

Cyclical behavior of high tech industries

During the last recession, employment declines in high tech industries were not as deep as those in manufacturing; only the group with high concentrations of skilled workers and large R&D expenditures outperformed the nonfarm sector

JOHN U. BURGAN

High technology industries are perceived to have offered good economic news during recent recessions. However, analysis of trends in these industries reveals that they are not immune from problems which occur in the economy, including the effects of the business cycle.

In the most recent recession, only the most narrowly defined of three groups of high tech industries performed better in terms of employment than the nonfarm business sector. The three groups of high tech industries are:

- Group I comprises industries with a proportion of technology-oriented workers (engineers, life and physical scientists, mathematical specialists, engineering and science technicians, and computer specialists) at least 1.5 times the average for all industries.
- Group II comprises industries with a ratio of R&D expenditures to net sales at least twice the average for all industries.
- Group III comprises manufacturing industries with a proportion of technology-oriented workers equal to or greater than the average for all manufacturing industries, and a ratio of R&D expenditures to sales close to or above the average for all industries. Two nonmanufacturing industries are also included.

This article discusses employment trends in high tech industries through 1984, updating the November 1983 *Monthly Labor Review* article which reported developments over the 1972–82 period.¹ In addition, it presents high tech employment in 1983 by State and for the District of Columbia, the Virgin Islands, and Puerto Rico.

Reaction to economic swings

Many high tech industries posted remarkable growth during the 1972–84 period. (See table 1.) For example, employment in communications services (not elsewhere classified), which includes industries involved in cablevision service delivery and home TV antenna construction, more than quintupled during this period. Computer and data processing services grew almost as fast (345 percent). Five other industries grew more than 80 percent from 1972 to 1983—surgical, medical, and dental instruments and supplies; optical instruments and lenses; office computing and accounting machines; crude petroleum and natural gas; and engineering and architectural services.

Not all high tech industries posted such remarkable growth rates. Of the 48 high tech industries, 16 had faster employment growth rates than nonagricultural employment, which grew 27.8 percent during the 1972–84 period. Sixteen high tech industries had employment reductions during this period, including radio and TV receiving equipment (–35 percent) and plastics materials and synthetics (–25 percent). Four other industries lost one job in six over these

John U. Burgan is an economist in the Office of Employment and Unemployment Statistics, Bureau of Labor Statistics.

Table 1. Employment in high technology industries, 1972 and 1984 annual averages

[In thousands]

SIC code	Industry	High tech group ¹	Employment		Percent change
			1972	1984	1972-84
131	Crude petroleum and natural gas	I	139.7	250.8	79.5
162	Heavy construction, except highway	I	495.1	540.6	9.2
281	Industrial inorganic chemicals	I, III	141.2	157.1	11.3
282	Plastic materials and synthetics	I, III	228.7	175.8	-23.1
283	Drugs	I, II, III	159.2	200.7	26.1
284	Soaps, cleaners, and toilet preparations	I, III	122.4	148.1	21.0
285	Paints and allied products	I, III	68.6	61.7	-10.1
286	Industrial organic chemicals	I, III	142.8	163.2	14.3
287	Agricultural chemicals	I, III	56.4	61.1	8.3
289	Miscellaneous chemical products	I, III	90.0	93.5	3.9
291	Petroleum refining	I, III	151.4	150.1	-.9
301	Tires and inner tubes	I	122.1	101.3	-17.0
324	Cement, hydraulic	I	31.9	26.2	-17.9
348	Ordnance and accessories	I, III	81.9	67.5	-17.6
351	Engines and turbines	I, III	114.6	113.5	-1.0
352	Farm and garden machinery	I	135.0	115.3	-14.6
353	Construction, mining, and material handling machinery	I	293.7	276.0	-6.0
354	Metalworking machinery	I	286.0	310.2	8.5
355	Special industry machinery, except metalworking	I, III	176.9	168.5	-4.7
356	General industrial machinery	I	267.5	276.9	3.5
357	Office, computing, and accounting machines	I, II, III	259.6	505.7	94.8
358	Refrigeration and service industry machinery	I	164.4	180.7	9.9
361	Electric transmission and distribution equipment	I, III	128.4	114.1	-11.1
362	Electrical industrial apparatus	I, III	209.3	213.1	1.8
363	Household appliances	I	186.9	153.1	-18.1
364	Electric lighting and wiring equipment	I	204.4	204.0	-.2
365	Radio and TV receiving equipment	I, III	139.5	90.2	-35.3
366	Communication equipment	I, II, III	458.4	614.8	34.1
367	Electronic components and accessories	I, II, III	354.8	684.9	93.0
369	Miscellaneous electrical machinery	I, III	131.7	160.1	21.6
371	Motor vehicles and equipment	I	874.8	867.3	-.9
372	Aircraft and parts	I, II, III	494.9	601.4	21.5
376	Guided missiles and space vehicles	I, II, III	92.5	152.7	65.1
381	Engineering, laboratory, and research instruments	I, III	64.5	80.2	24.3
382	Measuring and controlling instruments	I, III	159.6	251.8	57.8
383	Optical instruments and lenses	I, III	17.6	32.1	82.4
384	Surgical, medical, and dental instruments	I, III	90.5	175.5	93.9
386	Photographic equipment and supplies	I, III	117.1	126.0	7.6
483	Radio and TV broadcasting	I	142.7	229.8	61.0
489	Communication services, not elsewhere classified	I	29.7	152.5	413.5
491	Electric services	I	312.0	438.8	40.6
493	Combination electric, gas, and utility services	I	183.4	199.3	8.7
506	Wholesale trade, electrical goods	I	331.2	467.5	41.2
508	Wholesale trade, machinery, equipment, and supplies	I	868.6	1,400.8	61.3
737	Computer and data processing services	I, III	106.7	475.3	345.5
7391	Research and development laboratories	I, III	110.7	181.3	63.8
891	Engineering, architectural, and surveying services	I	339.3	615.6	81.4
892	Noncommercial educational, scientific and research organizations	I	111.8	109.9	-1.7

