Division of Science Resources Studies

DATA BRIEF

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1996 U.S. Industrial R&D: Firms Continue to Increase Their Investment

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U.S. industrial R&D spending reached $145 billion in 1996 after a second consecutive 10-percent annual increase.

The National Science Foundation's (NSF's) 1996 Survey of Industrial Research and Development[1] shows that firms[2] spent $144.7 billion on research and development (R&D) in the United States, 10 percent more than the amount spent during 1995. Company funding[3] continued to increase as it has each year since 1953, from $108.7 billion in 1995 to $121.0 billion in 1996. Federal funding of industrial R&D remained about the same ($23.5 billion in 1995 and $23.7 billion in 1996). After adjusting for inflation, total R&D rose 7 percent, company-funded industrial R&D rose 9 percent, and federally funded industrial R&D fell 1 percent. Summary statistics from the 1996 survey are presented and compared with statistics from the 1995 survey in table 1. The remainder of this data brief highlights the increasing support of

Table 1. Funds for industrial R&D, by source and size of company, in current and constant dollars: 1995-96

Source of funds, industry, and size of company	1995	1996	Percent change 1995-96	1995	1996	Percent change 1995-96
	Millions of current dollars			Millions of constant (1992) dollars		
Total industrial R&D	**132,103**	**144,667**	**9.5**	**122,812**	**131,492**	**7.1**
By source and performing sector:						
Company and other nonfederal, total	**108,652**	**121,015**	**11.4**	**101,011**	**109,994**	**8.9**
Manufacturing industries	81,236	91,845	13.1	75,523	83,480	10.5
Nonmanufacturing industries	27,415	29,170	6.4	25,487	26,513	4.0
Federal, total	**23,451**	**23,653**	**0.9**	**21,802**	**21,499**	**-1.4**
Manufacturing industries	18,831	20,020	6.3	17,507	18,197	3.9
Nonmanufacturing industries	4,620	3,633	-21.4	4,295	3,302	-23.1
By character of work:						
Basic research	6,099	8,207	34.6	5,670	7,460	**31.6**
Applied research	27,454	29,241	6.5	25,523	26,578	4.1
Development	98,552	107,218	8.8	91,621	97,453	6.4
Size of business:						
Fewer than 500 employees	16,662	20,249	21.5	15,490	18,405	18.8
500 to 999	4,693	4,637	-1.2	4,363	4,215	-3.4
1,000 to 4,999	16,960	18,273	7.7	15,767	16,609	5.3
5,000 to 9,999	9,532	11,537	21.0	8,862	10,486	18.3
10,000 to 24,999	17,071	20,164	18.1	15,870	18,328	15.5
25,000 or more	67,185	69,807	3.9	62,460	63,449	1.6
Company-financed R&D contracted to outside organizations	**5,177**	**5,833**	**12.7**	**4,813**	**5,302**	**10.2**
Manufacturing industries	3,812	4,293	12.6	3,544	3,902	10.1
Nonmanufacturing industries	1,365	1,540	12.8	1,269	1,400	10.3
Company-financed R&D performed outside the United States	**13,052**	**14,050**	**7.6**	**12,134**	**12,770**	**5.2**
Manufacturing industries	10,846	11,540	6.4	10,083	10,489	4.0
Nonmanufacturing industries	2,206	2,510	13.8	2,051	2,281	11.2

NOTES: Detail may not add to totals because of rounding. 1992 gross domestic product (GDP) implicit price deflators were used to convert current dollars to constant dollars. The 1995 and 1996 samples were designed to produce coefficients of variation of 2 percent for industries in which there is a large amount of H&D expenditures and 5 percent for other industries.

SOURCE: National Science Foundation/SRS, Survey of Industrial Research and Development

Electronic Dissemination

SRS data are available through the World Wide Web (http://www.nsf.gov/sbe/srs/stats.htm). For more information about obtaining reports, contact pubs@nsf.gov or call (301) 947-2722. For NSF's Telephonic Device for the Deaf, dial (703) 306-0090.

[1]NSF's definition of industrial research and development is presented toward the end of this data brief.

[2]In this data brief and in the NSF industrial R&D statistics, the terms "firm," "company," and "enterprise" are synonymous.

[3]Funds for industrial R&D are obtained from various sources. In the NSF statistics and for the purposes of this data brief, these sources are grouped into two categories, company funds and Federal funds. In the text, tables, and charts, company-funded R&D includes funds for industrial R&D performed within company facilities from all sources except the Federal Government. The funds predominantly are the company's own, but also include funds from outside organizations such as other companies, research institutions, universities and colleges, nonprofit organizations, and state governments.

R&D funded from companies' own resources compared with Federal funding of industrial R&D.

