Division of Science Resources Studies

DATA BRIEF

Directorate for Social, Behavioral and Economic Sciences

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R&D Exceeds Expectations Again, Growing Faster than the U.S. Economy during the Last Three Years

by Steven Payson

In 1995-97, R&D grew faster than the U.S. economy as a whole, reflecting steep increases in industry spending.

According to current projections, total research and development (R&D) expenditures in the United States will reach $205.7 billion per year by the end of 1997—a 6.5-percent increase over the $193.2 billion spent in 1996, before adjustment for inflation. The preliminary 1996 level represents a 5.6-percent increase in R&D from 1995, and the 1995 level, in turn, represents an 8.6-percent increase over 1994. In inflation adjusted terms, R&D increased by 3.8 percent in 1997, 3.2 percent in 1996, and 5.9 percent in 1995. In contrast, the entire economy of the United States, as measured by Gross Domestic Product (GDP) adjusted for inflation, has been estimated to increase in the same years by only 2.4 percent, 2.1 percent, and 2.1 percent, respectively.

Approximately one year ago, the National Science Foundation (NSF) reported that "R&D Growth Exceeded 1995 Expectations, but May Slow in 1996" (NSF 96-328). Those earlier projections indicated a 4-percent growth in R&D in 1995, after adjustment for inflation, and only 1-percent growth in 1996. Thus, on the basis of more recent information, current measures of R&D growth rates for 1995 and 1996 each reflect upward revisions in the preliminary estimates made earlier.

Of the $205.7 billion spent on R&D in 1997, $31.2 billion (or 15.2 percent) is expected to be spent on the performance of basic research, $46.2 billion (22.5 percent) on applied research, and $128.3 billion (62.4 percent) on development. In comparison with 1996, R&D performance in 1997 is expected to reflect a 2.8-percent "real" (adjusted for inflation) increase in basic research, a 3.9-percent real increase in applied research, and a 4.0-percent real increase in development.

1997 Funding Patterns

Industry has provided the greatest share of total support for R&D since 1980, and will continue to do so in 1997. Industry support for R&D is expected to reach $133.3 billion in 1997, by preliminary estimates (table 1). This funding represents a 7.3-percent increase in real terms over the preliminary 1996 level. Of these funds, nearly all ($130.6 billion) will be devoted to R&D performed by industry itself, with the remainder going towards academic R&D ($1.7 billion) and R&D performed by other nonprofit organizations ($1.0 billion).

In contrast, Federal R&D support in 1997 is expected to be $62.7 billion, a 2.7-percent decline in real terms from 1996. The Federal share of the Nation's R&D funds first fell below 50 percent in 1978, and was consistently between 44 and 47 percent from 1980-90. Since then, the Federal share has dropped steadily, rendering for 1997 the projected value of 30.5 percent, the lowest share reported in NSF's 45-year-old R&D data series.

The remaining R&D funds will come from universities and colleges, state and local governments, and other nonprofit institutions. In total, these remaining funds will reach $10 billion in 1997, by preliminary tabulations, reflecting a 5-percent increase over their 1996 level.

1997 R&D Performance Patterns

Industry, including industry-administered Federally Funded Research and Development

Electronic Dissemination

SRS data are available through the World Wide Web (http://www.nsf.gov/sbe/srs/stats.htm) For NSF's Telephonic Device for the Deaf, dial 703-306-0090. If you are a user of electronic mail and have access to the internet, you may order publications electronically. Send requests to pubs@nsf.gov. In your request, include the NSF publication number and title, your name, and a complete mailing address.

Table 1. National expenditures for research and development, by performing sector and source of funds: 1997

Performers	Total	Sources of funds: Industry	Federal Government	Universities and colleges	Other nonprofit institutions	Percent distribution, by performer
	All R&D: Basic Research, Applied Research and Development (millions of current dollars)					
Total	205,742	133,308	62,745	6,277	3,411	100.0%
Industry	151,418	130,631	20,787	--	--	73.6
Industry-administered FFRDCs	2,273	--	2,273	--	--	1.1
Federal Government	16,450	--	16,450	--	--	8.0
Universities and colleges	24,031	1,710	14,285	6,277	1,759	11.7
U&C-administered FFRDCs	5,405	--	5,405	--	--	2.6
Other nonprofit institutions	5,520	967	2,900	--	1,653	2.7
Nonprofit-administered FFRDCs	644	--	644	--	--	0.3
Percent distribution by sources	100.0%	64.8%	30.5%	3.1%	1.7%	
	Basic Research Only (millions of current dollars)					
Total	31,212	7,957	17,680	3,838	1,736	100.0%
Industry	6,645	6,467	178	--	--	21.3
Industry-administered FFRDCs	530	--	530	--	--	1.7
Federal Government	2,687	--	2,687	--	--	8.6
Universities and colleges	16,101	1,046	10,142	3,838	1,075	51.6
U&C-administered FFRDCs	2,781	--	2,781	--	--	8.9
Other nonprofit institutions	2,385	445	1,279	--	661	7.6
Nonprofit-administered FFRDCs	83	--	83	--	--	0.3
Percent distribution by sources	100.0%	25.5%	56.6%	12.3%	5.6%	