¹Group I comprises industries with a proportion of technology-oriented workers (engineers, life and physical scientists, mathematical specialists, engineering and science technicians, and computer specialists) at least 1.5 times the average for all industries.

Group II comprises industries with a ratio of R&D expenditures to net sales at least twice the average for all industries.

Group III comprises manufacturing industries with a proportion of technology-oriented workers equal to or greater than the average for all manufacturing industries, and a ratio of R&D expenditures to sales close to or above the average for all industries. Two non-manufacturing industries which provide technical support to high tech manufacturing industries also are included.

years—tires and inner tubes, hydraulic cement, ordnance and accessories, and household appliances.

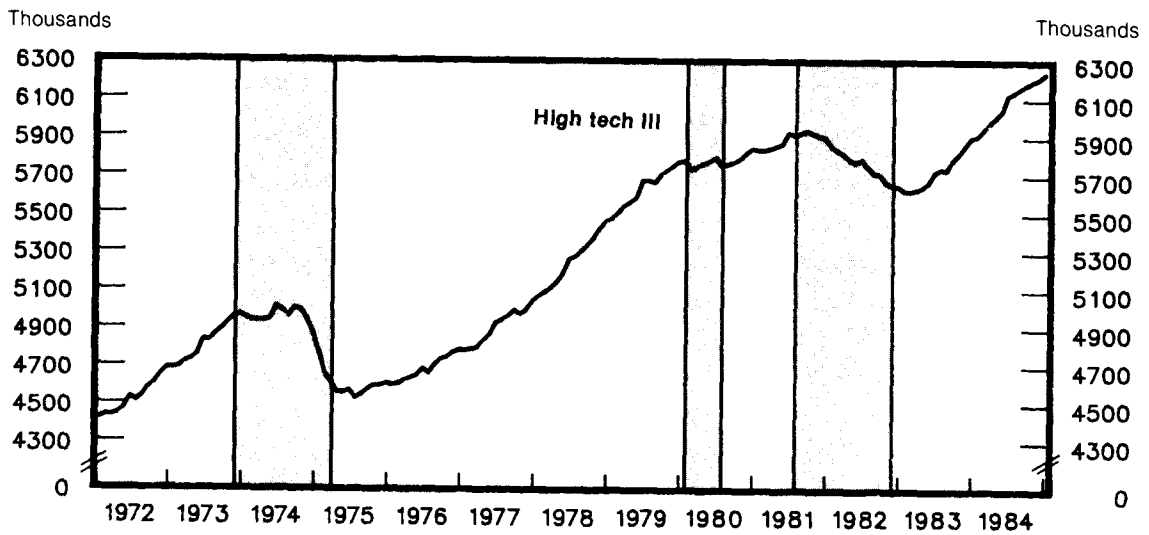
