Productivity continued to rise in many industries during 1987

Increases in output per employee hour were not as widespread as in 1986; among industries showing strong gains were steel, aluminum, and semiconductors

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Productivity, as measured by output per employee hour, increased in 1987 in more than two-thirds of the industries for which current data are available. More than three-fourths of the same industries recorded gains in 1986.

This article updates all indexes included in the Bureau of Labor Statistics industry productivity measurement program.[1] It extends the labor productivity measures through 1987 and includes certain industry multifactor productivity measures through 1986, as well as selected government productivity measures through 1987.

Table 1 shows labor productivity trends in the industries annually covered by the Bureau and includes measures for the following additional industries: men's and boys' suits and coats; agricultural chemicals; carburetors, pistons, rings, and valves; and variety stores.[2]

Changes in industry labor productivity

Manufacturing. Among major manufacturing industries, both steel and motor vehicles posted gains in output per employee hour in 1987. The steel industry registered a gain of 7.0 percent, well above the industry's long-term average. Output was up 9.5 percent in 1987, in contrast to a large decline in 1986. Demand for steel grew in construction, chemicals, oil and gas production, and heavy equipment manufacturing, while employee hours grew 2.4 percent in 1987. This was the fifth consecutive year of productivity growth in the steel industry. Motor vehicle manufacturing registered a productivity gain of 2.9 percent, slightly below the industry's long-term average. Output grew 0.8 percent, reversing the decline in 1986, while employee hours fell 2.0 percent in 1987. Although the production of passenger cars fell in 1987, this drop was more than compensated by output gains in trucks, buses, truck trailers, motor homes, and replacement parts. The gain was the seventh consecutive one in the industry.

Among the other manufacturing industries, some had large output per employee hour increases in 1987. Semiconductors posted a high gain of 23.6 percent after registering only a small increase in the previous year. Output was up 14.0 percent, aided by increased demand from computer manufacturers and limits placed on imports from Japan. Employee hours were off 7.8 percent, caused in part by mergers and consolidations in the industry.

The aluminum industries also had higher productivity gains in 1987 than in 1986. Aluminum rolling and drawing had an increase of 13.3 percent, based on an output gain of 12.3 percent and a decline in employee hours of 0.9 percent. Primary aluminum manufacturing registered a productivity gain of 7.1 percent, as output was up 10.2 percent while employee hours grew 2.9 percent. Both domestic demand for aluminum products and exports accelerated at the same time that new, more efficient plant and equipment were increasingly being utilized.

Productivity in the oilfield machinery industry rose 12.6 percent in 1987. However, it reflected a drop in output of 10.7 percent, because of continued poor demand for oilfield equipment as oil prices remained low, accompanied by an even larger drop of 20.6 percent in employee hours, as the industry continued to cut back on employment. The tires and tubes industry, benefiting from cost cutting in previous years involving elimination of outdated plant and equipment, recorded a large productivity gain of 10.8 percent in 1987, compared with a substantially smaller gain in 1986. Output was up 10.3 percent in 1987, while employee hours fell 0.5 percent in this industry.

Other important manufacturing industries with sub-

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Table 1. Indexes of output per employee hour in selected industries, 1982–87, and percent changes, 1986–87 and 1982–87
[1977 = 100]