KEY: FFRDC=Federally funded research and development center; U&C=Universities and colleges
NOTE: State and local government support to industry are included in industry support for industry performance. State and local government support to U&Cs are similarly included in U&C support for U&C performance.
SOURCE: National Science Foundation/SRS

Centers (FFRDCs) such as Sandia National Laboratory, is expected to account for 75 percent of the Nation's 1997 R&D performance total. The projected $153.7 billion in R&D performance by industry represents a 5.6-percent increase in real terms over its preliminary 1996 level. Eighty-five percent of industrial R&D performance will be supported by industry's own funds; Federal funding will account for the remaining 15 percent. The Federal share of industry's performance total has fallen considerably; for example, it had been as high as 32 percent in 1987.

The Federal Government is expected to perform $16.5 billion worth of R&D in 1997, a real decline of 4.4 percent from 1996. Federal agencies will account for 8.0 percent of national R&D performance, reflecting, again, a continual decline in the Federal share of the national total, which began in the mid-1970s. Universities and colleges, excluding academically-administered FFRDCs, are expected to account for 11.7 percent ($24.0 billion) of national R&D performance in 1997, reflecting a small, real increase (1.2 percent) in their R&D performance since 1996.

1997 Basic Research Patterns

Performance of basic research is substantially different from performance of total R&D in several respects. Industry, including industry-administered FFRDCs, is expected to account for only 23 percent ($7.2 billion) of the Nation's basic research performance in 1997. Universities and colleges, excluding academically-administered FFRDCs, are expected to account for 51.6

In 1997, the projected Federal share of support for U.S. R&D—30.5 percent—is the lowest ever reported in NSF's 45-year-old data series.

percent ($16.1 billion), and their FFRDCs for another 8.9 percent ($2.8 billion). The remaining basic research performance will be carried out by the Federal Government, comprising 8.6 percent ($2.7 billion) of the total, and by other nonprofit organizations and their FFRDCs, together comprising 7.9 percent ($2.5 billion). While Federal government performance of all R&D is expected to fall in 1997 in real terms (as described above), Federal performance of basic research is expected to increase in real terms by 5.7 percent.

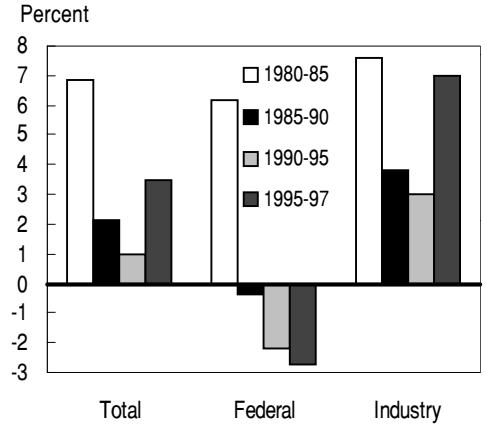
U.S. R&D Expenditure Trends

Growth in total U.S. R&D expenditures had been relatively slow in the early 1990s, but is now accelerating. In the past, annual R&D growth had been much higher—from 1980-85, it averaged 6.9 percent in real terms. That rate then slowed to 2.2 percent in 1985-90, and to 1.0 percent in 1990-95. However, in 1995-97 annual real growth in R&D has averaged 3.5 percent by preliminary estimates (chart 1).

International R&D Spending

Given the size of the United States economy, the United States spends more on R&D than any other country, in fact, more than Japan, Germany, France, the United Kingdom, and Italy combined. However, Japan spends a larger share of its total economy on R&D. In 1995—the latest year for which most data on other countries are available—the U.S. spent 2.52 percent of its GDP on R&D, in comparison to 2.78 percent spent by Japan, 2.34 by France, 2.28 by Germany, 2.05 by the United Kingdom, 1.61 by Canada, and 1.14 by Italy. Nondefense R&D as a percent of GDP was 2.05 for the United States in 1995, which was lower than it was for Germany (2.20) and Japan (2.74) (chart 2), but higher than it was for the United Kingdom (1.78), Canada (1.58) and Italy (1.11). It was equal to that of France in 1994 (the last year reported for France).

