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U.S. Research and Development Funding and Performance: Fact Sheet

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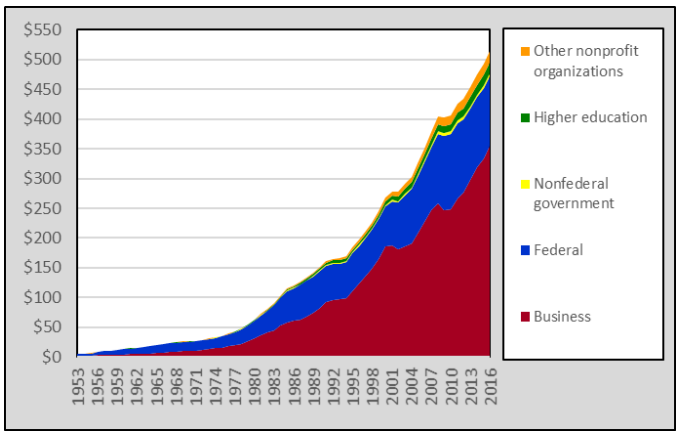
Research and development (R&D) in the United States is funded and performed by a number of sectors—including the federal government, state governments, businesses, academia, and nonprofit organizations—for a variety of purposes. This fact sheet begins by providing a profile of the U.S. R&D enterprise, including historical trends and current funding by sector and by whether the R&D is basic research, applied research, or development. The final section of this fact sheet includes data on R&D performance by sector.

Historical Trends in U.S. R&D Funding

The United States became a global leader in R&D in the 20th century, funding as much as 69% of annual global R&D in the period following World War II.[1] **Figure 1** shows the growth in total U.S. R&D expenditures from 1953 to 2016 in current dollars.[2] U.S. R&D in 2016 was 100 times higher than it was in 1953 in current dollars, and 14 times higher in constant dollars.[3] By sector, business-funded R&D grew the most during this period. However, faster growth in total R&D spending of other nations reduced the U.S. share of global R&D to approximately 28% in 2016.[4]

Figure 1. U.S. R&D Expenditures by Source of Funding, 1953-2016

Current dollars, in billions



Source: CRS analysis of National Science Foundation, *National Patterns of R&D Resources: 2016–17 Data Update*, February 27, 2019, https://ncses.nsf.gov/pubs/nsf19309.

Notes: 2016 data is preliminary and may be revised.

Two sectors—business and the federal government—have together accounted for more than 90% of U.S. R&D funding since 1953, though their combined share has fallen from a high of 98% in 1956 to 91% in 2016. Federal R&D expenditures as a share of total U.S. R&D expenditures peaked in 1964 at 66.8%, the same year that business R&D expenditures reached a nadir of 30.8%. Between 1964 and 2000, the federal government's share fell and business's share rose. In 2000, business accounted for 69.4% of U.S. R&D expenditures and the federal government 25.1%. This shift in the composition of R&D funding resulted not from a reduction in federal

[1] Office of Technology Policy, U.S. Department of Commerce, *The Global Context for U.S. Technology Policy*, 1997.

[2] Data for all years in this report are for calendar years unless otherwise specified.

[3] 2016 is the latest year for which total U.S. R&D data are available.

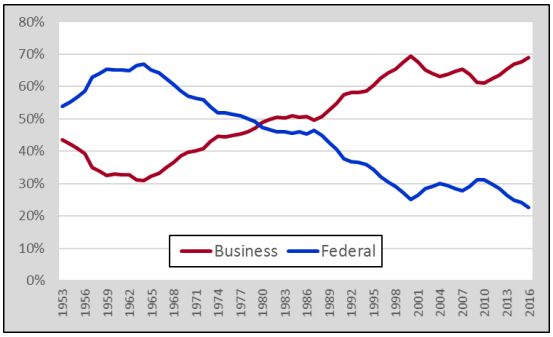
[4] Organisation for Economic Co-operation and Development, OECD.Stat, *Main Science and Technology Indicators*, database, https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB. For more information about global R&D, see CRS Report R44283, *Global Research and Development Expenditures: Fact Sheet*, by John F. Sargent Jr.

government R&D expenditures, but rather from faster growth in business R&D expenditures. From 2000 to 2010, business R&D's share declined from 69.4% to 60.0%, and has risen each year since, reaching 69.0% in 2016; from 2010 to 2016, the federal share has declined from 31.1% to 22.5%.[5] (See **Figure 2**.)

