3 categories of inventories, and land.

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 occur. 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 assumed for calculating the relative efficiency of an asset at different ages.

For manufacturing industries, estimates of investment by asset type are derived using annual capital expenditures from the economic censuses and annual surveys of the Bureau of the Census, along with estimates of asset detail by industry from the capital flow tables of the Bureau of Economic Analysis (BEA). 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 PPIs) with weights from the BEA capital flow tables that reflect each industry's use of individual asset commodities.

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, current dollar capital stocks are calculated with the perpetual inventory method. Inventories of parts and supplies are also included; the current dollar series is deflated with a weighted cost index based on data from the Air Transport Association (ATA) 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, were deflated with BLS producer price indexes and deflators based on BEA data. An estimate of capitalized hours was removed from the labor input measure in order to avoid double-counting, because some capitalized labor costs are embedded in the railroad investment data. The perpetual inventory method was used to calculate capital stocks for each of the items. Inventories of materials and supplies are also included. Estimates of investments in land from STB and AMTRAK were deflated with price indexes from BEA.

The index of aggregate capital input for each manufacturing and transportation industry is calculated as an annually-chained Törnqvist quantity index. To construct the index, the growth rates of the stocks of each type of asset are aggregated using weights that are the average of each asset type's cost share in successive years. The asset costs are estimated by multiplying the asset stocks by implicit rental prices.

**Labor Input:** For manufacturing, the industry labor input measures represent the hours paid to wage and salary workers in the industry. The primary source of data on employment and hours is the BLS Current Employment Statistics (CES) survey, which provides monthly data on the number of jobs held by wage and salary workers employed directly in nonfarm establishments. The CES survey also provides data on the average weekly hours of production workers in these establishments. Data from the BLS Current Population Survey (CPS) are used to supplement the CES data. The Division of Industry Productivity Studies (DIPS) estimates the average weekly hours of nonproduction workers for each industry using data from the CPS together with the CES data. The hours of all workers are treated as homogeneous and are directly aggregated.

For air transportation and line-haul railroads, labor input measures are derived primarily from DOT data. For air transportation, annual estimates are based on monthly data from BTS. For line-haul railroads, total labor hours for supervisory and nonsupervisory workers are derived from STB data and supplemented with data from AAR. For the railroad industry, the labor input measures use the same source data as that used in the labor

productivity series which includes an adjustment to remove capitalized labor hours.

**Intermediate Purchases Input:** The index of intermediate purchases is constructed as a Törnqvist index of separate quantities of materials, 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 and 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 benchmark input-output tables and other annual industry data BEA.

Constant-dollar materials consumed are derived by dividing annual current-dollar industry purchases by a weighted price deflator for each industry. Materials deflators are constructed for each industry by combining detailed producer price indexes and import price indexes from BLS 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.

Annual total fuels consumed by each industry are also deflated with weighted price deflators. Producer price indexes for individual fuel categories are weighted together with weights reflecting detailed fuels 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 were deflated using cost indexes from ATA. For line-haul railroads, intermediate purchases data from STB were supplemented with data from other sources including AAR, AMTRAK, EIA, and the Edison Electric Institute. The nominal values were deflated with producer price indexes from BLS and implicit price deflators calculated from BEA investment data.