SIC code[1]	Industry	1982	1983	1984	1985	1986	1987[2]	Percent change, 1986–87	Average annual percent change, 1982–87
	Mining								
1011	Iron mining, crude ore	100.9	139.0	173.3	187.9	200.3	267.5	33.5	18.9
1011	Iron mining, usable ore	98.2	138.6	171.7	187.9	197.8	262.0	32.5	18.9
1021	Copper mining, crude ore	106.4	129.9	140.3	164.2	195.4	193.1	-1.2	13.3
1021	Copper mining, recoverable metal	116.2	130.9	155.4	193.1	228.9	209.8	-8.3	14.9
111, 121	Coal mining	119.2	136.1	151.3	154.0	167.3	179.7	7.4	8.0
121	Bituminous coal and lignite mining	120.0	136.9	152.3	154.6	168.2	180.6	7.4	7.9
14	Nonmetallic minerals, except fuels	89.3	98.2	105.5	107.5	108.2	107.9	-.3	3.7
142	Crushed and broken stone	94.1	103.9	105.8	104.5	104.9	102.7	-2.1	1.3
	Manufacturing								
2011, 13	Red meat products	112.3	115.9	117.0	119.5	117.3	114.0	-2.8	.4
2011	Meat packing plants	119.5	123.4	125.6	130.1	126.2	124.1	-1.7	.8
2013	Sausages and other prepared meats	96.5	100.0	99.5	98.8	98.7	94.7	-4.1	-.4
2016, 17	Poultry dressing and processing	125.6	131.7	130.3	133.2	127.3	(3)	(3)	[4].4
2026	Fluid milk	135.3	142.4	147.7	152.3	157.0	164.2	4.6	3.8
203	Preserved fruits and vegetables	107.9	110.4	112.4	111.7	118.3	(3)	(3)	[4]2.0
2033	Canned fruits and vegetables	108.6	112.2	115.7	122.1	131.5	(3)	(3)	[4]4.8
204	Grain mill products	121.0	125.5	132.8	144.9	146.6	(3)	(3)	[4]5.4
2041, 45	Flour (including flour mixes) and other grains	112.3	117.7	122.9	126.0	132.1	(3)	(3)	[4]4.0
2041	Flour and other grain mill products	104.1	110.4	114.9	122.9	130.6	129.0	-1.2	4.8
2043	Cereal breakfast foods	115.0	118.8	129.3	133.8	134.0	(3)	(3)	[4]4.3
2044	Rice milling	104.5	103.3	93.2	103.2	112.6	118.4	5.2	2.9
2046	Wet corn milling	138.8	156.9	192.1	198.4	218.1	(3)	(3)	[4]12.1
2047, 48	Prepared feeds for animals and fowls	124.9	127.5	132.5	143.8	140.0	(3)	(3)	[4]3.5
205	Bakery products	103.3	106.9	106.8	108.5	114.4	(3)	(3)	[4]2.2
2061, 62, 63	Sugar	90.4	98.6	99.7	105.5	110.1	127.4	15.7	6.2
2061, 62	Raw and refined cane sugar	87.6	100.0	94.7	108.7	109.6	118.5	8.1	5.6
2063	Beet sugar	94.8	94.5	108.8	100.7	111.8	142.6	27.5	7.3
2082	Malt beverages	122.6	131.3	137.9	130.3	152.3	154.8	1.6	4.5
2086	Bottled and canned soft drinks	114.1	121.5	131.0	136.7	146.6	157.3	7.3	6.5
2111, 21, 31	Total tobacco products	100.7	105.1	110.3	113.4	117.2	119.2	1.7	3.5
2111, 31	Cigarettes, chewing and smoking tobacco	99.5	104.1	107.2	111.7	115.5	121.2	4.9	3.9
2121	Cigars	111.4	112.3	141.4	129.3	133.1	111.1	-16.5	1.2
2211, 21	Cotton and synthetic broad woven fabrics	112.5	121.8	119.9	123.7	132.9	133.7	.6	3.4
2251, 52	Hosiery	114.2	118.0	119.9	118.5	121.0	121.1	.1	1.0
2281	Nonwool yarn mills	118.2	128.5	129.6	134.5	141.1	142.8	1.2	3.7
2311	Men's and boys' suits and coats	95.2	90.2	96.9	106.3	107.5	114.8	6.8	4.5
2421	Sawmills and planing mills, general	115.1	126.8	132.3	139.2	155.1	151.6	-2.3	6.0
2431	Millwork	86.1	87.9	88.7	85.7	90.1	(3)	(3)	[4].7
2434	Wood kitchen cabinets	96.1	94.3	94.2	89.1	87.0	(3)	(3)	-[4]2.5
2435, 36	Veneer and plywood	114.4	121.1	120.0	125.1	126.6	(3)	(3)	[4]2.4
2435	Hardwood veneer and plywood	101.4	110.1	103.9	118.4	122.8	(3)	(3)	[4]4.7
2436	Softwood veneer and plywood	122.1	127.3	129.6	128.8	128.8	(3)	(3)	[4]1.2
251	Household furniture	104.7	110.1	112.2	112.5	118.5	115.9	-2.2	2.1
2511, 17	Wood household furniture	98.2	103.8	105.5	104.4	111.9	(3)	(3)	[4]2.7
2512	Upholstered household furniture	115.9	121.6	122.7	124.6	127.1	(3)	(3)	[4]2.1
2514	Metal household furniture	107.5	108.9	121.4	124.2	128.8	(3)	(3)	[4]5.1
252	Office furniture	107.4	112.0	117.8	116.7	122.6	4.1	2.3	
2521	Wood office furniture	90.3	93.9	96.0	96.2	93.4	(3)	(3)	[4].9
2522	Metal office furniture	116.6	122.1	130.5	128.2	131.9	(3)	(3)	[4]3.0
2611, 21, 31, 61	Paper, paperboard, and pulp mills	111.3	119.5	121.0	123.1	133.5	141.8	6.2	4.6
2643	Paper and plastic bags	95.3	102.9	105.6	107.1	112.3	(3)	(3)	[4]3.8
2651	Folding paperboard boxes	104.2	104.5	102.4	99.6	101.4	98.1	-3.3	-1.2
2653	Corrugated and solid fiber boxes	111.9	114.0	118.9	122.5	126.7	128.9	1.7	3.1
281	Industrial inorganic chemicals	86.3	94.0	104.5	101.4	105.4	(3)	(3)	[4]4.9
2812	Alkalies and chlorine	100.8	127.7	146.1	148.3	197.5	(3)	(3)	[4]16.1
2816	Inorganic pigments	96.7	107.4	128.0	132.7	138.8	(3)	(3)	[4]9.8
2819 PT	Industrial inorganic chemicals, n.e.c	80.8	85.8	95.0	91.5	90.6	(3)	(3)	[4]3.0
2823, 24	Synthetic fibers	103.6	126.2	125.3	135.8	146.2	155.7	6.5	7.6
2834	Pharmaceutical preparations	107.0	114.3	116.4	118.1	121.8	124.0	1.8	2.7
2841	Soaps and detergents	100.9	97.7	101.8	103.3	104.5	(3)	(3)	[4]1.3
2844	Cosmetics and other toiletries	84.0	86.2	85.2	87.3	94.3	(3)	(3)	[4]2.5
2851	Paints and allied products	106.5	113.8	121.5	125.6	125.2	128.5	2.6	3.7
2869	Industrial organic chemicals, n.e.c.	87.2	105.3	113.9	112.5	119.5	(3)	(3)	[4]7.2
287	Agricultural chemicals	94.5	106.2	119.8	115.6	108.0	(3)	(3)	[4]3.7
2873	Nitrogenous fertilizers	114.7	128.1	152.6	149.7	133.5	(3)	(3)	[4]4.0
2874	Phosphatic fertilizers	88.0	108.1	121.8	113.5	104.7	(3)	(3)	[4]4.0
2875	Fertilizers, mixing only	79.8	91.9	99.1	102.6	95.7	(3)	(3)	[4]4.8
2879	Pesticides and agricultural chemicals, n.e.c	95.7	97.2	110.0	103.1	103.1	(3)	(3)	[4]2.1
2911	Petroleum refining	79.4	81.8	92.5	102.6	113.8	118.8	4.4	9.3
3011	Tires and inner tubes	128.2	136.1	146.8	146.7	151.4	167.8	10.8	4.9
3079	Miscellaneous plastics products	110.1	107.2	110.5	113.0	114.1	(3)	(3)	[4]1.2
314	Footwear	106.4	103.9	105.7	107.3	109.5	104.5	-4.6	.2
3221	Glass containers	105.8	108.5	128.0	127.0	138.9	143.0	3.0	6.6

See footnote at end of table.

