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Five States Account for Half of U.S. R&D

Of the total U.S. R&D dollars spent in 1985—\$107 billion—one-half was spent in five states (California, New York, New Jersey, Michigan, and Massachusetts). These states, along with Maryland, Texas, Pennsylvania, Illinois, and Ohio, accounted for two-thirds of the national effort.¹ Performance of R&D in California alone reached \$22 billion (21 percent of the 1985 U.S. total); R&D expenditures ranged between \$3 billion and \$9 billion in the other nine leading states. Total R&D spending in each of the next 11 states was no more than \$1 billion. In fact, 90 percent of the nation's R&D effort was undertaken in 21 states.

Not coincidentally, most of the states that are national leaders in total R&D performance rank among the leading R&D performers in the industrial and academic sectors of the economy. For example, of the ten states that led in total R&D performance, all but Maryland were ranked among the top ten industrial performers, and all but Ohio were ranked among the top ten academic performers. While state rankings are somewhat more mixed in the federal and nonprofit sectors, each of the ten leaders in total R&D is ranked among the upper half of R&D performers in both of these two sectors. Thus, state R&D performance rankings are, in general, strikingly similar across all sectors.

The relative size of each sector's total R&D effort, however, differs considerably from one state to the next, and from one region to the next. For example, in 1985 R&D performance reached almost \$17 billion in the five Great Lakes states and \$15 billion in the eight states and the District of Columbia that compose the South Atlantic region.² Yet the distribution of such performance across economic sectors of the two regions was quite dissimilar. R&D in the Great Lakes was undertaken predominantly by industry. Industrial performers accounted for 84 percent of the regional R&D total; universities and colleges (10 percent), federal agencies (5 percent) and nonprofit performers (1 percent) combined for the rest.

By contrast, industry accounted for less than half (47 percent) of the R&D undertaken in the South Atlantic region, whereas R&D performed by federal agencies accounted for 41 percent of the regional total—highest in the nation. The remainder was undertaken by academia (11 percent) and other nonprofit performers (2 percent). (Similar information is available on each of the 50 states and the District of Columbia in a recently released report from the National Science Foundation. See citation at end of text.)

The ratio of R&D expenditures to GNP is often used to gauge a country's commitment to R&D and to measure the change in this commitment over time. For the U.S., the R&D/GNP ratio was about 3 percent in 1985. By comparison, the ratio of in-state R&D performance to Gross State Product (GSP) might be interpreted as a measure of the R&D intensity of a state's economy. The largest R&D/GSP ratios were achieved by New Mexico (11 percent) and Delaware (8 percent). These two states were ranked eleventh and twenty-fifth, respectively, in terms of total in-state R&D performance. Washington, Connecticut, and the District of Columbia were also among the R&D/GSP top ten, although they were not so highly ranked in terms of absolute R&D dollars. California (4.5 percent) and New York (2.5 percent), on the other hand, led the nation in terms of in-state R&D performance, but were seventh and seventeenth, respectively, in terms of their economies' R&D intensity. Of the ten largest states in R&D performance, only five were among the top ten in terms of their 1985 R&D/GSP ratios (Maryland, Massachusetts, New Jersey, California, and Michigan).

Over the 1975–85 period, the nine census-defined regions of the country experienced vastly differing rates of real R&D performance growth, and the regions with the best R&D performances were not necessarily the ones reporting the largest growth in such activities. While R&D in the nation as a whole increased at an average annual inflation-adjusted rate of 5.0 percent,³ the eight Mountain States recorded the national high of 8.1 percent real R&D growth during this ten-year period.⁴ Much

of this gain was driven by major spending increases in the federal government's defense-related R&D activities. The slowest growth was experienced in the Southeast, where real R&D performance in the region's four states grew on average by 3.5 percent annually.⁵ The best R&D-performing regions, Pacific and Mid-Atlantic, were in the middle range in terms of R&D growth rates, with 6.3 percent and 4.7 percent respectively.⁶

In spite of the varying rates of R&D growth over the 1975–85 period, there was no change in the regional rankings—and only minor changes in individual state rankings. The best R&D-performing regions in 1975 were the best in 1985. The regions with the smallest R&D performance in 1975 were also in the same category in 1985. This relative stability in the research distribution demonstrates that leading R&D centers are not easily outcompeted—especially over a period as short as ten years. That is because much of their leadership is derived from decades of national and local investments in physical and personnel infrastructures that have been compounded and strengthened over time.

¹ State totals include R&D performance by industry, academia, and federal agencies, as well as by the federally-funded R&D activities of other nonprofit institutions. Performance of federally-funded R&D centers is included in the totals of the administering sectors.

² Illinois, Indiana, Michigan, Ohio, and Wisconsin make up the Great Lakes region. The eight South Atlantic States include Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia, as well as the District of Columbia.

³ The GNP implicit price deflator is used to convert all R&D expenditures to constant 1982 dollars. Separate deflators are not available for individual states or regions.

⁴ Included are Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming.

⁵ Alabama, Kentucky, Mississippi, and Tennessee.

⁶ The Pacific region consists of Alaska, California, Hawaii, Oregon, and Washington. New Jersey, New York, and Pennsylvania make up the Mid-Atlantic States.

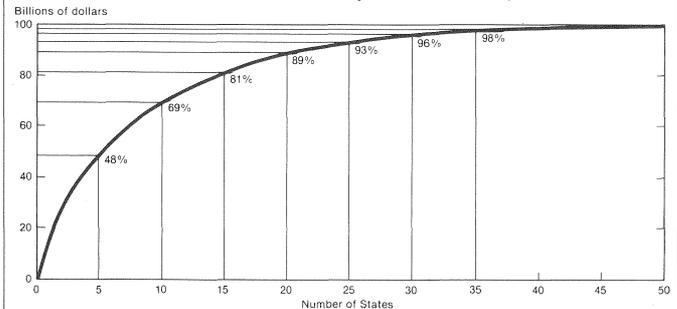
More extensive data and discussion on the state and regional distribution of R&D expenditures may be found in the National Science Foundation publication *Geographic Patterns: R&D in the United States*, Final Report, NSF 89-317 (Washington, D.C., 1989; available from L602; NSF; Washington, D.C. 20050; Attn: Elizabeth Michael).

Regional R&D performance in 1985

	Total (\$ bill.)	Percent distribution by sector			
		Industry	Federal	U&DCS	Nonprofits
United States	\$107.5	72.8%	12.0%	12.1%	3.0%
New England	9.5	72.6	6.1	12.4	8.9
Middle Atlantic	19.4	83.0	6.3	9.7	1.0
Great Lakes	16.8	84.3	4.6	10.3	0.8
Plains	4.7	82.1	2.9	13.9	1.1
South Atlantic	14.6	46.6	41.0	10.6	1.8
Southeast	2.3	53.5	31.1	13.7	1.7
Southwest	5.2	76.4	6.3	16.1	1.1
Mountain	6.4	54.7	22.3	21.3	1.7
Pacific	25.5	79.4	5.3	13.2	2.0

SOURCE: National Science Foundation, SNS

Cumulative distribution of R&D performance by State: 1985



SOURCE: National Science Foundation, SNS