**Table 1. Multifactor productivity and related data for 88 industries, percent change, 2005-2006**

NAICS code	Industry	2006 Employment (thousands)	Percent change, 2005-2006					
			Multifactor productivity	Output	Combined inputs	Labor	Capital	Intermediate purchases
<b>Manufacturing</b>								
3111	Animal food	49	-0.4	-1.5	-1.1	8.5	0.7	-3.0
3112	Grain and oilseed milling	61	-3.7	-3.6	0.1	-1.9	0.6	0.1
3113	Sugar and confectionery products	75	-2.4	-4.7	-2.3	-3.5	-0.6	-2.9
3114	Fruit and vegetable preserving and specialty	176	-1.1	-0.6	0.5	3.3	-0.1	0.1
3115	Dairy products	131	-4.0	1.3	5.6	0.7	1.5	7.2
3116	Animal slaughtering and processing	506	0.0	4.4	4.4	4.8	2.8	4.6
3117	Seafood product preparation and packaging	41	3.0	4.8	1.8	-4.3	2.0	3.0
3118	Bakeries and tortilla manufacturing	280	-4.5	-2.3	2.3	2.1	-0.3	3.0
3119	Other food products	160	1.3	4.8	3.5	4.7	1.5	4.5
3121	Beverages	171	-1.7	-0.8	0.9	6.5	0.4	0.2
3122	Tobacco and tobacco products	24	0.6	-3.8	-4.4	-5.7	-4.5	-3.7
3131	Fiber, yarn, and thread mills	48	-0.4	-8.7	-8.4	-6.2	-4.2	-9.4
3132	Fabric mills	90	-1.3	-9.1	-7.9	-12.5	-4.7	-7.2
3133	Textile and fabric finishing mills	58	-5.3	-17.3	-12.7	-8.4	-5.1	-15.0
3141	Textile furnishings mills	90	-5.5	-10.5	-5.3	-4.1	-1.5	-7.4
3149	Other textile product mills	71	0.4	-4.1	-4.4	-1.9	-1.9	-6.3
3151	Apparel knitting mills	35	6.6	0.0	-6.1	-3.0	-4.1	-9.1
3152	Cut and sew apparel	184	3.4	-2.3	-5.5	-5.6	-3.8	-6.3
3159	Accessories and other apparel	20	-1.6	-18.9	-17.6	-10.8	-4.6	-21.4
3161	Leather and hide tanning and finishing	4	-7.4	-27.1	-21.3	-26.8	-5.6	-20.9
3162	Footwear	17	5.8	1.3	-4.2	-7.3	-3.0	-2.7
3169	Other leather products	15	10.6	11.1	0.5	-4.7	5.0	-0.1