Table 1. Continued—Indexes of output per employee hour in selected industries, 1982-87, and percent changes, 1986-87 and 1982-87

[1977 = 100]

SIC code[1]	Industry	1982	1983	1984	1985	1986	1987[2]	Percent change, 1986-87	Average annual percent change, 1982-87
3241	Hydraulic cement	94.0	108.4	125.3	128.3	135.5	142.2	4.9	8.2
325	Structural clay products	102.6	105.4	111.3	112.8	115.6	118.7	2.7	3.0
3251, 53, 59	Clay construction products	103.3	101.1	110.4	112.6	114.5	116.2	1.5	2.8
3251	Brick and structural clay tile	88.6	85.7	93.4	100.4	98.9	102.9	4.0	3.6
3253	Ceramic wall and floor tile	128.1	126.2	144.0	131.1	140.5	(3)	(3)	[4]2.3
3255	Clay refractories	100.0	121.6	115.1	114.1	122.9	131.4	6.9	4.0
3271, 72	Concrete products	91.0	97.6	99.2	100.5	105.9	(3)	(3)	[4]3.4
3273	Ready-mixed concrete	90.6	93.7	96.3	97.4	100.1	(3)	(3)	[4]2.4
331	Steel	90.9	116.8	131.3	139.5	141.8	151.7	7.0	9.6
3321	Gray iron foundries	93.7	98.3	106.8	104.2	107.4	104.8	-2.4	2.3
3325	Steel foundries	89.0	89.9	98.8	95.6	100.3	94.3	-6.0	1.7
3325, 25	Steel foundries n.e.c.	88.4	90.2	103.5	101.0	104.3	101.9	-2.3	3.3
3331, 32, 33	Primary copper, lead, and zinc	128.0	141.2	148.0	181.5	210.8	221.1	4.9	12.6
3331	Primary copper	128.5	138.3	151.9	189.8	229.2	228.2	-.4	14.1
3334	Primary aluminum	103.0	111.5	125.4	125.4	134.0	143.5	7.1	6.5
3351	Copper rolling and drawing	106.0	121.1	128.1	122.0	127.2	139.8	9.9	4.3
3353, 54, 55	Aluminum rolling and drawing	99.2	110.4	116.2	115.9	125.0	141.6	13.3	6.3
3411	Metal cans	118.5	120.5	123.0	125.6	126.0	134.3	6.6	2.3
3423	Hand and edge tools	92.8	89.3	90.1	90.6	89.8	(3)	(3)	[4]-.5
3433	Heating equipment, except electric	102.3	93.2	102.0	101.6	105.0	(3)	(3)	[4]1.4
3441	Fabricated structural metal	99.5	103.0	107.9	117.7	117.7	(3)	(3)	[4]4.8
3442	Metal doors, sash, and trim	96.0	99.7	102.8	106.3	104.1	(3)	(3)	[4]2.3
3465, 66, 69	Metal stampings	98.1	104.7	110.4	104.7	108.7	(3)	(3)	[4]2.1
3465	Automotive stampings	106.7	122.3	127.9	120.1	121.8	(3)	(3)	[4]2.5
3469	Metal stampings, n.e.c.	89.3	89.3	95.1	90.0	95.9	(3)	(3)	[4]1.5
3494	Valves and pipe fittings	101.3	103.6	105.1	104.5	104.5	(3)	(3)	[4].7
3498	Fabricated pipe and fittings	89.5	87.2	98.0	90.4	91.0	(3)	(3)	[4].7
3519	Internal combustion engines, n.e.c.	82.0	86.8	99.8	102.7	108.5	(3)	(3)	[4]7.6
352	Farm and garden machinery	94.9	95.1	105.2	101.5	103.0	(3)	(3)	[4]2.3
3523	Farm machinery and equipment	92.6	92.0	104.6	98.6	95.5	(3)	(3)	[4]1.3
3524	Lawn and garden equipment	106.9	111.8	111.3	115.7	132.1	(3)	(3)	[4]4.7
3531	Construction machinery and equipment	88.9	88.2	102.6	104.1	107.1	99.3	-7.3	3.3
3532	Mining machinery and equipment	91.0	91.3	98.5	101.4	103.7	(3)	(3)	[4]3.7
3533	Oilfield machinery and equipment	98.4	91.8	87.5	80.1	70.1	78.9	12.6	-5.6
3541, 42	Machine tools	88.0	83.0	93.6	96.7	98.5	101.9	3.5	3.7
3541	Metal cutting machine tools	89.2	81.1	93.3	96.4	105.1	100.2	-4.7	4.1
3542	Metal forming machine tools	85.0	87.6	93.7	96.6	97.1	104.6	7.7	4.0
3545	Machine tool accessories	89.1	83.0	95.4	92.6	95.4	(3)	(3)	[4]2.5
3561, 63	Pumps and compressors	95.9	100.2	106.1	106.8	108.7	(3)	(3)	[4]3.2
3561	Pumps and pumping equipment	93.1	97.7	104.4	104.4	105.5	(3)	(3)	[4]3.2
3562	Ball and roller bearings	83.3	86.3	94.4	92.1	95.6	101.2	5.9	3.7
3563	Air and gas compressors	102.0	105.2	109.7	111.9	115.0	(3)	(3)	[4]3.1
3585	Refrigeration and heating equipment	100.1	100.9	105.5	103.7	101.5	(3)	(3)	[4].6
3592	Carburetors, pistons, rings, and valves	92.0	99.6	110.3	114.0	111.1	(3)	(3)	[4]5.3
3612	Transformers	99.6	99.1	97.6	99.3	99.4	94.6	-4.8	-.7
3613	Switchgear and switchboard apparatus	101.3	106.1	107.4	110.6	110.7	109.3	-1.3	1.5
3621	Motors and generators	102.4	104.3	107.9	110.5	112.3	115.9	3.2	2.5
3631, 32, 33, 39	Major household appliances	108.6	117.6	123.6	127.2	134.1	139.2	3.8	4.9
3631	Household cooking equipment	112.6	120.8	131.9	135.6	158.4	168.1	6.1	8.5
3632	Household refrigerators and freezers	116.1	127.1	127.5	136.8	133.5	131.6	-1.4	2.4
3633	Household laundry equipment	105.4	112.2	117.5	118.2	123.1	133.0	8.0	4.2
3639	Household appliances, n.e.c.	94.7	103.7	109.8	110.0	113.1	117.3	3.7	3.9
3641	Electric lamps	108.4	124.8	131.9	126.9	131.1	146.9	12.1	4.8
3645, 46, 47, 48	Lighting fixtures	91.0	96.3	102.2	107.0	113.8	116.5	2.4	5.2
3651	Radio and television receiving sets	163.9	196.1	236.9	249.8	278.1	300.5	8.1	12.5
3674	Semiconductors and related devices	197.9	211.5	229.2	206.1	210.5	260.1	23.6	3.6
371	Motor vehicles and equipment	96.9	109.6	115.7	121.2	121.7	125.2	2.9	4.8
3825	Instruments to measure electricity	119.2	121.8	133.7	130.4	122.2	(3)	(3)	[4]1.2
	Other								
401	Railroad transportation, revenue traffic	115.8	141.9	152.6	162.1	178.6	208.3	16.6	11.1
401	Railroad transportation, car miles	110.1	128.9	137.7	138.9	148.2	166.8	12.6	7.4
4111,13,414 PT	Class I bus carriers	98.8	95.4	90.9	87.4	86.8	(3)	(3)	-[4]3.4
4213 PT	Intercity trucking	108.0	130.7	135.1	130.2	134.5	(3)	(3)	[4]4.4
4213 PT	Intercity trucking, general freight	107.8	136.0	137.6	131.7	140.9	(3)	(3)	[4]5.1
4511, 4521 PT	Air transportation[5]	114.9	126.8	131.7	136.5	138.2	146.4	5.9	4.4
4612, 13	Petroleum pipelines	89.2	94.3	104.5	104.9	107.0	106.6	-.4	3.7
4811	Telephone communications	129.1	145.1	143.0	149.8	161.3	166.1	3.0	4.7
491, 492, 493	Gas and electric utilities	89.3	88.1	91.4	90.5	89.1	92.7	4.0	.6
491, 493 PT	Electric utilities	89.5	90.9	94.4	93.5	96.2	101.0	5.0	2.2
492, 493 PT	Gas utilities	89.0	81.1	83.6	82.1	73.0	74.8	2.5	-3.4
5251	Hardware stores[6]	109.2	111.4	121.1	124.6	137.4	149.5	8.8	6.6
5311	Department stores	112.4	119.5	126.6	129.2	135.3	137.2	1.4	4.1
5331	Variety stores[6]	112.5	119.7	123.7	114.3	101.2	(3)	(3)	-[4]2.5