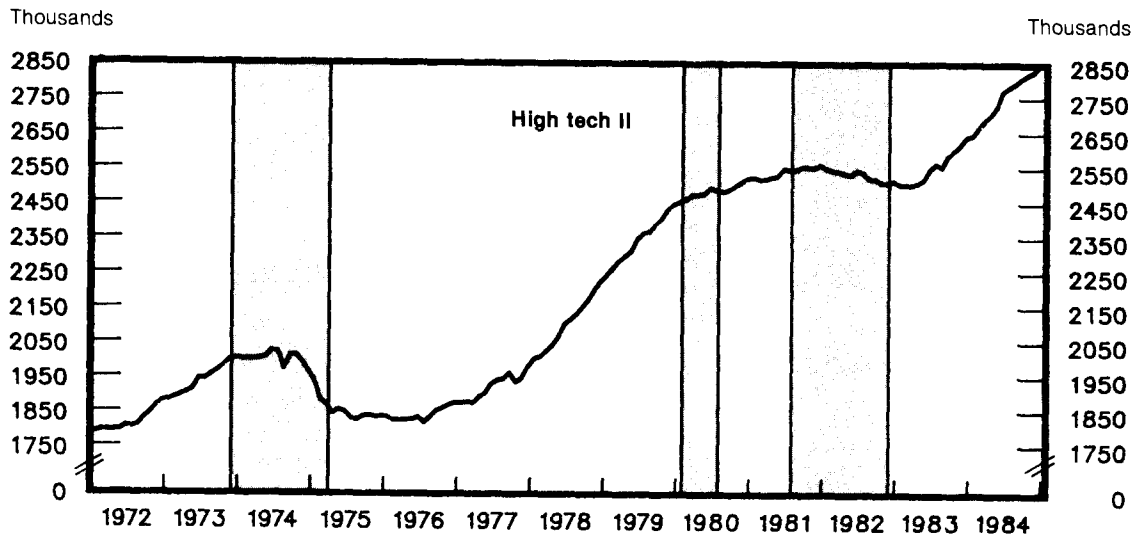
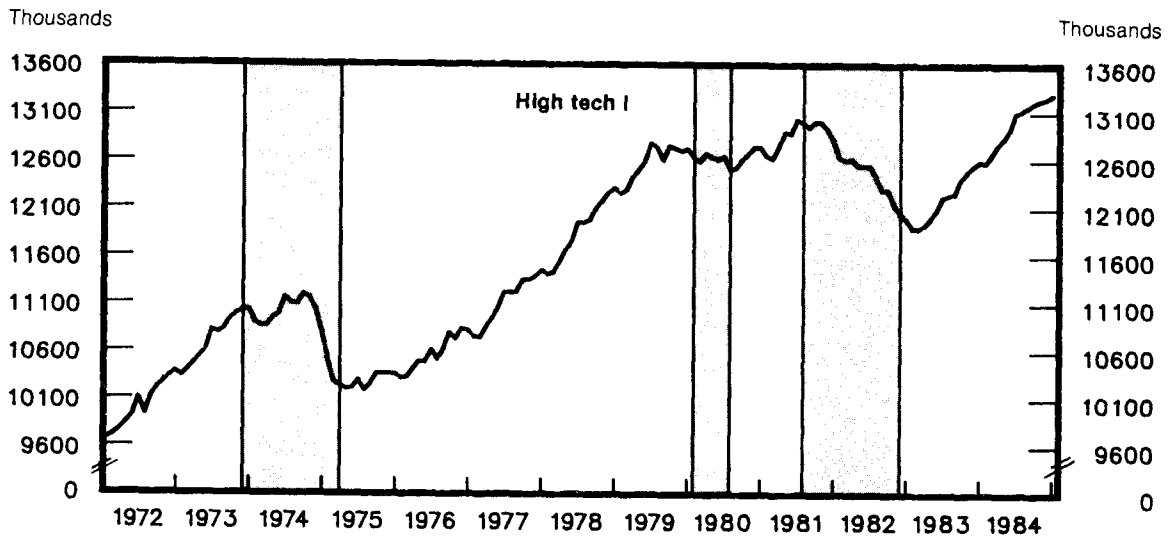
Each of the three groups of high tech industries is composed primarily of manufacturing industries. Only in group I do nonmanufacturing industries make up more than 10 percent of total employment of the group. The prevalence of cyclically sensitive manufacturing industries in these groups has important consequences when their performance during recent recessions is evaluated. According to some, high tech employment is relatively secure from the effects of the business cycle because it is characterized by high growth industries. However, as chart 1 demonstrates, high tech industries have been affected, to some extent, by economic downturns. Only the industries in group II have managed to weather a national recession since 1972 without an ab-

solute drop in employment, and that experience occurred during the short 1980 downturn.