3211	Sawmills and wood preservation	118	-3.3	1.3	4.8	-0.5	1.7	6.3
3212	Plywood and engineered wood products	120	2.3	1.8	-0.5	-4.5	2.9	0.3
3219	Other wood products	321	-1.2	0.3	1.5	1.1	4.1	1.4
3221	Pulp, paper, and paperboard mills	136	1.9	1.2	-0.7	-1.1	-3.2	0.8
3222	Converted paper products	334	-0.3	-1.1	-0.8	-2.7	1.8	-0.9
3231	Printing and related support activities	634	0.4	0.8	0.4	-0.5	1.2	0.8
3241	Petroleum and coal products	113	-3.0	0.4	3.5	1.2	3.3	3.6
3251	Basic chemicals	148	0.9	2.2	1.3	-0.3	-0.6	2.2
3252	Resin, rubber, and artificial fibers	105	2.5	-0.9	-3.3	-4.2	-1.0	-3.7
3253	Agricultural chemicals	38	-1.8	-3.7	-2.0	-2.4	-2.2	-1.9
3254	Pharmaceuticals and medicines	292	2.0	4.8	2.8	0.3	1.1	5.5
3255	Paints, coatings, and adhesives	67	-4.6	-4.6	-0.1	-0.2	-1.7	0.2
3256	Soaps, cleaning compounds, and toiletries	111	1.0	6.2	5.1	-0.2	0.6	10.0
3259	Other chemical products and preparations	105	-3.6	-3.0	0.6	1.4	-3.5	0.6
3261	Plastics products	631	-2.7	-0.2	2.5	1.2	1.1	3.4
3262	Rubber products	156	-2.7	-3.3	-0.6	-8.1	-0.6	2.9
3271	Clay products and refractories	61	-6.9	-4.0	3.1	-1.7	-0.1	7.2
3272	Glass and glass products	102	0.6	0.8	0.2	-6.6	-1.1	4.0
3273	Cement and concrete products	248	-3.5	3.8	7.5	7.2	2.9	9.6
3274	Lime and gypsum products	19	-4.4	-1.8	2.7	0.5	4.8	1.6
3279	Other nonmetallic mineral products	80	-0.9	4.9	5.9	7.2	1.1	7.6
3311	Iron and steel mills and ferroalloy production	97	0.1	1.5	1.4	1.3	-2.5	2.8
3312	Steel products from purchased steel	61	1.4	-3.2	-4.5	2.1	-3.2	-6.1
3313	Alumina and aluminum production	73	-3.1	1.2	4.4	3.0	-1.2	5.8
3314	Other nonferrous metal production	73	-16.0	-7.9	9.6	-2.6	-1.2	13.4
3315	Foundries	161	1.8	1.8	0.0	-0.7	-0.7	0.4