See footnotes at end of table.

Table 1. Continued—Indexes of output per employee hour in selected industries, 1982-87, and percent changes, 1986-87 and 1982-87
[1977 = 100]

SIC code[1]	Industry	1982	1983	1984	1985	1986	1987[2]	Percent change, 1986-87	Average annual percent change, 1982-87
54	Retail food stores[6]	95.5	95.5	96.1	96.6	94.6	92.8	-1.9	-0.5
5411	Grocery stores[6]	97.9	98.6	100.1	98.4	96.3	94.3	-2.1	-0.8
546	Retail bakeries[6]	90.6	93.0	87.2	81.6	85.5	86.3	.9	-1.6
5511	Franchised new car dealers	100.4	109.4	110.4	109.7	110.7	105.3	-4.9	.8
5541	Gasoline service stations[6]	111.8	122.5	129.1	134.3	143.9	145.7	1.3	5.4
56	Apparel and accessory stores[6]	126.4	132.9	141.0	146.5	153.7	146.4	-4.7	3.5
5611	Men's and boys' clothing stores[6]	116.6	120.6	127.4	135.0	139.5	135.0	-3.2	3.6
5621	Women's ready-to-wear stores[6]	142.0	151.3	158.3	162.8	176.4	171.9	-2.6	4.2
5651	Family clothing stores[6]	140.7	149.2	145.8	138.5	136.0	130.9	-3.8	-2.0
5661	Shoe stores[6]	110.2	107.6	110.1	117.4	125.8	124.0	-1.4	3.3
57	Furniture, home furnishings & equip. stores[6]	109.2	118.4	129.4	133.5	144.6	145.2	.4	6.0
571	Furniture and home furnishings stores[6]	97.6	104.1	113.1	108.7	115.5	116.0	.4	3.3
572, 3	Appliance, radio, television & music stores[6]	128.7	143.4	155.1	180.0	199.5	199.8	.2	10.0
572	Household appliance stores[6]	102.0	111.8	139.2	154.6	178.8	185.2	3.6	13.7
573	Radio, television, and music stores[6]	142.4	159.5	165.9	190.2	206.5	204.3	-1.1	8.1
58	Eating and drinking places[6]	96.9	95.3	91.1	87.9	89.7	90.4	.8	-1.6
5912	Drug and proprietary stores[6]	107.9	111.4	106.2	106.5	105.6	105.9	.3	-.7
5921	Liquor stores[6]	108.1	101.6	98.7	107.1	98.0	91.6	-6.5	-2.4
602	Commercial banking	93.2	101.3	104.3	109.7	111.7	([3])	([3])	[4]4.5
7011	Hotels, motels, and tourist courts[6]	88.8	95.4	102.1	97.5	92.8	88.0	-5.2	-.5
721	Laundry and cleaning services[6]	90.6	90.4	92.3	87.3	85.0	84.0	-1.2	-1.8
7231, 7241	Beauty and barber shops[6]	108.3	114.0	103.9	98.6	97.3	99.2	2.0	-2.7
7231	Beauty shops[6]	113.1	120.1	112.3	104.1	98.8	100.4	1.6	-3.5
753	Automotive repair shops[6]	87.4	86.1	88.3	96.1	93.2	98.4	5.6	2.6

[1] As defined in the *Standard Industrial Classification Manual*, 1972, published by the Office of Management and Budget.