Chart 2 provides a closer look at the employment performance of the three high tech industries during the most recent recession and the recovery to the end of 1984. Only group II, with the most restrictive definition, performed better than the total nonagricultural sector during the 1981-82 recession, although all three groups outperformed manufacturing industries. The broader the definition, the more the effects of the recession are seen. Group I—with the broadest definition—had the worst performance of the three groups. This group contains such cyclically sensitive industries as auto manufacturing, heavy construction, and electrical and nonelectrical machinery.

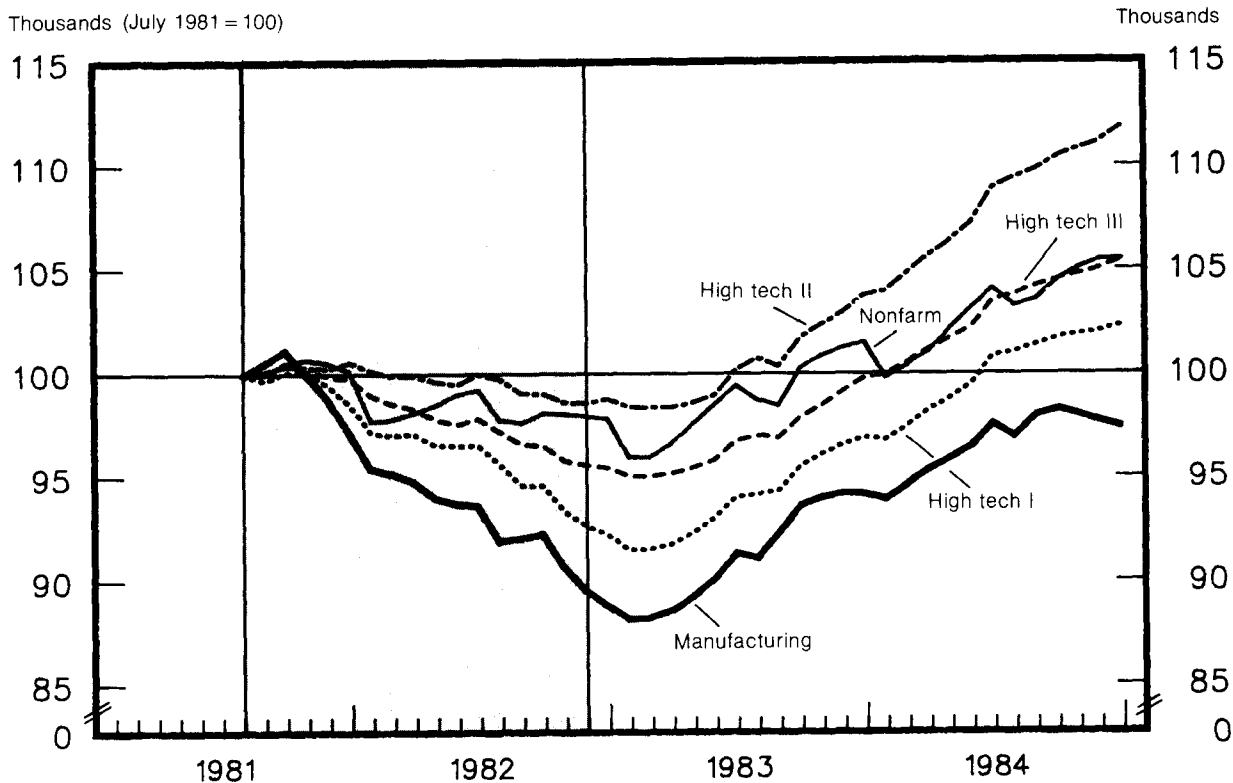
The extent to which the performance of the three high

Chart 1. Employment in high technology industries, 1972-84



NOTE: Shaded area denotes recession, as designated by the National Bureau of Economic Research.

Chart 2. Employment in high technology, manufacturing, and nonfarm industries, 1981-84



NOTE: Shaded area denotes recession, as designated by the National Bureau of Economic Research.

tech groups were affected by the most recent recession is demonstrated in table 2. Note that for each group, employment declines ended at about the same time—January or February 1983, after total nonfarm and manufacturing employment troughs (December 1982). However, the industries in group I experienced employment declines before the other two groups, at about the same time as the total nonfarm prerecession peak in midsummer of 1981. Group I industries were also the last to regain their prerecession employment

levels in June of 1984, 19 months after the recession's end. Group II, the most narrowly defined group of high tech industries, shows a different pattern. Employment did not begin to decline until December 1981, and the prerecession employment level was regained in July 1983, 11 months before the industries in group I. Group III displays a recession pattern which lies between groups I and II: its employment downturn began before group II, but after group I; its prerecession peak was regained after group II but be-