Chart 1. Average annual rates of change in U.S. R&D support, based on inflation-adjusted dollars



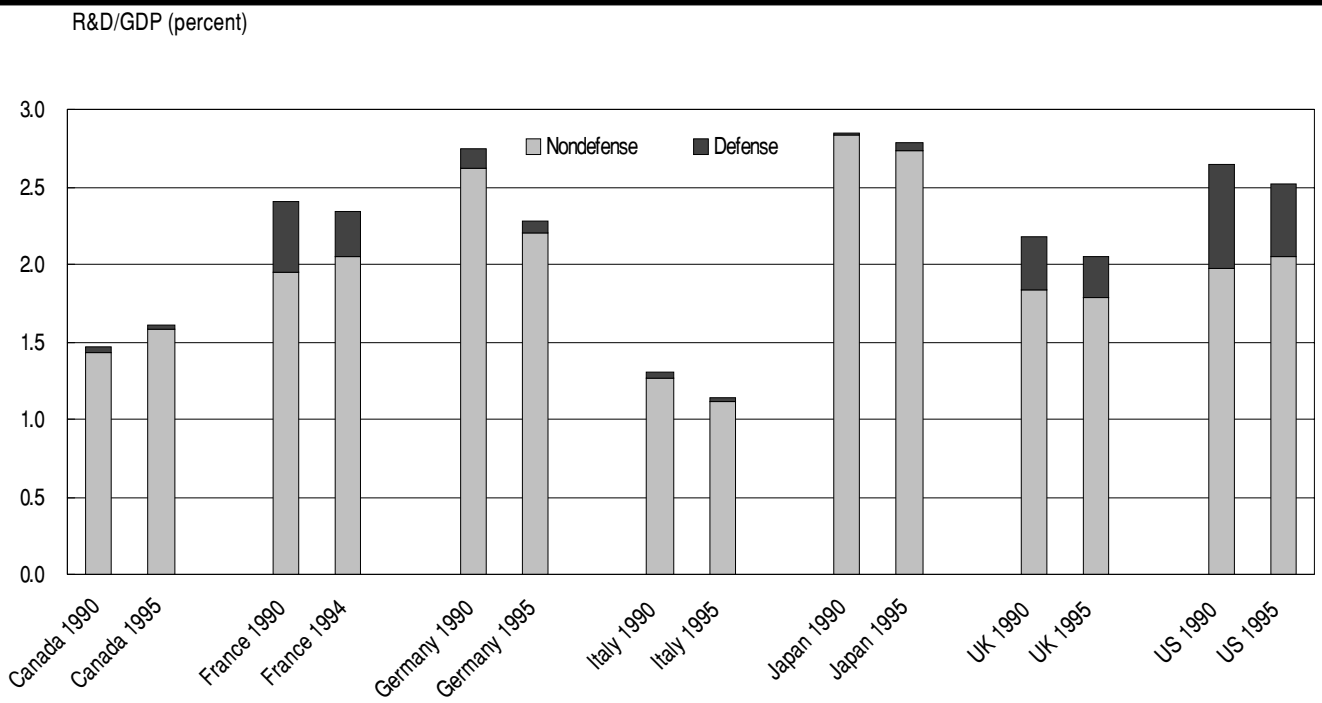
NOTE: These data are based on reports from R&D performers. Rates for 1996 are preliminary and for 1997 are projected.
SOURCE: National Science Foundation/SRS

User Notes

U.S. national R&D expenditures data were assembled from several NSF surveys. Projections for 1997 and preliminary tabulations for 1996 are also based on data provided by Federal R&D funding agencies, an independent survey of industrial R&D performers, and time series modeling techniques. Foreign R&D expenditure data are derived from national and international sources.

R&D expenditure levels from Federal sources, presented here based on performer-reported surveys, differ from the Federal R&D funding totals reported by the Federal agencies that provide those funds. During the past several years, these differences have widened. The difference in the Federal R&D totals appear to be concentrated in the funding of industry by the Department of Defense. See *National Patterns of R&D Resources: 1996* (NSF 96-333) and the forthcoming *National Patterns of R&D Resources: 1998* for detailed discussion and documentation of these differences.

Chart 2. R&D/GDP ratios for the "Group of Seven" countries: 1990 and 1995



NOTE: Data on France for 1995 were not available.

SOURCE: Organisation for Economic Co-operation and Development, Main Science and Technology Indicators database, and National Science Foundation/SRS

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