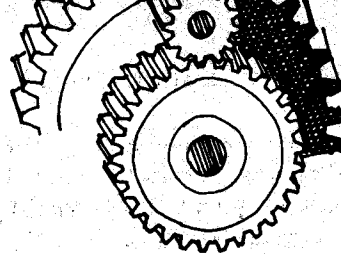


Productivity Reports



Productivity in selected industries and government services in 1986

ARTHUR S. HERMAN

Labor productivity, as measured by output per employee hours, increased in 1986 in more than three-fourths of the industries for which current data are available. In comparison, less than two-thirds of the industries posted gains in 1985.

This article updates to the most current year all indexes included in the industry productivity measurement program of the Bureau of Labor Statistics. It extends the measures through 1986, and includes data on industry multifactor productivity measures through 1985 and data on Federal, State, and local government productivity measures through 1986.

Table 1 shows labor productivity trends in the industries measured by the Bureau and includes measures for additional industries: cotton and synthetic broad woven fabrics; industrial inorganic chemicals; industrial organic chemicals; nonelectric heating equipment; semiconductors and related devices; retail hardware stores; department stores; and automotive repair shops.¹

Changes in industry labor productivity

Manufacturing. Among major manufacturing industries, both motor vehicles and steel registered small productivity gains in 1986. In motor vehicle manufacturing, productivity grew by 1.8 percent. Although output fell 2.2 percent in 1986, mainly because of a decline in the automobile segment of the industry, employee hours fell even more, dropping 4.0 percent. The productivity gain was the sixth consecutive one in this industry. In steel manufacturing, productivity was up 1.7 percent, as output dropped 5.9 percent, while employee hours fell 7.6 percent. Demand was off from automobile firms and from capital goods producers, such as the agricultural and industrial machinery industries, and other markets. The steel industry continued to eliminate less efficient plant and equipment. Steel manufacturing has recorded four consecutive annual increases in productivity.

A number of important manufacturing industries posted substantial gains in productivity in 1986, including

petroleum refining (12.0 percent); sawmills (11.0 percent); and paper, paperboard, and pulp mills (7.1 percent). These industries recorded output growth in 1986. In petroleum refining, output was up 5.8 percent as demand was aided by a sharp drop in the price of petroleum products and hours fell off 5.6 percent as a number of less efficient refineries were closed. Sawmills posted an output gain of 11.5 percent, as a result of increased demand from the single-family housing market, while hours grew 0.5 percent. In the paper industry, output gained 5.9 percent, as demand was stimulated by favorable overall economic conditions, while hours were off 1.1 percent.

Only a small number of manufacturing industries registered productivity declines in 1986. These were metal forming machine tools (-8.7 percent); steel foundries and non-wool yarn mills (both -3.9 percent); oilfield machinery (-3.4 percent); gray iron foundries (-1.9 percent); and cigarettes (-0.2 percent).

Mining. Among the mining industries, coal mining had a productivity gain of 8.2 percent based on a small output increase of 0.3 percent, while hours fell 7.3 percent. Between 1985 and 1986, demand for coal remained fairly stable while the industry continued to close less efficient mines. Nonmetallic minerals posted a productivity advance of 1.0 percent; output dropped 0.6 percent, as declining demand from the agricultural chemicals market more than offset a gain from the construction materials market, and hours fell 1.6 percent. In copper mining (recoverable metal), productivity was up by a large 22.5 percent, as output grew 4.2 percent while hours dropped 14.9 percent. On the other hand, iron mining (usable ore) had a decline in productivity of 6.3 percent; output fell 20.6 percent because of a continued decline in demand from the steel industry, while hours dropped 15.2 percent.

Transportation and utilities. Productivity changes were mostly positive among transportation and utility industries. Railroads had a large productivity gain of 11.0 percent; output grew 1.9 percent while employee hours continued to decline (-8.2 percent). In air transportation, productivity grew 1.2 percent. Air traffic was up significantly in 1986, and output grew 8.8 percent, while employment also was up (7.6 percent). Petroleum pipelines had a gain in productivity of 2.8 percent, as output grew 1.6 percent while employee hours fell 1.1 percent. In telephone communications, productivity was up 6.0 percent based on an output gain of 2.2 percent and a drop in employee hours of 3.6 percent. Pro-

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Table 1. Indexes of output per employee hour in selected industries, 1981-86, and percent changes, 1985-86 and 1981-86
 [1977=100]