Table 2. Employment in high technology, manufacturing, and nonfarm industries during the 1981-82 recession

(Numbers in thousands)

Industry	Prerecession peak		Trough		Date prerecession peak regained	Peak-to-trough employment loss (in percent)
	Number	Date	Number	Date		
High tech I	13,030	June 1981	11,897	January 1983	June 1984	8.7
High tech II	2,561	December 1981	2,504	February 1983	July 1983	2.2
High tech III	5,943	September 1981	5,626	February 1983	February 1984	5.3
Manufacturing	20,341	July 1981	18,041	December 1982	(¹)	11.3
Nonfarm	91,460	July 1981	88,646	December 1982	November 1983	3.1

¹Prerecession peak not yet regained.

NOTE: The high technology industry data have not been seasonally adjusted. Analysis

of these series has shown that the seasonal component is quite small compared to the trend cycle. Nonfarm data have been seasonally adjusted. See table 1 for definition of high technology industries.

fore group I. The post-recession performance of all three groups outpaced that of manufacturing industries, which has yet to regain its prerecession peak.

The percentage of total employment lost during the recession (as measured by the percentage difference between prerecession peak employment and trough employment) also varies by definition with group I losing the most (- 8.7 percent); group II the least (- 2.2 percent); and group III again in the middle (- 5.3 percent).

From the experience of the three high tech industry groups in the recent recession and in the two other post-1972 downturns, several observations can be made. First, high tech

industries are not isolated from the business cycle. In fact, during the 1981-82 recession, only group II, the most restrictive (and smallest) group, lost a smaller proportion of prerecession employment than did nonfarm industries. The other two high tech groups lost more than nonfarm industries, with the broadest—group I—losing 8.7 percent, compared with nonfarm's 3.1-percent loss. High tech industries, although comprised largely of manufacturing industries, performed better than total manufacturing during this period.

Thus, the degree to which industries defined as high tech were influenced by recent recessions depended, in part, on the definition. Industries included in the narrow definition

Table 3. Employment in high technology industries for all States, the District of Columbia, Puerto Rico, and the Virgin Islands, 1981, 1982, and 1983 annual averages

[In thousands]