**Table 1. Multifactor productivity and related data for 88 industries, percent change, 2005-2006 - Continued**

NAICS code	Industry	2006 Employment (thousands)	Percent change, 2005-2006					
			Multifactor productivity	Output	Combined inputs	Labor	Capital	Intermediate purchases
3321	Forging and stamping	113	4.2	6.4	2.1	2.8	0.7	2.3
3322	Cutlery and hand tools	54	2.5	-0.9	-3.4	-3.1	-3.3	-3.6
3323	Architectural and structural metals	412	3.1	8.2	4.9	4.1	2.5	5.7
3324	Boilers, tanks, and shipping containers	94	5.0	7.1	2.0	6.0	0.1	1.0
3325	Hardware	34	0.9	-2.1	-2.9	-1.6	-2.3	-3.8
3326	Spring and wire products	58	-3.2	-3.8	-0.7	-2.0	0.1	-0.2
3327	Machine shops and threaded products	353	2.2	5.8	3.5	5.1	2.0	2.9
3328	Coating, engraving, and heat treating metals	149	-0.8	0.7	1.5	1.5	-0.8	2.2
3329	Other fabricated metal products	287	3.5	7.2	3.6	2.5	0.0	6.2
3331	Agriculture, construction, and mining machinery	220	2.0	7.5	5.4	7.6	2.2	5.8
3332	Industrial machinery	123	6.2	10.0	3.6	-0.5	-1.6	6.0
3333	Commercial and service industry machinery	109	4.2	5.6	1.4	-0.5	-2.4	2.8
3334	HVAC and commercial refrigeration equipment	156	3.0	0.4	-2.5	3.3	-0.5	-4.7
3335	Metalworking machinery	200	-0.1	0.4	0.5	-0.4	-1.0	1.4
3336	Turbine and power transmission equipment	101	0.7	3.9	3.1	7.1	1.8	2.4
3339	Other general purpose machinery	272	1.7	3.8	2.1	-0.1	0.7	3.3
3341	Computer and peripheral equipment	196	23.9	25.1	1.0	-5.0	-1.2	2.5
3342	Communications equipment	141	13.5	17.7	3.7	-5.1	0.7	6.9
3343	Audio and video equipment	31	8.3	-1.1	-8.7	-5.4	-1.8	-9.6
3344	Semiconductors and electronic components	458	2.0	2.3	0.3	2.7	1.0	-1.3
3345	Electronic instruments	440	1.3	4.2	2.9	1.5	2.9	3.6
3346	Magnetic media manufacturing and reproduction	32	-2.5	-7.2	-4.8	-4.3	-3.2	-5.1
3351	Electric lighting equipment	59	2.2	0.2	-1.9	-4.5	-1.3	-1.1
3352	Household appliances	80	1.9	-1.8	-3.6	-6.7	-3.4	-2.9
3353	Electrical equipment	155	1.2	3.6	2.3	4.0	-1.7	2.8
3359	Other electrical equipment and components	139	-2.1	-0.4	1.7	4.6	-1.9	1.9
3361	Motor vehicles	237	4.6	2.6	-1.9	-7.1	-0.9	-1.5
3362	Motor vehicle bodies and trailers	179	1.8	3.8	2.0	6.9	1.7	0.8
3363	Motor vehicle parts	655	2.4	-3.7	-6.0	-3.4	-2.3	-6.9
3364	Aerospace products and parts	474	0.1	-0.1	-0.3	5.8	-1.4	-2.9
3365	Railroad rolling stock	28	7.0	15.1	7.6	6.8	1.3	9.0
3366	Ship and boat building	156	1.8	1.6	-0.2	5.1	-1.2	-2.4
3369	Other transportation equipment	41	3.6	5.0	1.4	-2.2	4.8	1.6
3371	Household and institutional furniture	371	-1.4	-2.3	-0.9	-4.9	0.0	0.8
3372	Office furniture and fixtures	136	-0.2	3.9	4.1	4.2	-0.7	5.9
3379	Other furniture-related products	51	2.1	-1.2	-3.2	-3.0	-1.7	-3.8
3391	Medical equipment and supplies	308	1.4	4.4	3.0	1.5	4.6	2.5
3399	Other miscellaneous manufacturing	341	1.3	1.7	0.4	-2.2	2.2	1.2
	<b>Transportation</b>							
481	Air Transportation	457	3.6	1.5	-2.0	-3.5	0.3	-1.5
482111	Line-Haul Railroads	186	2.6	4.7	2.0	1.5	0.4	3.2