sic Code ¹	Industry	1981	1982	1983	1984	1985	1986 ²	Percent change, 1985-86	Average annual percent change, 1981-86
Mining									
1011	Iron mining, crude ore	132.8	100.9	139.0	173.3	187.9	178.3	-5.1	10.7
1011	Iron mining, usable ore	130.6	98.2	138.6	171.7	187.9	176.1	-6.3	11.0
1021	Copper mining, crude ore	102.0	106.4	129.9	140.3	164.2	201.4	22.7	14.6
1021	Copper mining, recoverable metal	97.7	116.2	130.9	153.9	193.1	236.5	22.5	19.1
111,21	Coal mining	122.2	119.2	136.1	151.3	154.0	166.7	8.2	7.2
121	Bituminous coal and lignite mining	122.7	120.0	136.9	152.3	154.6	168.1	8.7	7.2
14	Nonmetallic minerals, except fuels	94.7	89.3	98.2	105.5	107.6	108.7	1.0	3.8
142	Crushed and broken stone	96.7	94.1	103.9	105.8	104.5	104.8	.3	2.1
Manufacturing									
2011,13	Red meat products	107.9	112.3	115.9	117.0	119.5	122.1	2.2	2.4
2011	Meat packing plants	113.9	119.5	123.4	125.6	130.1	131.7	1.2	2.9
2013	Sausages and other prepared meats	95.0	96.5	100.0	99.5	98.8	102.2	3.4	1.2
2016,17	Poultry dressing and processing	116.4	125.6	131.7	130.3	133.2	(3)	(3)	43.1
2026	Fluid milk	128.0	135.3	142.4	147.7	152.3	(3)	(3)	44.4
203	Preserved fruits and vegetables	99.2	107.9	110.4	113.1	112.6	(3)	(3)	43.1
2033	Canned fruits and vegetables	100.7	108.6	112.2	115.7	122.6	(3)	(3)	44.7
204	Grain mill products	110.9	121.0	125.5	132.8	144.9	(3)	(3)	46.5
2041,45	Flour (including flour mixes) and other grains	99.1	112.3	117.7	122.9	126.0	(3)	(3)	45.9
2041	Flour and other grain mill products	96.7	104.1	110.4	114.9	122.9	134.1	9.1	6.4
2043	Cereal breakfast foods	109.3	115.0	118.8	129.3	133.8	(3)	(3)	45.4
2044	Rice milling	117.9	104.5	103.3	93.2	103.2	(3)	(3)	4-3.7
2046	Wet corn milling	137.5	138.8	156.9	192.1	198.4	(3)	(3)	41.2
2047,48	Prepared feeds for animals and fowls	110.7	124.9	127.5	132.5	143.8	(3)	(3)	46.0
205	Bakery products	96.2	103.3	106.9	106.8	108.5	(3)	(3)	42.8
2061,62,63	Sugar	98.8	90.4	98.6	99.7	105.5	109.1	3.4	2.8
2061,62	Raw and refined cane sugar	98.8	87.6	100.0	94.7	108.7	111.4	2.5	3.5
2063	Beet sugar	98.7	94.8	94.5	108.8	100.7	107.4	6.7	2.1
2062	Malt beverages	118.3	122.6	131.3	137.9	130.3	137.0	5.1	2.8
2086	Bottled and canned soft drinks	114.3	118.3	127.0	138.3	145.3	149.0	2.5	6.0
2111,21,31	Total tobacco products	100.5	100.7	105.1	110.3	113.4	114.7	1.1	3.1
2111,31	Cigarettes, chewing and smoking tobacco	99.6	99.5	104.1	107.2	111.7	111.5	-2	2.7
2121	Cigars	107.3	111.4	112.3	141.4	129.3	150.0	16.0	7.0
2211,21	Cotton and synthetic broad woven fabrics	107.4	112.5	121.6	119.9	123.9	130.3	5.2	3.6
2251,52	Hosiery	122.0	114.2	118.0	119.7	118.3	118.6	.3	-1
2281	Nonwool yarn mills	103.1	118.2	128.5	129.6	134.5	129.2	-3.9	4.5
2421	Sawmills and planing mills, general	107.9	115.1	126.8	132.3	139.2	154.5	11.0	7.1
2431	Millwork	96.4	86.1	87.9	88.7	85.7	(3)	(3)	4-2.0
2434	Wood kitchen cabinets	94.8	96.1	94.3	94.2	89.1	(3)	(3)	4-1.4
2435,36	Veneer and plywood	106.9	114.4	121.1	120.0	121.3	(3)	(3)	43.1
2435	Hardwood veneer and plywood	100.3	101.4	110.1	103.9	108.9	(3)	(3)	41.9
2436	Softwood veneer and plywood	111.8	122.1	127.3	129.6	128.2	(3)	(3)	43.4
251	Household furniture	103.0	104.7	110.2	112.3	112.5	116.9	3.9	2.5
2511,17	Wood household furniture	97.3	98.2	103.9	105.6	104.5	(3)	(3)	42.2
2512	Upholstered household furniture	110.5	115.9	121.7	122.8	124.7	(3)	(3)	43.0
2514	Metal household furniture	98.7	107.5	109.2	121.3	123.9	(3)	(3)	45.9
2515	Mattresses and bedsprings	114.0	104.3	108.8	109.7	109.0	113.4	4.0	.3
252	Office furniture	108.8	107.4	112.0	117.7	116.7	117.2	.4	1.9
2521	Wood office furniture	99.5	90.3	93.9	96.0	96.2	(3)	(3)	4-1
2522	Metal office furniture	114.0	116.6	122.1	130.4	128.2	(3)	(3)	43.5
2611,21,31,61	Paper, paperboard, and pulp mills	104.4	111.3	119.5	121.0	120.3	128.8	7.1	3.8
2643	Paper and plastic bags	92.3	95.3	102.9	105.6	107.2	(3)	(3)	44.1
2651	Folding paperboard boxes	104.5	104.2	104.5	102.4	99.6	103.3	3.7	-6
2653	Corrugated and solid fiber boxes	109.8	111.9	114.0	118.9	122.5	127.3	3.9	3.1
281	Industrial inorganic chemicals	91.4	86.3	94.2	106.0	102.6	(3)	(3)	44.5
2812	Alkalies and chlorine	95.3	100.8	127.1	146.3	147.4	(3)	(3)	413.3
2816	Inorganic pigments	105.1	96.7	104.0	125.7	132.7	(3)	(3)	47.6
2819 pt	Industrial inorganic chemicals, n.e.c.	89.3	80.8	86.9	97.5	95.3	(3)	(3)	43.2
2823,24	Synthetic fibers	120.9	103.6	126.2	125.3	135.8	148.2	9.1	5.3
2834	Pharmaceutical preparations	104.2	107.0	115.2	114.3	111.9	114.8	2.6	1.8
2841	Soaps and detergents	107.3	100.9	97.7	101.8	103.3	(3)	(3)	4-7
2844	Cosmetics and other toiletries	76.1	84.0	86.2	85.2	86.7	(3)	(3)	42.8
2851	Paints and allied products	99.8	106.5	111.5	119.0	117.3	122.1	4.1	4.0
2869	Industrial organic chemicals, n.e.c.	103.9	87.2	105.3	114.0	112.4	(3)	(3)	44.3
2911	Petroleum refining	83.7	79.4	81.8	92.5	102.6	114.9	12.0	7.3
3011	Tires and inner tubes	118.1	128.2	136.1	146.8	146.7	148.1	1.0	4.7
3079	Miscellaneous plastics products	98.5	110.1	107.3	110.5	113.0	(3)	(3)	42.8
314	Footwear	95.6	106.4	103.9	105.7	107.3	107.4	.1	1.8
3221	Glass containers	110.1	105.8	108.5	128.0	127.0	135.8	6.9	5.2
3241	Hydraulic cement	91.1	94.0	108.4	125.3	128.3	132.6	3.4	8.8
325	Structural clay products	100.7	102.6	105.0	111.2	111.8	115.9	3.7	3.0
3251,53,59	Clay construction products	97.3	103.3	101.0	110.4	111.7	116.2	4.0	3.5
3251	Brick and structural clay tile	84.3	88.6	85.5	93.3	99.5	103.6	4.1	4.3
3253	Ceramic wall and floor tile	125.9	128.1	126.2	144.0	131.1	(3)	(3)	42.0