State	Group I			State	Group II			State	Group III		
	1981	1982	1983		1981	1982	1983		1981	1982	1983
United States	12,876.5	12,413.0	12,181.8	United States	2,562.5	2,555.6	2,578.7	United States	5,859.9	5,736.5	5,701.0
California	1,534.8	1,522.9	1,537.6	California	592.7	609.3	624.5	California	929.1	940.1	960.3
Texas	1,055.6	1,039.8	968.0	New York	201.8	202.4	202.9	New York	491.7	489.3	473.1
New York	917.5	905.4	882.8	Massachusetts	158.3	158.5	167.2	Texas	375.8	366.8	363.3
Ohio	722.1	660.3	634.9	Texas	160.5	155.0	155.6	New Jersey	316.9	312.6	313.9
Michigan	691.4	631.4	627.4	New Jersey	113.3	115.4	118.6	Massachusetts	300.9	299.9	306.5
Illinois	716.0	652.7	615.6	Florida	102.0	106.3	107.7	Illinois	287.0	269.7	259.7
Pennsylvania	628.6	598.5	571.2	Connecticut	99.0	97.0	97.4	Pennsylvania	285.5	269.4	256.5
New Jersey	511.4	506.5	507.2	Pennsylvania	94.6	90.8	89.8	Ohio	258.0	239.5	232.4
Massachusetts	441.9	435.3	442.8	Illinois	98.4	93.7	86.1	Connecticut	182.4	178.5	175.6
Florida	359.2	362.7	367.9	Washington	90.5	87.6	78.1	Florida	164.0	167.6	170.9
Indiana	367.2	336.5	326.0	Ohio	73.5	70.1	69.6	Indiana	169.1	153.2	148.3
Connecticut	285.7	276.1	270.6	Arizona	68.1	68.3	68.6	Missouri	128.3	125.1	124.7
North Carolina	265.1	262.3	264.8	Montana	61.8	59.4	59.7	North Carolina	120.6	119.5	122.2
Missouri	274.3	263.2	260.6	Indiana	65.9	61.7	57.8	Minnesota	119.5	119.0	120.0
Wisconsin	283.1	260.8	250.6	Minnesota	53.3	54.7	54.7	Michigan	128.4	121.2	119.0
Virginia	222.3	224.3	234.0	North Carolina	44.8	44.9	47.8	Washington	129.3	121.7	114.2
Georgia	212.1	215.5	225.3	Colorado	39.5	42.8	43.8	Tennessee	109.3	106.2	105.0
Minnesota	233.2	224.4	223.3	Maryland	33.7	36.0	37.5	Virginia	97.7	99.8	104.7
Tennessee	233.3	219.3	217.4	Kansas	50.9	40.4	37.2	Wisconsin	110.9	103.3	97.3
Louisiana	219.4	209.2	198.0	Georgia	25.7	27.4	29.5	Maryland	85.9	87.0	91.0
Maryland	191.6	191.0	196.0	New Hampshire	26.6	26.8	28.8	Colorado	81.4	87.1	89.3
Washington	213.6	201.1	188.2	Michigan	30.4	28.8	28.3	Arizona	86.5	86.5	86.5
Colorado	180.5	189.0	186.7	Puerto Rico	25.9	26.3	27.7	Georgia	68.1	70.2	74.0
Oklahoma	192.6	187.3	170.5	Virginia	20.2	21.7	25.5	South Carolina	70.4	70.6	69.2
South Carolina	146.7	144.2	144.9	Alabama	19.9	21.8	25.0	Louisiana	66.4	64.3	60.1
Arizona	150.1	144.3	143.9	Utah	21.1	22.2	23.9	Kansas	76.3	64.3	59.5
Alabama	137.7	134.6	139.5	Oklahoma	23.6	22.3	21.8	Puerto Rico	54.0	51.9	52.2
Kentucky	152.9	139.6	134.7	Tennessee	17.9	16.4	16.3	Alabama	49.2	50.2	52.0
Kansas	153.8	138.1	133.6	Oregon	14.5	15.3	15.9	New Hampshire	44.2	44.1	45.1
Iowa	153.8	134.8	126.8	South Carolina	14.0	14.8	13.9	Kentucky	48.5	43.4	42.9
Arkansas	90.9	85.2	87.6	Vermont	13.2	13.2	12.9	Oklahoma	45.9	44.8	42.4
Oregon	96.4	89.4	86.3	Iowa	14.0	13.5	12.4	Oregon	42.0	40.8	39.5
Mississippi	87.5	83.7	82.7	Wisconsin	12.1	11.6	11.2	Delaware	38.6	38.4	37.8
New Hampshire	70.2	72.6	73.5	Nebraska	11.5	10.6	10.4	Utah	32.2	33.5	35.7
Puerto Rico	73.5	69.8	70.1	Kentucky	10.7	9.4	9.6	Arizona	34.8	32.3	33.3
Utah	65.4	66.9	67.8	Louisiana	9.7	10.1	9.5	Iowa	36.6	34.3	31.7
West Virginia	63.9	61.9	58.1	New Mexico	6.7	7.7	8.0	Mississippi	28.5	26.3	28.5
Delaware	56.7	55.8	56.2	Maine	7.8	7.9	8.0	West Virginia	28.1	27.4	25.4
Nebraska	58.9	55.1	53.4	Rhode Island	7.8	7.8	7.7	New Mexico	19.2	20.6	21.6
New Mexico	49.7	51.8	51.4	Arizona	5.4	5.3	6.4	Nebraska	21.2	20.2	20.4
Rhode Island	38.4	36.3	36.0	Mississippi	5.9	5.6	6.2	Vermont	19.8	19.9	19.7
Idaho	32.7	31.3	31.1	Idaho	4.4	4.7	5.5	Rhode Island	17.9	17.4	16.6
District of Columbia	33.1	31.4	31.1	South Dakota	3.5	3.0	3.2	Idaho	13.9	14.1	14.9
Vermont	32.3	31.2	30.1	Nevada	2.7	2.8	2.6	Maine	13.6	12.9	12.6
Maine	29.8	29.3	28.7	Delaware	1.8	1.3	1.2	Nevada	10.6	11.1	11.4
Nevada	26.2	26.4	27.5	West Virginia	1.3	1.1	1.1	South Dakota	6.1	5.8	6.0
North Dakota	22.8	23.6	24.2	North Dakota	6	0.6	5	District of Columbia	3.8	3.4	3.5
Montana	20.0	20.6	19.6	District of Columbia	3	0.3	3	Montana	2.4	2.3	2.3
Wyoming	25.4	25.2	19.5	Wyoming	2	0.2	3	Wyoming	2.7	2.5	2.2
South Dakota	20.1	18.2	18.4	Montana	3	0.3	3	Hawaii	2.3	2.1	2.1
Alaska	14.5	16.4	18.0	Alaska	(1)	(1)	(1)	Virgin Islands	2.0	1.9	1.6
Hawaii	17.1	16.7	16.7	Hawaii	(1)	(1)	(1)	North Dakota	1.4	1.3	1.3
Virgin Islands	3.4	2.9	2.7	Virgin Islands	(1)	(1)	(1)	Alaska	.9	1.1	1.1

¹Fewer than 100 workers.