**Table 2. Multifactor productivity and related data for 88 industries, average annual percent change, 1987-2006**

NAICS code	Industry	Average annual percent change, 1987-2006					
		Multifactor productivity	Output	Combined inputs	Labor	Capital	Intermediate purchases
<b>Manufacturing</b>							
3111	Animal food	0.8	2.3	1.5	-0.8	2.4	1.5
3112	Grain and oilseed milling	-0.2	1.3	1.5	-1.2	1.3	1.8
3113	Sugar and confectionery products	0.6	0.9	0.3	-1.2	1.5	0.1
3114	Fruit and vegetable preserving and specialty	0.2	1.5	1.2	-0.2	1.8	1.3
3115	Dairy products	-0.5	1.0	1.6	-0.5	2.1	1.8
3116	Animal slaughtering and processing	0.8	2.5	1.6	1.5	2.9	1.5
3117	Seafood product preparation and packaging	0.1	1.3	1.2	-1.4	1.4	1.7
3118	Bakeries and tortilla manufacturing	-1.3	0.6	2.0	0.2	2.2	2.8
3119	Other food products	0.4	2.3	1.8	1.3	1.5	2.1
3121	Beverages	0.8	1.7	1.0	-0.3	0.9	1.2
3122	Tobacco and tobacco products	-0.4	-2.1	-1.7	-3.5	-1.9	-2.2
3131	Fiber, yarn, and thread mills	0.7	-0.6	-1.3	-4.4	-0.5	-0.4
3132	Fabric mills	1.1	-1.5	-2.5	-6.1	-1.1	-1.3
3133	Textile and fabric finishing mills	0.2	-2.2	-2.5	-3.9	-1.0	-2.3
3141	Textile furnishings mills	0.3	0.0	-0.2	-1.3	0.0	0.0
3149	Other textile product mills	0.3	0.7	0.4	-1.0	1.9	0.8
3151	Apparel knitting mills	0.9	-3.7	-4.5	-6.1	-1.4	-4.6
3152	Cut and sew apparel	-0.4	-5.0	-4.6	-7.5	-1.6	-4.3
3159	Accessories and other apparel	-1.9	-5.5	-3.7	-3.6	-0.8	-3.9
3161	Leather and hide tanning and finishing	-1.3	-4.9	-3.6	-6.1	-1.4	-3.6
3162	Footwear	-0.3	-6.5	-6.2	-8.5	-2.9	-5.6
3169	Other leather products	1.7	-1.3	-3.0	-4.6	-0.9	-2.7
3211	Sawmills and wood preservation	0.3	1.3	1.0	-1.4	0.2	1.8
3212	Plywood and engineered wood products	-0.3	1.6	1.9	0.7	2.2	2.4
3219	Other wood products	-0.7	1.0	1.7	0.0	2.0	2.4
3221	Pulp, paper, and paperboard mills	0.7	0.3	-0.4	-2.9	0.3	0.1
3222	Converted paper products	-0.1	0.6	0.7	-0.8	1.7	0.9
3231	Printing and related support activities	-0.5	0.3	0.8	-0.8	2.7	1.3
3241	Petroleum and coal products	0.7	1.3	0.6	-1.6	1.4	0.7
3251	Basic chemicals	-0.6	0.6	1.2	-2.4	1.0	2.1
3252	Resin, rubber, and artificial fibers	0.1	1.3	1.1	-1.7	1.4	1.5
3253	Agricultural chemicals	1.4	1.2	-0.2	-1.4	-0.9	0.5
3254	Pharmaceuticals and medicines	-1.2	4.2	5.4	2.7	5.7	6.2
3255	Paints, coatings, and adhesives	-1.2	0.3	1.5	-1.1	0.9	2.2
3256	Soaps, cleaning compounds, and toiletries	0.4	2.9	2.5	-0.6	2.4	3.1
3259	Other chemical products and preparations	-1.3	0.4	1.7	-1.9	0.9	3.1
3261	Plastics products	0.2	3.0	2.7	0.4	4.0	3.3
3262	Rubber products	0.7	1.1	0.4	-1.6	0.9	1.3
3271	Clay products and refractories	0.1	-0.5	-0.6	-1.8	-0.2	0.1
3272	Glass and glass products	0.7	0.8	0.2	-1.7	1.2	0.7
3273	Cement and concrete products	0.0	2.1	2.2	1.6	1.4	2.7
3274	Lime and gypsum products	-0.2	0.6	0.8	-0.8	1.2	1.0
3279	Other nonmetallic mineral products	0.8	1.7	0.9	-0.1	0.5	1.6
3311	Iron and steel mills and ferroalloy production	1.3	1.9	0.6	-2.9	-1.8	2.6
3312	Steel products from purchased steel	-0.3	-0.1	0.3	-0.5	-1.4	1.0
3313	Alumina and aluminum production	0.1	0.7	0.6	-2.0	-0.1	1.5
3314	Other nonferrous metal production	-1.5	-1.2	0.4	-2.1	-0.5	1.1
3315	Foundries	0.2	1.2	1.0	-1.3	0.2	2.8