See footnotes at end of table.

Table 1. Continued—Indexes of output per employee hour in selected industries, 1981–86, and percent changes, 1985–86 and 1981–86
[1977=100]

sic Code ¹	Industry	1981	1982	1983	1984	1985	1986 ²	Percent change, 1985–86	Average annual percent change, 1981–86
3255	Clay refractories	111.1	100.0	121.6	115.1	114.1	117.3	2.8	1.8
3271,72	Concrete products	88.5	91.0	97.6	99.2	100.5	(3)	(3)	43.5
3273	Ready-mixed concrete	95.4	90.6	93.7	96.3	97.4	(3)	(3)	41.0
331	Steel	112.0	90.9	116.8	131.3	139.5	141.9	1.7	7.7
3321	Gray iron foundries	92.7	93.7	98.3	106.8	104.2	102.2	-1.9	2.6
3324,25	Steel foundries	91.6	89.0	89.9	98.8	95.6	91.9	-3.9	.9
3331,32,33	Primary copper, lead, and zinc	118.6	128.0	141.2	148.4	181.3	200.9	10.9	11.2
3331	Primary copper	124.4	128.5	138.3	151.9	189.8	214.8	13.2	12.1
3334	Primary aluminum	103.8	103.0	111.5	125.4	125.4	128.2	2.2	5.2
3351	Copper rolling and drawing	97.3	105.4	120.2	127.4	121.3	129.9	7.1	5.7
3353,54,55	Aluminum rolling and drawing	96.8	99.2	110.4	116.2	115.9	125.8	8.5	5.4
3411	Metal cans	107.8	118.5	120.4	122.9	125.8	129.5	2.9	3.2
3423	Hand and edge tools	95.2	92.8	89.3	90.1	90.6	(3)	(3)	4-1.3
3433	Heating equipment, except electric	94.6	102.3	93.2	102.0	97.7	(3)	(3)	40.6
3441	Fabricated structural metal	98.5	99.5	103.0	107.9	117.7	(3)	(3)	44.5
3442	Metal doors, sash, and trim	90.4	96.0	99.7	102.8	106.3	(3)	(3)	44.0
3465,66,69	Metal stampings	101.4	98.1	104.7	110.4	104.7	(3)	(3)	41.8
3465	Automotive stampings	105.0	106.7	122.3	127.9	120.1	(3)	(3)	44.6
3469	Metal stampings, n.e.c.	98.0	89.3	89.3	96.1	90.1	(3)	(3)	4-0.9
3494	Valves and pipe fittings	105.4	101.3	103.6	105.1	104.5	(3)	(3)	4-0.2
3498	Fabricated pipe and fittings	93.5	89.5	87.1	97.9	90.4	(3)	(3)	40.2
3519	Internal combustion engines, n.e.c.	93.2	82.0	86.8	99.8	102.7	(3)	(3)	44.0
352	Farm and garden machinery	95.1	94.9	95.3	105.2	101.7	(3)	(3)	42.4
3523	Farm machinery and equipment	94.1	92.6	92.0	104.6	98.8	(3)	(3)	42.2
3524	Lawn and garden equipment	101.0	106.9	111.9	111.4	115.7	(3)	(3)	43.2
3531	Construction machinery and equipment	96.1	88.9	88.2	102.6	104.1	105.3	1.2	3.1
3532	Mining machinery and equipment	97.8	91.0	91.3	98.5	101.4	(3)	(3)	41.5
3533	Oilfield machinery and equipment	104.7	98.4	91.8	87.5	80.1	77.4	-3.4	-6.0
3541,42	Machine tools	96.5	88.5	83.5	94.0	92.0	95.2	3.5	0.5
3541	Metal cutting machine tools	98.9	89.2	81.1	93.3	96.4	104.7	8.6	1.9
3542	Metal forming machine tools	89.4	85.0	87.4	93.7	79.5	72.6	-8.7	-3.3
3545	Machine tool accessories	102.0	89.1	83.0	95.4	92.7	(3)	(3)	4-1.2
3561,63	Pumps and compressors	102.4	95.9	100.2	106.1	108.3	(3)	(3)	42.2
3561	Pumps and pumping equipment	101.7	93.1	97.7	104.4	104.8	(3)	(3)	41.8
3562	Ball and roller bearings	94.3	83.3	86.3	94.4	93.2	93.5	0.3	1.1
3563	Air and gas compressors	106.8	102.0	105.2	109.7	111.9	(3)	(3)	41.7
3585	Refrigeration and heating equipment	99.4	100.1	100.9	105.4	103.7	(3)	(3)	41.4