NOTE: States are ranked by 1983 high technology employment. See table 1 for definition of high technology industries.

(group II), which have relatively large concentrations of highly skilled workers and relatively large R&D expenditures, were less affected by general economic downturns than industries in groups I and III, which include industries with lesser concentrations of highly skilled workers and lower R&D expenditures.

Employment by State

As noted earlier, high tech industries were not immune from the effects of the 1981–82 recession. Of 53 States and territories, only 11 had over-the-year increases in group I employment between 1981 and 1982, and only 14 had increases under group III definition. Even under group II, the narrowest definition, fewer than half (23) had over-the-year

increases.³ (See table 3.)

Seven States—Colorado, Florida, Georgia, Nevada, New Mexico, Utah, and Virginia—had annual average increases under all three high tech groups during the 1981–82 period. Most of these States are in the Sun Belt, an area that has been characterized by high growth rates in both population and employment in recent years. Four of the States—Colorado, Florida, Georgia, and Utah—were also among the eight States that had over-the-year increases in total nonagricultural employment for that period. Colorado and New Mexico had the highest percentage increases under each of the three high tech definitions.

The general economic improvement in 1983 affected the performance of each high tech group. High tech I employ-

Table 4. High technology employment as a percent of total nonagricultural employment in all States, the District of Columbia, Puerto Rico, and the Virgin Islands, 1983 annual averages

Group I		Group II		Group III	
Delaware	21.1	New Hampshire	7.1	Delaware	14.2
Michigan	19.7	Connecticut	6.8	Connecticut	12.2
Connecticut	18.8	Arizona	6.4	Massachusetts	11.5
New Hampshire	18.0	California	6.3	New Hampshire	11.1
Massachusetts	16.6	Massachusetts	6.3	New Jersey	10.0
Indiana	16.2	Vermont	6.3	California	9.7
New Jersey	16.1	Washington	4.9	Vermont	9.6
Texas	15.7	Puerto Rico	4.3	Arizona	8.1
California	15.5	Utah	4.2	Puerto Rico	8.1
Ohio	15.5	Kansas	4.1	Indiana	7.4
Vermont	14.7	New Jersey	3.8	Washington	7.2
Kansas	14.6	Colorado	3.3	Minnesota	7.0
Oklahoma	14.6	Minnesota	3.2	Colorado	6.7
Colorado	14.1	Missouri	3.1	Kansas	6.5
Illinois	13.7	Indiana	2.9	Missouri	6.5
Missouri	13.6	United States	2.8	New York	6.5
Wisconsin	13.6	Florida	2.8	United States	6.3
Arizona	13.5	New York	2.8	Utah	6.3
United States	13.4	Texas	2.5	Tennessee	6.1
Minnesota	13.0	Maryland	2.2	South Carolina	5.9
Louisiana	12.7	North Carolina	2.0	Texas	5.9
Pennsylvania	12.6	Pennsylvania	2.0	Illinois	5.8
Tennessee	12.6	Rhode Island	2.0	Ohio	5.7
Iowa	12.4	Alabama	1.9	Pennsylvania	5.7
South Carolina	12.3	Illinois	1.9	Maryland	5.4
New York	12.1	Maine	1.9	Wisconsin	5.3
Utah	12.0	Oklahoma	1.9	North Carolina	5.1
Washington	11.9	Idaho	1.7	Virginia	4.8
Arkansas	11.8	Nebraska	1.7	Idaho	4.7
Kentucky	11.7	New Mexico	1.7	Arkansas	4.5
Maryland	11.5	Ohio	1.7	New Mexico	4.5
North Carolina	11.0	Oregon	1.6	Virgin Islands	4.5
Puerto Rico	10.9	South Dakota	1.4	Florida	4.4
New Mexico	10.7	Georgia	1.3	West Virginia	4.4
Virginia	10.7	Iowa	1.2	Rhode Island	4.2
Alabama	10.6	South Carolina	1.2	Oregon	4.1
Mississippi	10.5	Virginia	1.2	Alabama	3.9
West Virginia	10.0	Arkansas	.9	Louisiana	3.8
Georgia	9.9	Michigan	.9	Kentucky	3.7
Idaho	9.8	Tennessee	.9	Michigan	3.7
North Dakota	9.7	Kentucky	.8	Mississippi	3.6
Wyoming	9.6	Mississippi	.8	Oklahoma	3.6
Florida	9.5	Louisiana	.6	Nebraska	3.4
Rhode Island	9.2	Nevada	.6	Georgia	3.3
Oregon	9.0	Wisconsin	.6	Iowa	3.1
Nebraska	8.8	Delaware	.5	Maine	3.0
Alaska	8.5	North Dakota	.2	Nevada	2.8
South Dakota	7.9	West Virginia	.2	South Dakota	2.6
Virgin Islands	7.4	District of Columbia	.1	Wyoming	1.1
Montana	7.3	Montana	.1	Montana	.9
Maine	6.8	Wyoming	.1	District of Columbia	.6
Nevada	6.8	Alaska	(¹)	Alaska	.5
District of Columbia	5.2	Hawaii	(¹)	Hawaii	.5
Hawaii	4.1	Virgin Islands	(¹)	North Dakota	.5