[2] Preliminary.

[3] Not available.

[4] Percent change, 1982-86.

[5] Output per employee.

[6] Output per hour of all persons.

NOTE: Although the output per employee hour measures relate output to the hours of all employees engaged in each industry, they do not measure the specific contribution of labor, capital, or any other single factor of production. Rather, they reflect the joint effects of many influences, including new technology, capital investment, the level of output, capacity utilization, energy use, and managerial skills, as well as the skills and efforts of the work force. Some of the measures use a labor input series that is based on hours paid, and some use a labor input series that is based on plant hours.
n.e.c. = not elsewhere classified.

stantial gains in productivity in 1987 included radio and television sets (8.1 percent); bottled and canned soft drinks (7.3 percent); men's and boys' suits and coats (6.8 percent); metal cans (6.6 percent), synthetic fibers (6.5 percent); and paper, paperboard, and pulp mills (6.2 percent). All of these industries had output gains in 1987.

However, a number of manufacturing industries registered large declines in productivity in 1987. These industries included cigars (-16.5 percent); construction machinery (-7.3 percent); steel foundries (-6.0 percent); transformers (-4.8 percent); metal cutting machine tools (-4.7 percent); and footwear (-4.6 percent).

Mining. Productivity changes were mixed among the mining industries. Iron mining (usable ore) had a very high productivity gain of 32.5 percent in 1987. Output grew 21.0 percent, in response to strong demand from the steel industry, while employee hours continued to decline (-8.7 percent). In contrast, copper mining (recoverable metal), posted a productivity decline of 8.3 percent. Although output increased strongly (11.0 percent) as demand for copper expanded sharply, employee hours were up even more (21.1 percent), as many workers were engaged in renovating reopened mines prior to the actual production of ore.

Coal mining productivity was up 7.4 percent. Output grew 3.0 percent, partially because of increased demand from utilities, while employee hours fell 4.1 percent due to changes in work rules and a continued decline in small mines. Nonmetallic mineral mining recorded a small drop in productivity of 0.3 percent. Although output was up slightly (1.8 percent), based on demand from the construction industry, employee hours were up somewhat more (2.0 percent).

Transportation and utilities. Almost all of the transportation and utility industries had productivity gains in 1987. Productivity grew 16.6 percent in railroad transportation (revenue traffic), well above the gain in 1986. Output was up 8.2 percent, as shipments of coal, grain, lumber, and wood increased, and passenger transportation grew. Air transportation had a gain of 5.9 percent in 1987. Output was up 10.4 percent, as both passenger and freight traffic increased, while employees were up 4.2 percent.

Productivity in electric utilities grew 5.0 percent as output was up 3.3 percent and employee hours fell 1.5 percent. Gas utilities had a gain of 2.5 percent, with output up 1.4 percent and hours down 1.0 percent. Extreme weather conditions, both heat and cold, resulted in output growth for both of these utility industries, while technological changes helped to lower labor requirements.

Productivity in telephone communications grew 3.0

percent with output up 5.6 percent and hours up 2.5 percent. Continued productivity growth was aided by expanding the installation of electronic switches and fiber optic cables. Productivity declined slightly in petroleum pipelines (−0.4 percent); output and employee hours were off slightly (−0.8 percent and −0.5 percent, respectively).

Trade and services. Most of the productivity gains in trade and services were small in 1987, and many industries recorded declines. The hardware store industry was an exception with a gain of 8.8 percent. Output grew 11.6 percent as expenditures for maintenance and repair of residential properties were up, while hours increased 2.6 percent. Another exception was automotive repair shops, which grew 5.6 percent based on a gain in output of 4.5 percent and a drop in hours of 1.1 percent. Productivity of beauty and barber shops increased 2.0 percent; department store productivity rose 1.4 percent; and gasoline stations posted a 1.3-percent gain. Productivity in eating and drinking places increased 0.8 percent, output grew 4.9 percent, and hours were up 4.2 percent. Furniture and home furnishings stores had a 0.4-percent gain in productivity. Demand for furniture and appliances remained high in 1987 because of the continued growth in the housing market. Productivity in drug stores grew 0.3 percent, output increased 2.8 percent, because of expanding prescription sales, while hours were up 2.5 percent.

Among the trade and service industries with declines, retail food stores posted a drop of 1.9 percent in productivity. The slight increase in output of 0.3 percent was outweighed by the 2.2-percent increase in hours. Apparel and accessory stores had a productivity decline of 4.7 percent. Output declined slightly (−0.1 percent), while hours were up (4.9 percent) as the number of stores continued to grow. All of the components of this industry (men's, women's, and family clothing and shoe stores) also registered declines in productivity. Productivity of franchised new car dealers fell 4.9 percent, output was down 2.5 percent because of declining sales of new and used cars, while hours were up 2.4 percent. Productivity fell 5.2 percent in hotels and motels as the industry continued to feel the effects of overbuilding. Output was up only 0.2 percent while hours grew 5.7 percent 1987. Liquor store productivity declined 6.5 percent, as output fell 3.0 percent and hours increased 3.9 percent. Productivity declined in the laundry and cleaning services industry by 1.2 percent, as a result of an increase in hours (3.0 percent) that exceeded the output increase of 1.7 percent.