3612	Transformers	106.9	99.6	99.1	97.6	99.3	101.9	2.6	-0.8
3613	Switchgear and switchboard apparatus	99.5	101.3	106.1	107.4	110.9	121.2	9.3	3.7
3621	Motors and generators	100.4	102.4	104.3	107.9	110.5	(3)	(3)	42.5
3631,32,33,39	Major household appliances	107.6	108.6	117.6	123.6	127.2	135.7	6.7	4.9
3631	Household cooking equipment	105.7	112.6	120.8	131.9	135.6	144.8	6.8	6.5
3632	Household refrigerators and freezers	117.4	118.1	127.1	127.5	136.8	146.1	6.8	4.6
3633	Household laundry equipment	103.9	105.4	112.2	117.5	118.2	123.3	4.3	3.6
3639	Household appliances, n.e.c.	100.4	94.7	103.7	109.8	110.0	119.3	8.5	4.0
3641	Electric lamps	106.9	108.4	124.8	131.9	126.9	128.7	1.4	4.2
3645,46,47,48	Lighting fixtures	88.7	91.0	96.3	102.2	107.0	(3)	(3)	45.0
3651	Radio and television receiving sets	133.6	163.9	196.1	236.9	249.8	258.9	2.8	14.4
3674	Semiconductors and related devices	171.6	197.9	211.5	229.2	206.1	218.4	6.0	4.1
371	Motor vehicles and equipment	93.1	96.9	109.6	115.7	121.1	123.3	1.8	6.3
3825	Instruments to measure electricity	111.9	119.2	121.8	133.7	130.4	(3)	(3)	44.3
	Other								
401	Railroad transportation, revenue traffic	111.5	115.8	141.9	152.6	162.1	179.9	11.0	10.4
401	Railroad transportation, car miles	107.6	110.1	128.9	137.7	138.9	148.2	6.7	7.0
4111,31,414 pt	Class I bus carriers	90.7	98.8	95.4	90.9	88.2	(3)	(3)	4-1.4
4213	Intercity trucking	98.7	93.3	101.0	102.5	97.2	(3)	(3)	40.6
4213	Intercity trucking, general freight	92.5	86.8	92.5	94.2	90.5	(3)	(3)	40.4
4511,4521 pt	Air transportation ⁵	104.9	114.9	126.8	131.7	136.5	138.1	1.2	5.7
4612,13	Petroleum pipelines	86.0	89.2	94.3	104.5	104.9	107.8	2.8	5.0
4811	Telephone communications	124.4	129.1	145.1	143.0	149.9	158.9	6.0	4.8
491,492,493	Gas and electric utilities	94.4	89.3	88.1	91.4	90.5	88.9	-1.8	-0.6
491,493 pt	Electric utilities	93.0	89.5	90.9	94.4	93.5	94.6	1.2	0.7
492,493 pt	Gas utilities	98.1	89.0	81.1	83.6	82.1	75.3	-8.3	-4.3
5251	Hardware stores ⁶	107.3	108.9	107.0	112.8	111.4	118.1	6.0	1.7
5311	Department stores	106.0	107.4	114.9	122.1	125.0	130.3	4.2	4.5
54	Retail food stores ⁶	95.2	93.5	93.9	93.6	94.2	93.0	-1.3	-0.3
5511	Franchised new car dealers	98.1	100.4	109.4	110.4	109.7	111.3	1.5	2.6
5541	Gasoline service stations ⁶	105.8	110.7	118.1	121.0	122.6	126.6	3.3	3.6
56	Apparel and accessory stores ⁶	127.1	130.9	137.8	146.6	152.2	162.8	7.0	5.1
5611	Men's and boys' clothing stores ⁶	115.6	115.7	120.1	127.2	133.2	144.3	8.3	4.6
5621	Women's ready-to-wear stores ⁶	139.0	158.2	169.7	178.4	187.8	206.6	10.0	7.5
5651	Family clothing stores ⁶	131.4	139.6	149.8	148.1	142.5	141.3	-0.8	1.2
5661	Shoe stores ⁶	113.0	108.9	110.0	116.5	128.1	141.1	10.1	4.8
57	Furniture, home furnishings, and equipment stores ⁶	112.6	109.2	118.4	128.1	131.0	141.2	7.8	5.1
571	Furniture and home furnishings stores ⁶	101.2	97.6	104.1	112.9	108.4	114.3	5.4	2.9
572,3	Appliance, radio, television, and music stores ⁶	132.4	128.7	143.4	154.7	172.8	191.8	11.0	8.4