**Table 2. Multifactor productivity and related data for 88 industries, average annual percent change, 1987-2006 - Continued**

NAICS code	Industry	Average annual percent change, 1987-2006					
		Multifactor productivity	Output	Combined inputs	Labor	Capital	Intermediate purchases
3321	Forging and stamping	1.0	2.2	1.2	-0.9	1.9	2.2
3322	Cutlery and hand tools	-0.4	-0.2	0.2	-1.8	0.5	1.4
3323	Architectural and structural metals	-0.1	2.2	2.3	0.9	1.6	3.2
3324	Boilers, tanks, and shipping containers	0.5	-0.1	-0.5	-0.7	0.0	-0.6
3325	Hardware	-0.2	-1.1	-1.0	-3.1	0.1	-0.2
3326	Spring and wire products	0.9	1.2	0.3	-1.6	1.4	1.0
3327	Machine shops and threaded products	1.1	3.5	2.4	1.2	2.9	3.4
3328	Coating, engraving, and heat treating metals	1.3	3.5	2.2	0.4	2.5	3.2
3329	Other fabricated metal products	0.1	0.6	0.6	-0.7	0.8	1.3
3331	Agriculture, construction, and mining machinery	0.7	3.3	2.6	0.4	0.0	4.0
3332	Industrial machinery	0.4	2.3	1.9	-0.8	2.6	3.3
3333	Commercial and service industry machinery	-0.5	0.0	0.5	-1.8	0.5	1.7
3334	HVAC and commercial refrigeration equipment	0.9	2.2	1.3	-0.2	1.7	1.9
3335	Metalworking machinery	0.7	0.8	0.1	-1.4	1.2	1.2
3336	Turbine and power transmission equipment	-0.4	2.2	2.7	-0.3	1.0	4.1
3339	Other general purpose machinery	0.4	2.0	1.6	-0.9	0.8	3.1
3341	Computer and peripheral equipment	17.2	19.4	1.9	-4.1	1.3	3.6
3342	Communications equipment	3.4	5.4	1.9	-2.6	3.2	4.0
3343	Audio and video equipment	2.5	3.7	1.2	-3.4	1.1	2.1
3344	Semiconductors and electronic components	14.2	16.3	1.8	-1.2	6.7	1.0
3345	Electronic instruments	-0.1	1.8	1.9	-2.2	1.0	5.2
3346	Magnetic media manufacturing and reproduction	3.0	2.1	-0.8	-0.4	2.0	-1.3
3351	Electric lighting equipment	0.3	0.3	0.1	-1.8	0.6	0.7
3352	Household appliances	1.9	1.8	-0.1	-2.7	0.1	0.7
3353	Electrical equipment	0.2	0.3	0.1	-2.6	-0.4	1.8
3359	Other electrical equipment and components	0.0	0.3	0.3	-1.7	0.6	1.1
3361	Motor vehicles	0.6	2.6	2.0	-1.5	1.5	2.4
3362	Motor vehicle bodies and trailers	-0.3	3.0	3.3	1.6	2.2	3.8
3363	Motor vehicle parts	1.1	3.3	2.2	0.1	1.8	3.0
3364	Aerospace products and parts	-1.0	-1.2	-0.2	-2.7	-0.2	1.5
3365	Railroad rolling stock	1.3	6.0	4.7	0.7	-0.5	6.7
3366	Ship and boat building	-0.6	1.0	1.7	-0.5	-0.2	3.2
3369	Other transportation equipment	1.4	5.5	4.1	0.2	3.3	5.3
3371	Household and institutional furniture	0.1	1.4	1.3	-0.6	1.7	2.2
3372	Office furniture and fixtures	0.4	1.8	1.4	-0.6	2.0	2.4
3379	Other furniture-related products	0.7	2.6	1.9	0.4	0.8	2.7
3391	Medical equipment and supplies	1.5	4.8	3.3	1.1	5.3	3.7
3399	Other miscellaneous manufacturing	0.7	1.9	1.2	-0.8	2.2	2.0
	<b>Transportation</b>						
481	Air Transportation	1.2	3.4	2.3	0.4	4.1	3.4
482111	Line-Haul Railroads	2.6	2.6	0.0	-2.1	-0.5	2.5