Trends, 1982–87

Gains. Almost all of the industries measured registered growth in productivity over the 1982–87 period. Iron mining (usable ore) posted the highest rate of gain at an average annual rate of 18.9 percent per year. Demand was up from the steel industry and output grew at a 4.4-percent rate, while employee hours averaged a decline of 12.2-percent from 1982 to 1987. During this period, production of iron ore became more concentrated in the large scale, highly efficient taconite mining operations in the Lake Superior district. Copper mining (recoverable metal) had a large productivity gain of 14.9 percent from 1982–87. Copper mine output grew at a rate of 2.4 percent while employee hours declined at an average of 10.9 percent per year. Intense international competition in recent years led to domestic copper mine modernization, adaptation of advanced mining methods, and the shutdown of old mines and facilities.

Other industries recording significant gains from 1982 to 1987 included primary copper, lead, and zinc (12.6 percent); radio and TV sets manufacturing (12.5 percent); railroad transportation (revenue traffic) (11.1 percent); and appliance, radio, TV, and music stores (10.0 percent).

It is noteworthy that the steel industry recorded a productivity gain of 9.6 percent during 1982–87. The gain is significantly above the 1.6-percent long-term rate for this industry during the 1947–82 period. Demand for steel recovered from the low level of the 1982 recession while the industry continued the widespread elimination of less efficient plant and equipment. The motor vehicle industry registered a productivity gain of 4.8 percent over the 1982–87 period. This is above the long-term rate of 3.0 percent for the previous period, 1957–82. Output of motor vehicles grew at the high rate of 10.0 percent from 1982 to 1987, while employee hours were up an average of 4.9 percent. During this period, the industry was involved in modernizing existing plant and equipment, opening new, highly advanced plants and closing older, less efficient production facilities.

Declines. Among the relatively few industries that registered average annual productivity declines over the 1982–87 period, the oilfield machinery and equipment industry posted the steepest, declining at a rate of −5.6 percent. Output recorded significant declines in every year, averaging −21.6 percent. Employee hours also fell off sharply, dropping at a rate of −16.9 percent. Demand for oilfield equipment decreased sharply over this period as drilling activity declined because of an oversupply of oil and a falloff in its price. Other industries with declining productivity rates from 1982–87 included gas utilities (−3.4 percent), beauty and barber shops (−2.7 percent); liquor stores (−2.4 percent); family clothing stores (−2.0 percent); and laundry and cleaning services (−1.8 percent).

Industry multifactor productivity

Measures of multifactor productivity for the tires and inner tubes and footwear industries are presented for the first time. They are included with the updated measures for the steel and motor vehicles industries. This is an ongoing program and measures for additional industries will be published as they are completed.[3]

In multifactor productivity measures, output is related

to the combined inputs of labor, capital, and intermediate purchases. Multifactor productivity is equal to output per hour adjusted to remove the effects of changes in capital per hour and intermediate purchases per hour (materials, fuels, electricity, and services). These effects are measured as the change in the nonlabor to labor input ratio, weighted by the nonlabor input's share in total output. The capital effect, for example, is the change in the capital-labor ratio weighted by capital's share in output. Multifactor productivity measures still show the effect of many influences such as economies of scale, capacity utilization, skill and effort of the work force, and technological change. Multifactor measures are available through 1986. Data for multifactor productivity and related indexes for 1982–86 are presented in table 2.

Current developments. In 1986, multifactor productivity grew in the tires and inner tubes industry (2.8 percent) and steel industry (2.2 percent), but declines were recorded in motor vehicles (–5.0 percent) and footwear (–0.2 percent). All four industries experienced declining output in 1986, but in steel and tires and inner tubes, combined inputs fell faster than output.

In the tires and inner tubes industry, output fell 3.7 percent while combined inputs dropped 6.2 percent resulting in the multifactor productivity gain. Labor hours and intermediate purchases fell significantly (–6.1 and –8.3 percent, respectively), while capital declined a slight 0.4 percent. In the steel industry, the fall in output of 4.3 percent was exceeded by the reduction in combined inputs of 6.3 percent leading to the multifactor productivity increase in 1986. Substantial declines were recorded for labor (–8.5 percent); capital (–5.1 percent); and intermediate purchases (–5.2 percent).

The multifactor productivity drop in the motor vehicles industry can be attributed to a decline in output of 2.9 percent which was accompanied by an increase of 2.3 percent in combined inputs. Although labor hours fell (–3.4 percent), both capital and intermediate purchases increased (by 2.9 percent and 3.8 percent, respectively).

The multifactor productivity decrease in the footwear industry is based on a drop in output (–11.0 percent) which was not quite matched by the reduction in combined inputs (–10.8 percent). The decline in labor hours (–12.7 percent) and in intermediate purchases (–11.7 percent) exceeded the drop in output, but capital fell somewhat less (–4.7 percent).

Trends, 1982–86. Over the 1982–86 period, substantial average annual gains in multifactor productivity were recorded in the steel industry (5.9 percent) and in the motor vehicles and tires and inner tubes industries (both 2.8 percent). However, the footwear industry posted a 2.7-percent rate of decline in multifactor productivity. The gain in multifactor productivity in steel manufacturing can be attributed to the closing of older plants and the increasing shift to continuous casting of steel. In motor vehicles, sharp output gains in 1983 and 1984 (29.3 and 22.3 percent, respectively) were accompanied by strong gains in multifactor productivity (6.4 and 4.6 percent, respectively). In tires and inner tubes, the multifactor productivity gain from 1982–86 was based on continuing elimination of older, less efficient plants. Strong output increases in 1983 and 1984 led to substantial gains in

Table 2. Multifactor and related productivity indexes[1] for selected industries, 1982–86, and percent changes, 1985–86 and 1982–86

[1977 = 100]