See footnotes at end of table.

Table 1. Continued—Indexes of output per employee hour in selected industries, 1981–86, and percent changes, 1985–86 and 1981–86
[1977=100]

sic Code ¹	Industry	1981	1982	1983	1984	1985	1986 ²	Percent change, 1985–86	Average annual percent change, 1981–86
58	Eating and drinking places ⁶	97.0	96.6	97.1	94.9	93.5	96.3	3.0	-0.4
5912	Drug and proprietary stores ⁶	107.6	107.9	110.1	105.0	100.3	97.0	-3.3	-2.2
592	Liquor stores ⁶	103.7	107.8	101.7	99.1	105.9	109.1	3.0	0.5
602	Commercial banking	90.5	93.2	101.7	104.6	109.2	(3)	(3)	45.0
7011	Hotels, motels, and tourist courts ⁶	91.6	88.8	95.4	102.1	97.5	92.8	-4.8	-1.2
721	Laundry and cleaning services ⁶	88.1	90.2	90.1	92.1	87.0	84.9	-2.4	-0.8
723,724	Beauty and barber shops ⁶	109.2	108.3	114.1	103.9	98.5	98.7	0.2	-2.5
723	Beauty shops ⁶	114.7	113.1	120.0	112.3	104.0	103.2	-0.8	-2.4
753	Automotive repair shops ⁶	93.6	87.7	86.2	88.5	96.2	94.1	-2.2	-0.9

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, 1981–85.

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 these 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.

ductivity in electric utilities grew 1.2 percent, with output up 2.2 percent and hours up 1.1 percent. On the other hand, gas utilities posted a productivity decline of 8.3 percent; output fell 11.1 percent partly because of a warm winter and the shift of some customers to cheaper oil heat. Employee hours were off 3.1 percent.

Trade and services. Productivity changes were mixed among the trade and service industries. Furniture, home furnishings, and equipment stores posted a 7.8-percent productivity gain, as output grew 9.3 percent while hours were up 3.8 percent. The demand for furniture and appliances was up because of the expansion in new and existing home sales, while home electronics also had a good year, fueling the large output gain. The appliance, radio, and TV component of this industry recorded an 11.0-percent productivity gain. Apparel and accessory stores had a 7.0-percent gain in productivity; output was up 9.1 percent, as sales were good in all types of apparel stores; and all person hours grew 2.0 percent. Changes in productivity among the components of this industry ranged from 10.1 percent in shoe stores to -0.8 percent in family clothing stores. The gasoline service station industry posted a 3.3-percent gain as output grew 5.0 percent, helped by lower gasoline prices, while hours were up 1.6 percent. Both eating and drinking places and liquor stores had 3.0-percent productivity increases, while new car dealers had a gain of 1.5 percent, and beauty and barber shops grew 0.2 percent.

Productivity declines were posted by a number of trade and service industries. There was a decline of 1.3 percent in retail food stores. Output was up 1.8 percent while hours grew 3.1 percent, as the industry continued to provide more service-oriented operations such as delicatessens, salad bars, in-store bakeries, pharmacies, and photo departments. Other industries with declines in productivity were laundries and cleaning services (-2.4 percent), drug stores (-3.3 percent), and hotels and motels (-4.8 percent).