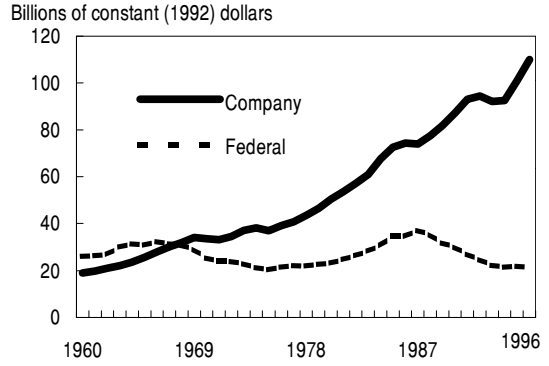
Sources of R&D Funds

Since the beginning of NSF's Survey of Industrial Research and Development, which has produced annual statistics since 1953, firms have contributed more each year toward the performance of research and development than during the prior year. Even after adjusting for inflation, current year investment exceeded the prior year's investment during 39 of the 44 survey years. During the ten-year period, 1987-96, the average annual increase in the amount of company-funded R&D was 8 percent, 5 percent after adjusting for inflation. Federal agencies decreased support for industrial R&D during all but 3 of those 10 years, an average of 3 percent per year, 6 percent after adjusting for inflation. The relationship between the sources of industrial R&D funding is illustrated in chart 1.

During 1996, manufacturers spent $92 billion on company-funded R&D, up 13 percent over 1995.

As shown in chart 1, in the early 1960s, the Federal Government contributed more funds for industrial R&D performance, mostly in the form of defense-related contracts and grants, than firms contributed from their own resources. During 1967 and 1968, both sources contributed an average of 31 billion inflation-adjusted dollars per year. During 1969, company-funded industrial R&D exceeded federally funded industrial R&D by about $5 billion and this funding difference steadily increased to $88 billion in 1996, after adjusting for inflation. As a percentage share of total industrial R&D funding, the Federal portion peaked during 1959 at 59 percent. Since then, the Federal share has been steadily declining, except for a seven-year period beginning in 1980 when it hovered around 31 percent. During 1996, federally funded industrial R&D accounted for 16 percent of the total amount performed. Conversely, during the period 1959-96, the share that companies contributed to the performance of industrial R&D increased from 41 to 84 percent. Focusing on recent trends, 1993-96 survey statistics indicate that Federal funding, in constant dollars, stayed in the $21-22 billion range while company funding increased from $92.2 billion during 1993 to $110.0 billion during 1996.

Figure 1. Company and Federal funding of industrial R&D, in constant dollars, 1960-96



NOTE: 1992 gross domestic product (GDP) implicit price deflators were used to convert current dollars to constant dollars.

SOURCE: NSF/SRS, Survey of Industrial Research and Development

Manufacturing and Nonmanufacturing R&D

An increasing amount of R&D performance by U.S. industry has been undertaken by firms in the nonmanufacturing industries during the past decade. During the late 1950s and up until the late 1980s, over 90 percent of industrial R&D was performed by manufacturing firms. Beginning in 1988, R&D performed by nonmanufacturing firms exceeded 10 percent of total industrial R&D, and that share increased to 23 percent in 1996. During the entire 1988-96 period, nonmanufacturing R&D increased at an average annual rate of 15 percent while R&D performed by manufacturers increased at an annual rate of 3 percent, although toward the end of this period, during 1995-96, the rate slowed to 2 percent for nonmanufacturing R&D and increased to 12 percent for manufacturing R&D. After adjusting for inflation, the rates for 1988-96 were 12 percent for nonmanufacturing R&D and less than 1 percent for manufacturing R&D. For 1995-96, the rates were less than 1 percent and 9 percent, respectively.

Company funding. Increased company funding accounted for most of the growth in the performance of R&D by both manufacturers and firms in nonmanufacturing industries during the period 1988-96. Manufacturing companies increased performance of R&D funded from their own resources by an average of 6 percent

per year—from $59.4 billion in 1988 to $91.8 billion in 1996. Nonmanufacturing firms increased their funding by 19 percent per year—from $7.3 billion in 1988 to $29.2 billion in 1996. After adjusting for inflation, the percentages were 2 percent and 15 percent, respectively. Among manufacturing firms that performed the largest amount of R&D funded with their own resources during 1996 were makers of motor vehicles ($14.5 billion), electronic components ($12.5 billion), drugs and medicines ($9.8 billion), professional and scientific instruments ($8.2 billion), and office, computing, and accounting machines ($8.1 billion).

Among the largest nonmanufacturing performers of company-funded R&D were business (including computer- related) service firms ($10.3 billion), trade industries ($6.3 billion), telephone communications firms ($3.9 billion), and research, development, and testing labs ($3.8 billion).

Statistics on company-funded R&D performed during 1995 and 1996 are compared in table 2.