SIC code	Industry and measure	1982	1983	1984	1985	1986[2]	Percent change, 1985–86	Average annual percent change 1982–86
3011	Tires and tubes:							
	Multifactor productivity	118.9	126.9	132.6	130.9	134.5	2.8	2.8
	Output per hour	128.8	136.0	147.7	147.3	151.2	2.6	4.0
	Output per unit of capital	93.0	107.2	128.2	120.5	116.5	–3.3	5.8
	Output per unit of intermediate purchases	121.9	126.6	124.2	124.0	130.2	5.0	1.1
314	Footwear:							
	Multifactor productivity	100.3	99.2	97.6	91.4	91.2	–.2	–2.7
	Output per hour	106.0	104.1	105.0	105.4	107.4	1.9	.4
	Output per unit of capital	88.1	85.2	77.9	69.4	64.7	–6.8	–7.9
	Output per unit of intermediate purchases	101.6	101.8	101.6	93.5	94.3	.9	–2.3
331	Steel:							
	Multifactor productivity	96.4	115.0	119.4	121.9	124.6	2.2	5.9
	Output per hour	98.1	119.5	131.3	138.6	145.1	4.7	9.8
	Output per unit of capital	72.5	82.6	95.4	95.8	96.7	.9	7.5
	Output per unit of intermediate purchases	96.8	114.0	113.6	114.4	115.7	1.1	3.7
371	Motor vehicles and equipment:							
	Multifactor productivity	90.9	96.7	101.1	105.2	99.9	–5.0	2.8
	Output per hour	96.2	109.4	115.3	121.3	121.8	.4	5.9
	Output per unit of capital	57.2	80.7	104.1	110.9	104.8	–5.5	16.5
	Output per unit of intermediate purchases	95.6	94.1	93.9	96.9	90.6	–6.5	–.8

[1] The output measures underlying the productivity indexes relate to the total net production of the industry. They do not relate to the specific output of any single factor of production.

[2] Preliminary

Table 3. Productivity[1] indexes for government, 1982–87, and percent changes, 1986–87 and 1982–87
[1977 = 100]

SIC Code	Functional group	1982	1983	1984	1985	1986	1987	Percent change, 1986–87	Average annual percent change, 1982–87
	Federal								
	Total Federal sample	108.6	110.2	110.2	110.9	112.7	113.0	0.2	0.8
	Audit of operations	93.3	95.3	97.9	100.6	93.7	84.5	-9.8	-1.5
	Buildings and grounds	127.0	127.9	130.4	128.8	122.5	121.8	-.5	-1.0
	Communications	183.2	196.1	213.8	226.1	236.2	247.4	4.8	6.2
	Education and training	111.8	109.2	108.1	108.6	109.2	107.8	-1.3	-.5
	Electric power production and distribution	62.8	77.9	67.2	58.5	54.5	44.2	-18.8	-8.1
	Equipment maintenance	110.5	110.5	115.5	117.1	119.5	119.2	-.2	1.8
	Finance and accounting	150.8	166.9	163.6	163.2	168.8	174.1	3.1	2.2
	General support services	162.0	158.2	148.6	136.1	142.7	144.1	1.0	-2.8
	Information services	106.7	114.1	118.8	125.2	126.6	130.4	3.0	4.0
	Legal and judicial	108.9	111.7	110.1	113.1	113.5	113.7	.2	.8
	Library services	107.2	110.1	118.6	120.9	130.8	128.7	1.7	4.2
	Loans and grants	104.7	117.3	112.2	122.4	122.7	112.8	-8.1	1.7
	Medical services	101.9	104.0	103.4	103.6	105.5	106.1	.6	.7
	Military base services	109.3	107.9	99.4	100.4	108.0	110.2	2.0	.1
	Natural resources and environmental management	111.9	112.7	115.6	119.3	120.4	125.7	4.4	2.3
	Personal investigations	104.5	99.4	102.2	105.6	98.6	106.9	8.4	.4
	Personnel management	106.7	94.3	101.9	100.1	100.7	98.4	-2.3	-.7
4311	Postal service	107.0	107.4	108.8	109.1	110.9	110.9	(3)	.8
	Printing and duplication	105.8	113.1	120.3	122.1	125.0	126.8	1.5	3.6
	Procurement	125.3	124.7	127.2	122.5	119.5	121.4	1.6	-.9
	Records management	120.2	122.0	125.2	121.4	128.5	125.3	-2.5	1.0
	Regulation—compliance and enforcement	118.6	126.6	126.9	130.2	140.6	136.6	-2.8	3.0
	Rgulation—rulemaking and licensing	131.4	139.3	146.1	153.9	150.9	154.8	2.6	3.2
	Social services and benefits	102.4	109.7	110.1	118.4	114.6	120.3	5.0	2.9
	Specialized manufacturing	133.4	138.0	143.8	146.9	149.1	141.2	-2.0	2.1
	Supply and inventory control	106.1	104.3	100.2	96.7	99.1	104.2	5.2	-.8
	Traffic management	117.0	115.8	112.7	120.8	111.8	130.8	17.0	1.5
	Transportation	114.3	114.6	113.2	114.4	116.4	115.0	-1.2	.2
	State and local								
4911	Electric power	96.7	94.8	93.4	93.8	95.8	(2)	(2)	-.3[4]
5182 pt and 5921 pt	Alcoholic beverages	106.3	108.0	109.0	103.1	100.0	98.7	-1.3	-1.9
9441	Unemployment insurance	117.5	119.2	102.0	105.1	110.1	107.1	-2.7	-1.9

[1] Output per employee year.
[2] Not available.
[3] Less than 0.05 percent.
[4] Percent change, 1982–86.

multifactor productivity in those years.

The footwear industry's declining rate of multifactor productivity is based on a sharp fall in output (by a total of 36 percent) over the 1982–86 period because of a strong rise in shoe imports. This steep decline in output (an acceleration of an earlier trend), combined with slow rates of introduction and diffusion of technological innovations, has made it difficult to attain productivity gains.

Government productivity

Measures of output per employee year for the Federal Government and selected State and local government services are updated to 1987. Data are presented for fiscal years 1982–87 for most series and are shown in table 3.[4]

Federal. Output per employee year increased 0.2 percent in fiscal 1987 in the productivity index covering the measured sample of Federal Government organizations. This gain reflected a 1.4-percent increase in output and a 1.2-percent increase in employee years.

The measure covers 61 Federal agencies and is based on data representing 372 organizational units in fiscal 1987. The organizations included 2.1 million executive branch civilian employees representing 69 percent of the total Federal civilian labor force.