Trends, 1981–86

A large majority of the measured industries recorded average annual gains in productivity over the 1981–86 period. Copper mining (recoverable metal) posted the highest rate of growth in the last 5 years, averaging 19.1 percent a year. Intense international competition in recent years has resulted in improved mining methods and the shutdown of older, less efficient mines. The radio and television receiving sets industry experienced the second highest rate of gain during the 1981–86 period—14.4 percent per year. Productivity growth in this highly competitive industry was aided by the widespread use of automated production technology and the closing of less efficient plants. Other industries with high rates of gain during 1981–86 include: alkalies and chlorine (13.3 percent, 1981–85); primary copper, lead, and zinc (11.2 percent); wet corn milling (11.2 percent, 1981–85); iron mining (usable ore) (11.0 percent); and railroad transportation (revenue traffic) (10.4 percent).

However, several industries showed marked declines in productivity in the 1981–86 period. Among these, the oil-field machinery industry recorded the greatest falloff, declining at a rate of 6.0 percent. The industry faced a sharp drop in demand for its products stemming from a downward movement in the price of crude oil. Falling output coupled with the industry's made-to-order, labor intensive operations, aggravated the productivity decline. Additionally, the gas utilities industry was also among those industries that had a marked falloff in productivity (-4.3 percent annually). During the 1981–86 period, the output of this industry fell at a rate of 5.0 percent because of a decline in average use per customer. There was only a minimal decline in employee hours due to an increase in the number of customers. Thus, productivity declined substantially. Other industries with substantial declines were: rice milling (-3.7 percent, 1981–85); metal forming machine tools (-3.3 per-

cent); beauty and barber shops (-2.5 percent); and drug stores (-2.2 percent).

Industry multifactor productivity

Measures of multifactor productivity are presented for the steel and motor vehicles industries. These industry measures are the first to be published from the Bureau's industry multifactor productivity project. This is an ongoing program and measures for additional industries will be published as they are completed.²

In multifactor productivity measures, output is related to 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.

The multifactor measures for the steel and motor vehicles industries are available through 1985. Because these measures were greatly affected by cyclical changes in the economy, the periods from the last peak forward are analyzed here, rather than the last 5 years as done for the other measures. For the steel industry, the period 1979-85 is discussed while for the motor vehicles industry, 1978-85 is covered. Table 2 shows multifactor productivity and related data for these periods for the two industries.

Steel. Multifactor productivity in the steel industry grew at an average annual rate of 3.4 percent per year between 1979 and 1985, as output fell at a rate of 6.1 percent, and combined inputs fell more steeply at a 9.2-percent rate. This performance can be compared with growth of 4.8 per-

cent per year in output per hour in steel manufacturing over the same period. The difference between the growth rate of labor productivity (output per hour) and that of multifactor productivity was attributable to a 0.3-percent average annual growth in the capital effect (the change in the capital-labor ratio weighted by the capital share of about 15 percent) and a 1.1-percent intermediate purchases effect (the change in the ratio of intermediate purchases to labor weighted by the intermediate purchases share of about 50 percent).

Some large, integrated mills with obsolescent plant and equipment closed, as the restructuring of the industry continued during the 1979-85 period, while diffusion of technological changes such as the electric arc furnace and the continuous casting steel making method increased. Labor hours fell faster (-10.4 percent) than capital (-3.2 percent) or intermediate purchases (-8.8 percent) in this period, and both the capital-labor and intermediate purchases-labor ratios increased.

Motor vehicles. Multifactor productivity in the motor vehicles and equipment industry grew at an average annual rate of 0.8 percent per year between 1978 and 1985, as output gains averaged 1.7 percent per year and combined inputs rose at a 0.9-percent rate. Labor productivity (output per hour) grew by 3.5 percent per year. The difference between the growth of labor productivity and that of multifactor productivity was almost entirely attributable to the intermediate purchases effect. Changes in the capital-labor ratio were so slight as to have virtually no effect on labor productivity over the period. Both labor and capital declined during this period, while intermediate purchases increased. Between 1978 and 1985, the intermediate purchases effect made up the entire difference between labor productivity and multifactor productivity and, in fact, was a larger source of the growth in labor productivity than was multifactor productivity.

Table 2. Multifactor and related productivity indexes¹ for selected industries, 1978 or 1979-85

[1977=100]										
SIC Code	Industry and measure	1978	1979	1980	1981	1982	1983	1984	1985 ²	Average annual percent change
331	Steel:									1979-85
	Multifactor productivity	—	104.4	102.4	101.6	96.4	115.0	119.4	123.6	3.4
	Output per hour	—	106.6	105.8	112.1	98.1	119.5	131.3	140.5	4.8
	Output per unit of capital	—	114.3	99.5	108.2	72.5	82.6	95.4	97.3	-2.9
	Output per unit of intermediate purchases	—	101.5	100.7	95.5	96.8	114.0	113.6	116.0	3.0
371	Motor vehicles and equipment:									1978-85
	Multifactor productivity	100.1	98.8	89.8	90.3	90.9	96.7	101.1	105.1	.8
	Output per hour	99.6	97.5	89.8	92.0	96.2	109.4	115.3	121.2	3.5
	Output per unit of capital	98.0	88.8	61.8	62.9	57.2	80.7	104.1	110.9	3.0
	Output per unit of intermediate purchases	100.7	102.0	95.0	95.1	95.6	94.1	93.9	96.7	-.9

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.