Table 2. Company and other funds for industrial R&D, by manufacturing and nonmanufacturing industry, in current and constant dollars: 1995-96

Source of funds, industry, and size of company	1995	1996	Percent change 1995-96	1995	1996	Percent change 1995-96
	Millions of current dollars			Millions of constant (1992) dollars		
Total company-funded industrial R&D	**108,652**	**121,015**	**11.4**	**101,011**	**109,994**	**8.9**
Manufacturing industries, total	**81,236**	**91,845**	**13.1**	**75,523**	**83,480**	**10.5**
Chemicals and allied products	17,337	17,520	1.1	16,118	15,924	-1.2
Drugs and medicines	10,202	9,769	-4.2	9,484	8,879	-6.4
Other chemicals	**7,135**	**7,751**	**8.6**	**6,633**	**7,045**	**6.2**
Machinery	9,676	13,338	37.8	8,995	12,123	34.8
Office, computing, and accounting machines	4,699	8,132	73.1	4,369	7,391	69.2
Other machinery	4,977	5,206	4.6	4,627	4,732	2.3
Electrical equipment	**17,060**	**20,356**	**19.3**	**15,860**	**18,502**	**16.7**
Electronic components	9,628	12,497	29.8	8,951	11,359	**26.9**
Other electrical equipment	7,432	7,859	5.7	6,909	7,143	3.4
Transportation equipment	19,311	20,535	6.3	17,953	18,665	4.0
Motor vehicles and motor vehicle equipment	13,590	14,528	6.9	12,634	13,205	4.5
Other transportation equipment	5,721	6,007	5.0	5,319	5,460	2.7
Professional and scientific instruments	8,516	8,207	-3.6	7,917	7,460	-5.8
Scientific and mechanical measuring instruments	3,787	3,283	-13.3	3,521	2,984	-15.2
Optical, surgical, photographic, and other instruments	4,729	4,924	4.1	4,396	4,476	1.8
Other manufacturing industries	9,336	11,889	27.3	8,679	10,806	24.5
Nonmanufacturing industries, total	**27,415**	**29,170**	**6.4**	**25,487**	**26,513**	**4.0**
Transportation and utilities	5,183	4,492	-13.3	4,818	4,083	-15.3
Communications	4,756	3,970	-16.5	4,422	3,608	-18.4
Electric, gas, and sanitary services	347	311	-10.4	323	283	-12.4
Other transportation and utilities	**80**	**211**	**163.8**	**74**	**192**	**157.9**
Trade	**7,514**	**6,338**	**-15.7**	**6,986**	**5,761**	**-17.5**
Finance, insurance, and real estate	710	1,280	80.3	660	1,163	76.3
Services	13,606	15,904	16.9	12,649	14,456	14.3
Business services	8,681	10,280	18.4	8,070	9,344	15.8
Health services	**753**	**735**	**-2.4**	**700**	**668**	**-4.6**
Engineering and management services	**4,011**	**4,572**	**14.0**	**3,729**	**4,156**	**11.4**
Other services	**161**	**317**	**96.9**	**150**	**288**	**92.5**
Other nonmanufacturing industries	402	1,156	187.6	374	1,051	181.1

NOTES: Detail may not add to totals because of rounding. 1992 gross domestic product (GDP) implicit price deflators were used to convert dollars to constant dollars. The 1995 and 1996 samples were designed to produce coefficients of variation of 2 percent for industries in which there is a large amount of R&D expenditures and 5 percent for other industries.

SOURCE: National Science Foundation/SRS, Survey of Industrial Research and Development

Federal funding.
During the period 1988-96, federally funded R&D performed by manufacturing firms decreased an average of 4 percent per year—from $27.1 billion in 1988 to $20.0 billion in 1996—and increased for firms in the nonmanufacturing industries an average of 1 percent per year—from $2.7 billion in 1988 to $3.6 billion in 1996. However, toward the end of the period, performance of federally funded R&D by manufacturers *increased* 6 percent—from $18.8 billion in 1995 to $20.0 billion in 1996—and *decreased* 21 percent for non-manufacturing R&D—from $4.6 billion in 1995 to $3.6 billion in 1996. After adjusting for inflation, funding for both sectors during 1988-96 decreased at annual rates of 7 percent for manufacturing and 2 percent for nonmanu-facturing. During 1996, aircraft and missile producers performed the most federally funded R&D among manufacturers ($10.5 billion of the $20.0 billion total), and research, development, and testing labs performed the most federally funded R&D among firms in the nonmanufacturing industries ($1.7 billion of the $3.6 billion total).

Definition of Industrial Research and Development

Industrial R&D is: the pursuit of a planned search for new knowledge, whether or not the search has reference to a specific application (basic research); the application of existing knowledge to problems involved in the creation of a new product or process (applied research); or the application of existing knowledge to problems involved in the improvement of a present product or process (development) by persons trained, either formally or by experience, in engineering or in the physical, biological, mathematical, statistical or computer sciences and employed by a publicly or privately owned firm engaged in for-profit activity in the United States.

Statistical Reports

This Data Brief is the first publication of statistics and information from the 1996 Survey of Industrial Research and Development. The annual report, *Research and Development in Industry: 1995-96*, will contain the full set of approximately 70 tables available from the survey. To provide users with the most timely statistics possible while the annual report is being prepared, a set of advanced release tables is available from the Internet and mailing addresses below. Both the advanced release tables and the annual report present R&D statistics by industry, size of company, sources of funds, and character of R&D. They also provide historical trends in R&D; R&D as a percent of net sales; R&D contracted to outside organizations and performed outside the United States; sales and total employment of R&D-performing companies; and employment and cost of R&D scientists and engineers, and state statistics. The annual report presents technical information on the survey sample and processing and additional analysis of the statistics.

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