The Federal organizations are divided into 28 functional categories based on similarity of tasks performed (for example, auditing, medical, personnel, and transportation) to better identify and understand the forces which affect Federal productivity. The change in output per employee year for the 28 functions in 1987 ranged from an increase of 17.0 percent for traffic management, to a decline of 18.8 percent for electric power production and distribution. Productivity increased in 15 functions, decreased in 12, and remained unchanged in one.

The traffic management function, which includes those organizations responsible for arranging for the movement of people and goods, posted the largest gain among the functions with a 17.0-percent increase in productivity in 1987. Output increased by 12.0 percent in 1987 while employee years decreased by 4.2 percent. Two of the three organizational units experienced increasing output in 1987, whereas all three showed declines in employee years.

In contrast, the electric power production and distribution function had the steepest productivity falloff (-18.8

percent) caused by a 15.5-percent decrease in output and a 4.0-percent increase in employee years. Output declined in four of the six organizations while employee years increased in two, remained unchanged in two, and decreased in two. Four of the six organizations experienced productivity declines in 1987.

The postal service, the largest of the 28 functions in terms of employees, includes only a single organization, the U.S. Postal Service. Its productivity remained unchanged in 1987. By comparison, productivity rose 1.6 percent in fiscal 1986. During 1987, output increased 3.5 percent while labor increased 3.4 percent.

Trends, 1982–87. Over the 1982–87 period, output per employee year in the Federal sample rose at an average annual rate of 0.8 percent. The year-to-year changes in productivity ranged from no change in 1984 to a 1.6-percent gain in 1986. The overall increase in Federal productivity reflects an average rise of 2.3 percent in output and a 1.5-percent increase in labor input. Output increased annually at rates ranging from 1.4 percent in 1987 to 2.6 percent in 1985. Annual rates of change in employee years ranged from an increase of 0.7 percent in 1986 to 2.2 percent in 1984.

From 1982 to 1987, productivity trends for the 28 functions ranged from 6.2-percent annual growth for communications to a 8.1-percent annual decline for electric power production and distribution.

Communications had the highest average annual increase in productivity (6.2 percent) of any of the 28 functions. In 1983 and 1984, productivity increased 7.0 and 9.0 percent, respectively. The high productivity gain during the period is primarily attributed to technological changes in equipment that receives and transmits messages instantaneously all over the world. The six organizations accounting for this function in 1987 are in the Department of Defense, the General Services Administration, and the Department of State.

The function with the second largest average annual increase in productivity over the last 5 years is library services (4.2 percent), which includes the Library of Congress and four agency libraries. Output was up 2.6 percent, while employee years fell 1.6 percent over the 1982–87 period. Productivity in library services was aided by computerization of operations and the introduction of new facilities.

Between 1982 and 1987, the electric power production and distribution function registered the largest decrease in productivity of the 28 functions (–8.1 percent). During this period, productivity decreased in every year but one, which is a reflection of sharply decreasing output (–14.5 percent). Employment has been cut back over the past 5 years, but the decrease in output has exceeded the cut in input by a wide margin.

State and local government services

Electric power. Output per employee year in State and local government electric power increased 2.1 percent in 1986, the last year for which data are available, as output and employment increased 5.3 and 3.1 percent, respectively. In 1985, output, employment, and productivity also increased. However, over the 1982–86 period, productivity declined at an average annual rate of 0.3 percent as employment increased at a more rapid rate than output.

State sales of alcoholic beverages. Output per employee year in State sales of alcoholic beverages dropped 1.3 percent in 1987 as output, and input fell 3.1 and 1.9 percent, respectively. In 1986, productivity, output, and input also declined. The drop in output in 1986 and 1987 was a continuation of a trend that started in 1980 which reflects decreasing demand for spirits and a shift in several States from government to private sector operations.

Unemployment insurance. State unemployment insurance productivity decreased 2.7 percent in fiscal 1987 as output dropped 6.3 percent and inputs were cut 3.7 percent. Over the 1982–87 period, productivity, output, and labor decreased. The decrease in output is a reflection of decreasing unemployment in the Nation and the resulting drop in unemployment insurance claims and payments. While State staffing has been cut, it has not declined as rapidly as output has dropped. The result is an average annual decrease in productivity of 1.9 percent between 1982 and 1987.

FOOTNOTES

[1]A full report, *Productivity Measures for Selected Industries and Government Services*, BLS Bulletin 2322, is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

[2]For a detailed report on productivity in these industries, see the following *Monthly Labor Review* articles: Mark Scott Sieling and Daniel Curtin, "Patterns of productivity change in men's and boys' suits and coats," November 1988, pp. 25–31; Horst Brand and Kelly Bryant, "Productivity in agricultural chemicals," March 1989, pp. 21–28; James D. York, "Variety stores experience shifting trend in productivity," October 1988, pp. 30–33; and a forthcoming article on productivity in the carburetors, pistons, and valves industry.

[3]For additional information about multifactor productivity in the steel and motor vehicles industries and a description of the methodology used to develop the industry productivity measures, see Mark K. Sherwood, "Performance of multifactor productivity in the steel and motor vehicles industries," *Monthly Labor Review*, August 1987, pp. 22–30; and forthcoming articles on multifactor productivity in the tires and inner tubes industry and the footwear industry.

[4]For additional information about productivity in government, see Donald M. Fisk, "Productivity trends in the Federal Government," *Monthly Labor Review*, October 1985, pp. 3–9; Jerome A. Mark, "Public sector productivity measurement: the BLS experience," in *The Measurement and Implications of Productivity Growth: Proceedings of a Workshop, Nov. 22–33, 1984* (Canberra, Australia Department of Employment and Industrial Relations, Bureau of Labor Market Research, 1986), Monograph Series No. 14; and Donald M. Fisk, *Measuring Productivity in State and Local Government*, Bulletin 2166 (Bureau of Labor Statistics, 1983).