**Table 3. Multifactor productivity trends, 1987-2006 and selected subperiods**

NAICS code	Industry	Average annual percent change					
		1987-2006	1987-90	1990-95	1995-00	2000-06	2005-06
<b>Manufacturing</b>							
3111	Animal food	0.8	0.6	0.3	-0.8	2.7	-0.4
3112	Grain and oilseed milling	-0.2	0.0	0.5	0.3	-1.2	-3.7
3113	Sugar and confectionery products	0.6	-0.4	0.3	1.8	0.2	-2.4
3114	Fruit and vegetable preserving and specialty	0.2	-2.6	1.1	0.9	0.4	-1.1
3115	Dairy products	-0.5	-0.3	-0.6	-0.7	-0.4	-4.0
3116	Animal slaughtering and processing	0.8	-1.1	1.2	1.2	1.2	0.0
3117	Seafood product preparation and packaging	0.1	-1.3	0.0	-0.4	1.2	3.0
3118	Bakeries and tortilla manufacturing	-1.3	-4.9	0.4	-0.9	-1.2	-4.5
3119	Other food products	0.4	-0.2	0.4	-0.2	1.3	1.3
3121	Beverages	0.8	0.3	0.9	-1.0	2.4	-1.7
3122	Tobacco and tobacco products	-0.4	-1.1	-0.7	0.5	-0.7	0.6
3131	Fiber, yarn, and thread mills	0.7	0.0	0.3	0.0	1.8	-0.4
3132	Fabric mills	1.1	-0.2	1.3	-0.1	2.5	-1.3
3133	Textile and fabric finishing mills	0.2	-0.2	-0.1	1.1	0.1	-5.3
3141	Textile furnishings mills	0.3	-0.6	1.2	-1.0	1.0	-5.5
3149	Other textile product mills	0.3	-1.0	-0.5	-0.1	1.8	0.4
3151	Apparel knitting mills	0.9	0.9	2.0	-2.7	3.0	6.6
3152	Cut and sew apparel	-0.4	-1.3	0.5	-1.7	0.3	3.4
3159	Accessories and other apparel	-1.9	1.0	0.4	-4.9	-2.7	-1.6
3161	Leather and hide tanning and finishing	-1.3	-3.5	-2.0	4.1	-4.0	-7.4
3162	Footwear	-0.3	-1.8	0.3	-1.0	0.7	5.8
3169	Other leather products	1.7	-0.4	-2.0	2.0	5.7	10.6
3211	Sawmills and wood preservation	0.3	2.4	0.2	-1.0	0.4	-3.3
3212	Plywood and engineered wood products	-0.3	-0.7	-0.4	-0.8	0.3	2.3
3219	Other wood products	-0.7	-0.8	-1.2	-1.0	0.0	-1.2
3221	Pulp, paper, and paperboard mills	0.7	-1.7	-0.4	1.2	2.3	1.9
3222	Converted paper products	-0.1	-0.7	-0.2	-0.3	0.5	-0.3
3231	Printing and related support activities	-0.5	-0.2	-0.4	-1.5	0.2	0.4
3241	Petroleum and coal products	0.7	-2.0	1.9	1.9	0.0	-3.0
3251	Basic chemicals	-0.6	-1.0	-3.3	-1.1	2.3	0.9
3252	Resin, rubber, and artificial fibers	0.1	-0.8	1.0	-0.8	0.6	2.5
3253	Agricultural chemicals	1.4	2.1	1.0	-1.2	3.5	-1.8
3254	Pharmaceuticals and medicines	-1.2	-1.8	-2.5	-2.2	1.1	2.0
3255	Paints, coatings, and adhesives	-1.2	-2.0	-0.8	-2.0	-0.5	-4.6
3256	Soaps, cleaning compounds, and toiletries	0.4	-1.4	0.2	-1.9	3.7	1.0
3259	Other chemical products and preparations	-1.3	-1.7	0.1	-0.9	-2.5	-3.6
3261	Plastics products	0.2	-0.8	1.0	0.4	0.0	-2.7
3262	Rubber products	0.7	1.4	1.2	0.9	-0.2	-2.7
3271	Clay products and refractories	0.1	0.7	1.6	0.3	-1.5	-6.9
3272	Glass and glass products	0.7	-0.3	1.7	1.7	-0.5	0.6
3273	Cement and concrete products	0.0	0.5	0.4	0.0	-0.7	-3.5
3274	Lime and gypsum products	-0.2	-1.4	-2.4	0.6	1.8	-4.4
3279	Other nonmetallic mineral products	0.8	-1.3	1.9	-0.4	1.9	-0.9
3311	Iron and steel mills and ferroalloy production	1.3	1.3	2.0	1.9	0.3	0.1
3312	Steel products from purchased steel	-0.3	1.1	2.3	-0.1	-3.3	1.4
3313	Alumina and aluminum production	0.1	-0.3	-0.7	0.0	1.1	-3.1
3314	Other nonferrous metal production	-1.5	-0.6	1.1	-0.3	-5.1	-16.0
3315	Foundries	0.2	0.0	1.5	0.0	-0.5	1.8