NOTE: Dashes indicate data are not available.

Government productivity

Measures of output per employee year for the Federal Government and selected State and local government services are included here for the first time. Data are presented from fiscal years 1981-86 for most series and are shown in table 3.³

Federal. Output per employee year increased 1.7 percent in fiscal 1986 in the measured sample of Federal Government organizations. This gain reflected a 2.3-percent increase in output and a 0.6-percent increase in employee years. The 1986 productivity rate surpassed the 1985 rate of 0.7 percent.

The measure covers a sample of Federal agencies drawn from 60 agencies and representing 380 organizational units in fiscal 1986. The organizations included 2.0 million executive branch civilian employees representing 68 percent of the total Federal civilian labor force. Agency employee coverage ranged from 100 percent to 1.2 percent.

The Federal organizational units are divided into 28 functional groups 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 1986 ranged from an increase of 8.4 percent for regulation compliance and enforcement to a decline of 7.5 percent for traffic management. Productivity increased in 19 functions and decreased in 9.

The regulation compliance and enforcement function includes 64 organizations that enforced Federal rules, regulations, and laws in 1986. Organizational examples include coal mine inspection, hazardous substance response, customs, and consumer product safety. The 8.4-percent increase in productivity in this function in 1986 was driven by a 9.1-percent increase in output; labor increased 0.7 percent. The 1985 increase in productivity was 2.8 percent.

The traffic management function, which includes those organizations responsible for arranging for the movement of people and goods, showed a 7.5-percent drop in productivity in 1986. Both output and employee years declined in 1986 but the 8.1-percent decrease in output exceeded the 0.7-percent drop in employment. Each of the three organizational units comprising this function showed decreasing output in 1986.

The postal service function, the largest of the 28 functions in terms of employees, includes only a single organization, the U.S. Postal Service. In fiscal 1986, its productivity grew at 1.3 percent, up from 0.4 percent in 1985. During 1986,

Table 3. Productivity indexes¹ for government, 1981-86

SIC Code	Functional group	1981	1982	1983	1984	1985	1986	Percent change, 1985-86	Average annual percent change, 1981-86
	Federal								
	Total, Federal sample	107.0	108.6	110.3	110.6	111.3	113.2	1.7	1.0
	Audit of operations	97.0	93.3	95.3	97.9	100.6	93.7	-6.9	.2
	Building and grounds	122.1	127.0	127.9	130.4	128.8	125.3	-2.7	.5
	Communications	178.4	183.2	196.1	213.8	226.1	236.3	4.5	6.2
	Education and training	115.8	111.8	109.2	108.1	108.6	109.2	.6	-1.1
	Electric power production and distribution	85.6	62.8	77.9	67.2	58.5	54.5	-6.9	-7.2
	Equipment maintenance	110.3	110.5	110.5	115.5	117.1	119.3	1.8	1.8
	Finance and accounting	127.9	150.8	166.6	163.9	163.2	170.0	4.2	4.8
	General support services	129.3	162.0	158.2	148.6	136.1	143.0	5.1	-2
	Information services	104.4	106.7	114.0	118.8	124.6	125.9	.1	4.2
	Legal and judicial	104.4	108.9	112.0	110.5	113.7	113.8	.1	1.6
	Library services	111.5	107.2	110.1	118.6	120.9	130.8	8.3	3.6
	Loans and grants	110.3	104.7	117.3	112.1	122.4	122.7	.3	2.8
	Medical services	100.8	101.9	103.9	103.4	103.6	105.4	1.7	.8
	Military base services	104.9	109.3	107.9	99.4	100.4	108.0	7.5	-6
	Natural resources and environmental management	102.7	111.9	112.7	118.2	120.0	121.1	.9	3.1
	Personnel investigations	109.7	104.5	99.4	102.2	105.6	99.4	-5.8	-1.2
	Personnel management	97.3	106.7	94.3	101.9	100.1	99.0	-1.1	-1
4311	Postal service	106.4	107.0	107.9	109.8	110.3	111.7	1.3	1.0
	Printing and duplication	102.6	105.8	113.1	120.3	122.1	125.0	2.4	4.3
	Procurement	127.7	125.3	124.7	127.2	122.5	119.4	-2.6	-1.1
	Records management	113.8	120.0	120.5	123.5	121.7	122.9	.1	1.3
	Regulation—compliance and enforcement	112.5	118.6	126.6	126.9	130.5	141.4	8.4	4.2
	Regulation—rulemaking and licensing	121.7	131.4	139.3	146.1	153.3	150.5	-1.8	4.6
	Social services and benefits	102.1	102.4	109.8	110.1	118.7	118.6	-.1	3.5
	Specialized manufacturing	141.8	133.4	138.0	143.8	146.9	149.4	1.7	1.7
	Supply and inventory control	98.8	106.1	104.3	100.2	96.7	98.2	1.6	-1.0
	Traffic management	124.8	117.0	115.8	112.7	120.8	111.8	-7.5	-1.4
	Transportation	112.0	114.3	114.6	113.2	114.4	116.3	1.7	.5
	State and local								
4911	Alcoholic beverages	105.2	107.8	109.7	110.3	108.5	(2)	(2)	3.9
	Electric power	99.1	96.7	94.8	93.3	93.8	(2)	(2)	3-1.4
9441	Unemployment insurance	101.6	117.9	119.1	102.0	105.0	110.0	4.8	-3