¹Fewer than 100 workers.

NOTE: See table 1 for definition of high technology industries.

ment increased in 18 States and Puerto Rico, compared with 11 States in 1982; high tech II employment increased in 26 States and Puerto Rico, compared with 23 States in 1982; and high tech III employment increased in 21 States and Puerto Rico, compared with 14 States in 1982. Thirteen States and Puerto Rico had employment increases during 1983 under all three definitions; three of these States—Alabama, Georgia, and Virginia—had increases which placed them in the top six in each high tech group.

A total of 14 States had employment decreases under all three high tech definitions. Many of the declines occurred in Great Lakes States—Michigan, Ohio, Illinois, Indiana, Wisconsin, and neighboring Pennsylvania and Iowa. Two small New England States—Vermont and Rhode Island—also had declines. The largest job losers under each definition were Iowa, Louisiana, and Washington.

The importance of high tech industry to a State's economy is readily seen by observing employment in high tech industries as a percentage of total employment. (See table 4.) Employment in high tech industries is more concentrated than in manufacturing. For each group, there were fewer States with above-average proportions of employment in high tech industries as a proportion of nonfarm employment

than those with below-average proportions. This is in marked contrast to the distribution of manufacturing employment among States, in which about half the States have proportions above the national average and half below. Only about one-third of the States, under each definition, have higher proportions of employment in high tech industries than the U.S. average.

There is little change in the rankings of the 10 States with the highest proportions of high tech employment since 1982.⁴ The New England States still are predominant. The addition of Puerto Rico to the rankings does cause a surprising result, however. Puerto Rico appears in the top ten under groups II and III.

Puerto Rico's economy includes considerable employment in pharmaceutical manufacturing and in electrical and nonelectrical machinery manufacturing. One reason high tech companies have located in Puerto Rico may be the Federal income tax advantages given to firms there. Drug manufacturers such as G. D. Searle, Upjohn, and Schering-Plough, plus electrical equipment manufacturing firms such as General Electric, Motorola, and Prime Computer have taken advantage of these tax benefits and established high tech manufacturing establishments in Puerto Rico.⁵ □

—FOOTNOTES—

¹Richard W. Riche, Daniel E. Hecker, and John U. Burgan, "High technology today and tomorrow: a small slice of the employment pie," *Monthly Labor Review*, November 1983, pp. 50–58.

²The industry employment statistics cited in this study are from two Bureau of Labor Statistics payroll employment programs—the Current Employment Statistics and ES-202 programs. The industry classifications are taken from the Office of Management and Budget, *1972 Standard Industrial Classification Manual*, as amended in 1977.

Employment estimates for the Nation were compiled from the Current Employment Statistics survey. These data are produced from employer payroll records reported to the Bureau on a voluntary basis each month. Self-employed persons and others not on a regular civilian payroll are outside the scope of the survey.

Industry detail within the high technology groups, as well as national

historical data, may be obtained from the Bureau's Division of Industry Employment Statistics, 441 G Street, N.W., Washington, D.C. 20212.

State data were compiled from the Covered Employment and Wages Program, which collects information on the employment and wages of workers covered by unemployment insurance programs. Each quarter, covered employers submit mandatory reports of employment and wages to the appropriate State Employment Security Agency. These reports are edited and summarized by county, State, and detailed industry, and forwarded to the Bureau. Self-employed persons are not included.

³State data are usually available for internal (Bureau) analysis approximately 9 months after the reference quarter. Hence, 1983 data are the most current annual averages available.

⁴See Riche and others, "High technology," table 7.

⁵See Richard Greene, "Drug Abuse," *Forbes*, Aug 16, 1982, p. 36.