**Table 3. Multifactor productivity trends, 1987-2006 and selected subperiods - Continued**

NAICS code	Industry	Average annual percent change					
		1987-2006	1987-90	1990-95	1995-00	2000-06	2005-06
3321	Forging and stamping	1.0	-0.7	1.0	0.9	1.8	4.2
3322	Cutlery and hand tools	-0.4	-1.4	0.9	-0.4	-0.9	2.5
3323	Architectural and structural metals	-0.1	-1.1	0.8	-0.7	0.2	3.1
3324	Boilers, tanks, and shipping containers	0.5	0.5	1.3	0.2	0.0	5.0
3325	Hardware	-0.2	-2.2	0.7	-0.2	0.2	0.9
3326	Spring and wire products	0.9	0.4	1.5	0.5	1.0	-3.2
3327	Machine shops and threaded products	1.1	1.0	2.9	0.1	0.4	2.2
3328	Coating, engraving, and heat treating metals	1.3	0.8	2.0	-0.6	2.6	-0.8
3329	Other fabricated metal products	0.1	-1.8	0.2	-0.8	1.7	3.5
3331	Agriculture, construction, and mining machinery	0.7	2.3	-0.2	-1.0	2.0	2.0
3332	Industrial machinery	0.4	0.1	1.5	-0.4	0.3	6.2
3333	Commercial and service industry machinery	-0.5	0.8	-0.6	-1.1	-0.5	4.2
3334	HVAC and commercial refrigeration equipment	0.9	-0.3	0.6	0.5	2.0	3.0
3335	Metalworking machinery	0.7	0.0	1.3	-0.9	1.9	-0.1
3336	Turbine and power transmission equipment	-0.4	-0.6	-0.1	0.9	-1.7	0.7
3339	Other general purpose machinery	0.4	0.4	0.0	-0.1	1.1	1.7
3341	Computer and peripheral equipment	17.2	5.4	12.6	25.3	21.0	23.9
3342	Communications equipment	3.4	3.7	4.0	3.1	3.0	13.5
3343	Audio and video equipment	2.5	3.7	2.1	0.9	3.7	8.3
3344	Semiconductors and electronic components	14.2	7.1	18.1	22.7	8.1	2.0
3345	Electronic instruments	-0.1	1.6	0.0	-3.2	1.6	1.3
3346	Magnetic media manufacturing and reproduction	3.0	1.2	5.8	0.4	3.8	-2.5
3351	Electric lighting equipment	0.3	-1.8	0.1	0.3	1.4	2.2
3352	Household appliances	1.9	-0.4	2.4	1.1	3.3	1.9
3353	Electrical equipment	0.2	0.4	1.8	-2.0	0.7	1.2
3359	Other electrical equipment and components	0.0	-1.8	1.1	0.7	-0.6	-2.1
3361	Motor vehicles	0.6	0.2	-1.4	0.4	2.7	4.6
3362	Motor vehicle bodies and trailers	-0.3	-2.9	2.0	-1.9	0.6	1.8
3363	Motor vehicle parts	1.1	-0.8	2.1	0.2	2.2	2.4
3364	Aerospace products and parts	-1.0	-2.8	-1.6	-1.4	0.8	0.1
3365	Railroad rolling stock	1.3	2.2	-1.3	4.1	0.6	7.0
3366	Ship and boat building	-0.6	0.0	-2.0	-0.4	0.1	1.8
3369	Other transportation equipment	1.4	-1.7	4.2	-0.6	2.3	3.6
3371	Household and institutional furniture	0.1	-0.4	0.7	-0.7	0.7	-1.4
3372	Office furniture and fixtures	0.4	-2.6	0.2	1.7	0.9	-0.2
3379	Other furniture-related products	0.7	0.0	0.6	-0.3	2.1	2.1
3391	Medical equipment and supplies	1.5	2.2	0.2	2.0	1.7	1.4
3399	Other miscellaneous manufacturing	0.7	1.2	0.5	0.0	1.3	1.3
	<b>Transportation</b>						
481	Air Transportation	1.2	-0.9	0.7	0.0	3.6	3.6
482111	Line-Haul Railroads	2.6	4.4	4.1	1.4	1.6	2.6