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AUTHOR	Bennof, Richard J.
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ABSTRACT

This document presents research and development (R&D) expenditures reported by state based on data from the year 1999 in the United States. Information includes R&D expenditures by state, sector distribution of R&D performance by state, ratio of R&D to gross state product, and federal support for R&D by state. (YDS)

Half the Nation's R&D Concentrated in Six States

by Richard J. Bennof

INFOBRIEF SRS Science Resources Statistics

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HALF THE NATION'S R&D CONCENTRATED IN SIX STATES

by Richard J. Bennof

In 1999, the most recent year for which these data are available, total U.S. research and development (R&D) expenditures were $244 billion, of which $232 billion could be attributed to expenditures within individual states with the remainder falling under an undistributed "other/unknown" category. The statistics and discussion in this InfoBrief refer to state R&D levels in relation to the distributed total of $232 billion.

R&D Expenditures by State

R&D is substantially concentrated in a small number of states. In 1999, the 20 highest ranking states in R&D expenditures accounted for 86 percent of the U.S. total, while the lowest ranking 20 states accounted for only 5 percent. The six states with the highest levels of R&D expenditures—California, Michigan, New York, Texas, Massachusetts, and Pennsylvania (in decreasing order of magnitude)—accounted for one-half of the entire national effort. And the top 10 states—adding, in descending order, New Jersey, Illinois, Washington, and Maryland—accounted for nearly two-thirds (table 1). As in prior years, California had the highest level of R&D expenditures in the Nation (nearly $48 billion); it alone accounted for about one-fifth of the $232 billion U.S. R&D total. California's R&D effort exceeded by more than a factor of two that of the next highest state, Michigan, with $19 billion in R&D expenditures. After Michigan, R&D levels for the top 10 states declined incrementally to $8 billion for Maryland.

Sector Distribution of R&D Performance by State

States that are national leaders in total R&D performance are also usually ranked among the leading states in terms of R&D performance by the industrial and academic sectors. Thus, 9 of the top 10 states for total R&D (all but Maryland) were the leading industrial R&D-performing states; Ohio rounded out this list of top 10 industrial R&D states. The leading four industrial R&D-performing states were also the top four ranked states in total R&D performance. For academic R&D, North Carolina and Georgia replaced New Jersey and Washington among the top 10.

In 1999, the 20 highest ranking states in R&D expenditures accounted for 86 percent of the U.S. total, while the lowest ranking 20 states accounted for only 5 percent.

There was less commonality among the top 10 states for total R&D and those states performing the most Federal intramural research. Only four states were found in both top 10 lists: Maryland, California, Texas, and New Jersey. The six additions to the Federal intramural list, listed in descending order of Federal R&D performance, were the District of Columbia, Virginia, Alabama, Florida, Ohio, and New Mexico. Maryland ranked first among Federal R&D performers, followed by the District of Columbia, Virginia, and California. This top-three ranking is not unexpected, since it reflects the concentration of Federal facilities and administrative offices within the national capital area. Alabama, Florida, and New Mexico rank among the highest in Federal R&D because of their relatively high shares of Federal space- and defense-related R&D.

Table 1. **Leading states in total R&D performance, R&D by sector, and R&D as a percentage of GSP: 1999**

	Top 10 states in total R&D performance[1]		Top 10 states in size of R&D, by type of performer			Top 10 states in R&D intensity (states with the highest R&D/GSP ratio)		
Rank	State	Total R&D (millions of current dollars)	Industry[2]	Universities & colleges[3]	Federal Government[4]	State	R&D/GSP (percent)	GSP (billions of current dollars)
1	California	47,965	California	California	Maryland	New Mexico	6.43	51.0
2	Michigan	18,799	Michigan	New York	District of Columbia	Michigan	6.10	308.3
3	New York	14,110	New York	Texas	Virginia	Rhode Island	5.07	32.5
4	Texas	12,429	Texas	Massachusetts	California	Massachusetts	4.64	262.6
5	Massachusetts	12,190	New Jersey	Pennsylvania	Alabama	Maryland	4.63	174.7
6	Pennsylvania	10,695	Massachusetts	Maryland	Florida	District of Columbia	4.50	55.8
7	New Jersey	10,536	Pennsylvania	Illinois	Ohio	Washington	3.98	209.3
8	Illinois	9,719	Illinois	North Carolina	Texas	California	3.90	1,229.1
9	Washington	8,336	Washington	Michigan	New Jersey	Delaware	3.87	34.7
10	Maryland	8,087	Ohio	Georgia	New Mexico	Idaho	3.85	34.0

[1]Includes in-state total R&D performance of industry, universities, Federal agencies, and FFRDCs, and federally financed nonprofit R&D performance.

[2]Includes R&D activities of industry-administered FFRDCs located within these states.

[3]Excludes R&D activities of university-administered FFRDCs located within these states.

[4]Includes costs associated with the administration of intramural and extramural programs by Federal personnel as well as actual intramural performance.

KEY: FFRDC = federally funded research and development center; GSP = gross state product; R&D = research and development

NOTES: Reliability of the estimates of industry R&D varies by state because the sample allocation was not based on geography. Rankings do not take into account the margin of error of estimates from sample surveys.