Trends in Federally Funded R&D

In current dollars, federal funding for R&D grew from $2.8 billion in 1953 to $116.1 billion in 2016, a compound annual growth rate (CAGR) of 6.1%. In constant dollars, federal R&D grew by a 2.8% CAGR during this period. However between 2011 and 2014, federal R&D funding, as measured in current dollars, fell for three consecutive years for the first time since such data has been collected; the total decline in federal funding for these years was $8.7 billion (6.8%). In constant dollars, federal R&D has declined seven straight years, from 2009 to 2016. by a total of $22.8 billion (17.2%); a similar drop occurred from 1987 to 1994, when federal R&D fell by 16.0%.[6]

Figure 2. Federal and Business Shares of U.S. R&D Expenditures, 1953-2016



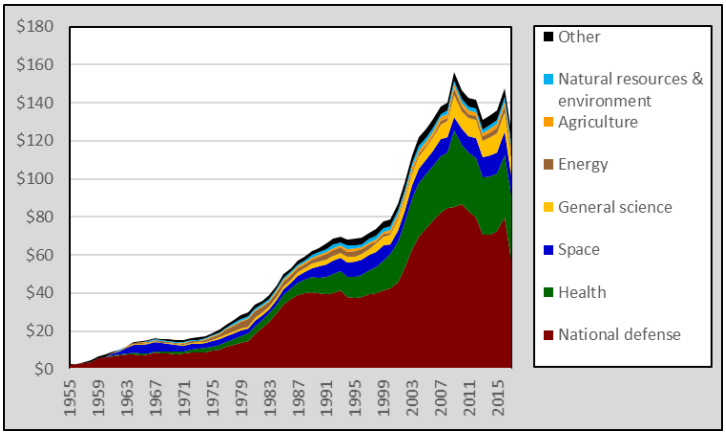
Source: CRS analysis of National Science Foundation data, *National Patterns of R&D Resources: 2016–17 Data Update*.

Notes: 2016 data is preliminary and may be revised.

Figure 3 shows federal R&D funding by budget function in constant dollars from 1953 to 2015.

Figure 3. Federal R&D Funding by Budget Function, 1955-2017

Current dollars, in billions



Source: CRS analysis of data from National Science Foundation, *Federal R&D Funding, by Budget Function: Fiscal Years 2017–19* (NSF 19-312), Table 23, February 27, 2019.

Notes: Figure includes 2017 data although the final year shown on the axis is 2015. 2017 data are preliminary. 2009 data includes supplemental R&D funding provided by the American Recovery and Reinvestment Act of 2009 (P.L. 111-5). Data for 1955–1977 are obligations; data for 1978–2017 are budget authority. All data are for fiscal years.

[5] CRS analysis of data from National Science Foundation, *National Patterns of R&D Resources: 2016–17 Data Update*, February 27, 2019, https://ncses.nsf.gov/pubs/nsf19309.

[6] Ibid.

Trends in U.S. Business-Funded R&D

Business funding of R&D, measured in current dollars, has grown nearly every year since 1953. In current dollars, business-funded R&D grew from $2.2 billion in 1953 to $355.5 billion in 2016, a compound annual growth rate (CAGR) of 8.4%. In constant dollars, business-funded R&D grew by a 5.0% CAGR during this period. In recent years, business-funded R&D has grown at a slower pace. Between 2000 and 2016, business R&D grew by a 4.1% CAGR in current dollars, and by a 2.2% CAGR in constant dollars.[7]

Current Composition of U.S. R&D Funding

R&D funding can be categorized by the character of the work that it supports: basic research, applied research, and development. (See text box for definitions.) Total U.S. R&D expenditures in 2016 (the most recent year for which data are available) were $515.3 billion. Of this amount, $88.6 billion (17.2%) was for basic research, $104.6 billion (20.3%) was for applied research, and $322.1 billion (62.5%) was for development.[8]

Character of R&D: Definitions

Basic research. Experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.

Applied research. Original investigation undertaken to acquire new knowledge; directed primarily, however, toward a specific, practical aim or objective.