¹ Output per employee year.

² Not available.

³ Percent change—1981-85.

output increased 4.4 percent while labor increased 3.0 percent.

Trends, 1981-86. Over the 1981-86 period, output per employee year in the Federal sample rose at an average annual rate of 1.0 percent. The year-to-year changes in productivity ranged from a low of 0.2 percent in 1984 to 1.7 percent in 1986. The overall increase in Federal productivity reflects an average rise of 2.3 percent in output and a 1.3-percent increase in labor input. Output increased annually at rates ranging from 1.2 percent in 1982 to 2.7 percent in 1985. Annual rates of change in employee years ranged from a drop of 0.2 percent in 1982 to an increase of 2.1 percent in 1984.

From 1981 to 1986, productivity trends for the 28 functions ranged from 6.2-percent annual growth for communications to a 7.2-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 percent and 9.0 percent, respectively. The six organizations accounting for this function in 1986 are in the Department of Defense, the Federal Emergency Management Agency, and the Department of State.

The function with the second largest average annual increase in productivity over the last 5 years is finance and accounting (4.8 percent), which includes internal government services, such as treasury bill and bond sales to the public. In 1986, 18 organizations were included in this function. Finance and accounting productivity had been driven by the automation of many of the routine processing operations. In one organization that serves the public, productivity doubled in 1 year as output mushroomed, operations were mechanized, and employment was held roughly constant.

From 1981-86, the electric power production and distribution function registered the largest decrease in productivity of the 28 functions. During this period, productivity has decreased in every year but one, which is a reflection of sharply decreasing output. 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.

¹ For a detailed report on productivity in these industries, see the following *Monthly Labor Review* articles: Mark W. Dumas and J. Edwin Heneberger, "Productivity trends in the cotton and synthetic broad woven fabrics industry"; Horst Brand and Ziaul Ahmed, "Productivity in industrial inorganic chemicals"; Clyde Huffstutler and Barbara Bingham, "Productivity in industrial organic chemicals"; John W. Ferris and Virginia L. Klarquist, "Productivity in nonelectric heating equipment"; Mark Scott Sieling, "Strong gains in semiconductor productivity linked to multiple innovations"; Patricia S. Wilder and Virginia L. Klarquist, "Productivity in the retail hardware store industry"; Brian L. Friedman, "Productivity trends in the department store industry"; and John G. Olsen and Richard B. Carnes, "Productivity in the automotive repair shop industry."

² For additional information about multifactor productivity in these two

State and local services

Electric power. State and local government electric power output per employee year increased 0.5 percent in 1985, the last year for which data are available, as output and employment increased 2.9 percent and 2.5 percent, respectively. In 1984, output and employment also increased, but productivity dropped as employment grew more rapidly than output. However, from 1981 to 1985, productivity declined at an average annual rate of 1.4 percent as employment increased at a more rapid rate than output (3.0 percent versus 1.5 percent).

Unemployment insurance. State unemployment insurance productivity increased 4.8 percent in fiscal 1986 as output dropped 3.1 percent and inputs were cut 7.4 percent. In 1985, productivity increased 2.9 percent and output and employment dropped 1.2 percent and 4.1 percent, respectively. The decrease in output over the past 3 years is a reflection of decreasing unemployment in the Nation and the resulting drop in unemployment insurance claims and payments. Over the 1981-86 period, productivity fell at a rate of 0.3 percent, while output declined at an average annual rate of 5.3 percent, and labor decreased at a 5.0-percent rate.

State sales of alcoholic beverages. Output per employee year in State sales of alcoholic beverages dropped 1.6 percent in 1985, the latest year for which data are available, as output and input dropped 2.6 percent and 1.1 percent, respectively. In 1984, productivity increased as output and employment dropped. The drop in output and input in 1984 and 1985 is a continuation of trends that started in 1978, trends which reflect decreasing demand for alcoholic beverages, and a shift in several States from government to private sector operations. Over the 1981-85 period, productivity increased at a 0.9-percent average rate as employment fell at a higher rate than output (3.2 percent versus 2.4 percent.)

A full report, *Productivity Measures for Selected Industries and Government Services*, BLS Bulletin 2296, is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price \$9.50. □

FOOTNOTES

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.

³ 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. 22-23, 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).