SOURCE: National Science Foundation/Division of Science Resources Statistics, *National Patterns of R&D Resources,* annual series; GSP data are from the U.S. Bureau of Economic Analysis.

The leading 10 states in total R&D performance in 1999, and in each of the three performing sectors discussed above, were also among the 10 leading R&D-performing states in 1998, with the single exception of Georgia, which replaced Ohio among the top academic R&D performers in 1999.

Ratio of R&D to Gross State Product

States vary significantly in the size of their economies, owing to differences in population, land area, infrastructure, natural resources, and history. Consequently, variations in the R&D expenditure levels of states may simply reflect differences in economic size or the nature of their R&D efforts. An easy way of controlling for the size effect is to measure each state's R&D level as a proportion of its gross state product (GSP). That proportion is referred to as R&D intensity or concentration.

Overall, the Nation's total R&D to gross domestic product ratio was 2.5 percent in 1999. The top 10 rankings for state R&D intensity in 1999 were, in descending order, New Mexico (6.43 percent), Michigan, Rhode Island, Massachusetts, Maryland, the District of Columbia, Washington, California, Delaware, and Idaho (the last with an intensity of 3.85 percent). Each of the 10 states with the highest R&D intensity levels in 1999 was also among the top 10 states in R&D intensity in 1998. New Mexico's high R&D intensity is largely attributable to Federal (specifically Department of Energy) support of the federally funded research and development centers (FFRDCs) Los Alamos National Laboratory and Sandia National Laboratories.

Federal Support for R&D by State[1]

The leading 10 Federal agencies that fund R&D reported a total of $74 billion in Federal R&D obligations to all types of performers in fiscal year (FY) 1999 (table 2). The Department of Defense (DoD) and the

[1]The Federal R&D totals in this section reflect funding of R&D by Federal agencies only. In comparison, the R&D totals discussed in the previous sections reflect the performance of R&D by various sectors, including the Federal Government.

Table 2. **Federal R&D obligations, by agency and state: FY 1999**

Agency	Total R&D (millions of dollars)	Largest recipient	Percentage received	Second largest recipient	Percentage received
Ten-agency total	73,718	California	21.2	Maryland	11.0
Department of Agriculture	1,602	District of Columbia	10.9	Maryland	9.0
Department of Commerce	989	Maryland	35.7	Colorado	9.2
Department of Defense	35,499	California	26.1	Virginia	13.2
Department of Energy	6,007	New Mexico	21.7	California	18.8
Department of Health and Human Services	15,865	Maryland	22.1	California	10.9
Department of the Interior	632	Colorado	9.0	Virginia	8.2
Department of Transportation	665	District of Columbia	25.3	New Jersey	8.0
Environmental Protection Agency	552	North Carolina	21.2	District of Columbia	10.8
National Aeronautics and Space Administration	9,414	California	30.1	Texas	21.4
National Science Foundation	2,493	California	14.9	New York	7.7

SOURCE: National Science Foundation/Division of Science Resources Statistics, *Federal Funds for Research and Development: Fiscal Years 1999, 2000, and 2001*, NSF 01-328 (Arlington, VA, 2001).

Department of Health and Human Services (HHS) together provided 70 percent of this total R&D.

California and Maryland were the two largest recipients of total Federal R&D funds. Recipients in California received 26 percent of DoD's R&D support, over four-fifths of which went to industrial firms. Maryland received 22 percent of HHS's funding, almost three-fourths of which covered intramural activities at the National Institutes of Health's biomedical research facilities. California also received more R&D funds from the National Aeronautics and Space Administration (NASA) and from the National Science Foundation (NSF) than any other state. The main recipients in California of NASA R&D funding were FFRDCs (most notably, the Jet Propulsion Laboratory) and industrial firms. Fully 93 percent of NSF's funding in California went to universities and colleges. Maryland had the largest share of any one Federal agency's total R&D support, with 36 percent of the Department of Commerce's R&D funds; nearly all of this funding was for intramural research activities.

User Notes

NSF's Division of Science Resources Statistics (SRS) collects and analyzes statistics on the geographic distribution of R&D expenditures in the United States among the 50 states, the District of Columbia, and Puerto Rico. The data are categorized by type of performer (industry, Federal Government, academia, FFRDCs, and other nonprofit organizations) and by source of funds (industry and Federal Government, and for university performers only, state government, academia and other nonprofit organizations).[2] The amounts of R&D funding from specific Federal agencies also are provided.

In addition to these state R&D statistics, SRS collects state-specific data in its surveys of science and engineering (S&E) personnel and institutions. These data and those assembled from non-SRS sources (e.g., data on population, patents, and GSP) are included in a set of 52 one-page S&E state profiles available at http://www.nsf.gov/sbe/srs/sepro/start.htm.

Data on U.S. and state R&D expenditures were assembled from ongoing NSF surveys. For information about S&E State Profiles, please contact:

Richard J. Bennof
Division of Science Resources Statistics
Research and Development Statistics Program
National Science Foundation
4201 Wilson Boulevard, Suite 965
Arlington, VA 22230
(703) 292-7783
rbennof@nsf.gov

[2]Data on industry R&D—and therefore on total R&D—performance are not available for Puerto Rico.

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