Development. Systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes

Source: *National Science Board, Science and Engineering Indicators 2018.*

Table 1 shows total U.S. R&D expenditures in 2016 by funding sector and character of work. Notably, federal R&D funding accounts for the largest share of basic research (42.6%) while industry accounts for the largest shares of applied research (54.8%) and development (69.0%). **Figure 4** shows this information graphically.

Table 1. U.S. R&D Funding by Sector and Character, 2016

Current dollars, in billions

Sector	Basic Research		Applied Research		Development		Total	
	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
Federal Government	$37.8	42.6	$35.4	33.9	$42.9	13.3	$116.1	22.5
Nonfederal Government	2.4	2.8	1.5	1.5	0.6	0.2	4.5	0.9
Business	25.7	29.0	57.3	54.8	272.5	84.6	355.5	69.0
Higher Education	11.5	12.9	5.0	4.8	2.0	0.6	18.5	3.6
Other Nonprofit	11.2	12.6	5.4	5.1	4.1	1.3	20.6	4.0
Total	$88.6	100.0	$104.6	100.0	$322.1	100.0	$515.3	100.0

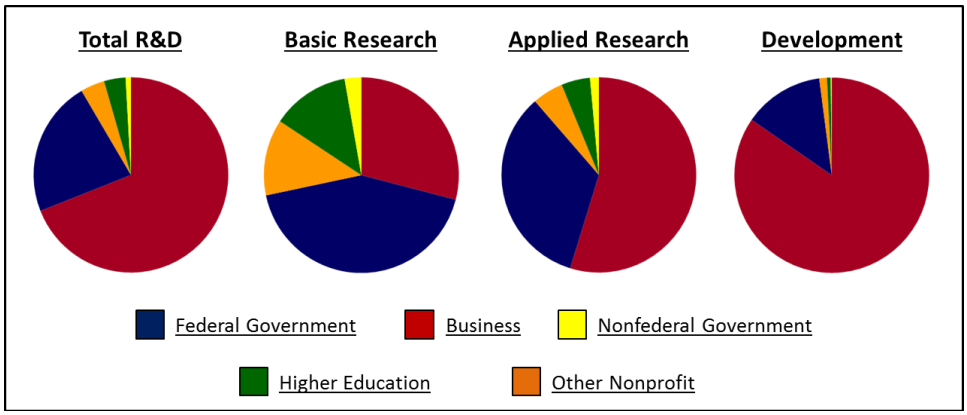
Source: CRS analysis of National Science Foundation, *National Patterns of R&D Resources: 2016–17 Data Update*, February 27, 2019.

Note: Rows and columns may not add to totals due to rounding.

[7] Ibid.

[8] Ibid.

Figure 4. U.S. R&D Funding by Character and Sector, 2016



Source: CRS analysis of National Science Foundation, *National Patterns of R&D Resources: 2016–17 Data Update*, February 27, 2019.

Current Composition of U.S. R&D Performance

R&D is often performed by sectors other than the one funding the R&D. For example, the federal government performs some of the research it funds, but also funds research performed by business, universities and colleges, and other organizations. **Table 2** provides data on performance of U.S. R&D by sector and character of the work (basic research, applied research, and development).

Table 2. U.S. R&D Performance by Sector and Character, 2016

Current dollars, in billions

Sector	Basic Research		Applied Research		Development		Total	
	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
Federal Government	$10.3	11.6	$17.4	16.6	$23.4	7.3	$51.1	9.9
Nonfederal Government	0.1	0.1	0.5	0.5	0.0	0.0	0.7	0.1
Business	24.6	27.8	61.0	58.3	289.0	89.7	374.7	72.7
Higher Education	42.3	47.7	19.1	18.2	6.5	2.0	67.8	13.2
Other Nonprofit	11.2	12.7	6.6	6.3	3.2	1.0	21.0	4.1
Total	$88.6	100.0	$104.6	100.0	$322.1	100.0	$515.3	100.0

Source: CRS analysis of National Science Foundation, *National Patterns of R&D Resources: 2016–17 Data Update*, February 27, 2019.

Note: Rows and columns may not add to totals due to rounding.

Author Information

John F. Sargent Jr.
Specialist in Science and Technology Policy

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