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U.S. INDUSTRIAL R&D PERFORMERS REPORT INCREASED EXPENDITURES FOR 2004

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Companies spent $208 billion in current-year dollars on research and development (R&D) performed in the United States during 2004 compared with $201 billion in 2003 (table 1), according to estimates from the Survey of Industrial Research and Development.[1] In inflation-adjusted (2000) dollars, 2004 R&D expenditures increased $2.1 billion from 2003. The increase for 2004 tracked the long-term trend: annual increases in inflation-adjusted expenditures were reported for all but nine years since the survey's inception in 1953.

Funding from both the company's own and other nonfederal sources (hereafter, company or company and other funding) and from federal sources for R&D were higher in 2004 than in 2003. Company funding during 2004 amounted to $188 billion in current-year dollars compared with $183 billion during 2003, and federal funding amounted to $20 billion during 2004 compared with $18 billion during 2003. Since 1953, annual inflation-adjusted company-funded R&D has increased in all but six years; federally funded industrial R&D has increased in about half of the years.

R&D Performance by Industrial Sector

In 2004 companies in manufacturing industries performed $147 billion of R&D which accounted for 71% of all industrial R&D performed in the United States; companies in nonmanufacturing industries performed $61 billion of R&D (table 2). Manufacturers performed $132 billion of company-funded R&D and $15 billion of federally funded industrial R&D; companies in the nonmanufacturing industries performed $56 billion and $5 billion, respectively. Other company and federally funded R&D costs by detailed industry are given in table 2 (see Data Notes for information on industry classification).

Sales and Employment of R&D Performers

Domestic net sales (see table 1 for definition) of companies that performed R&D in the United States was $5.7 trillion in 2003 and $5.6 trillion in 2004. The R&D-to-sales ratio was 3.7% in 2004 compared with 3.5% in 2003. Domestic employment during 2004 was 14.8 million (table 3), compared with 15.3 million reported in 2003. The number of full-time equivalent scientists and engineers who performed industrial R&D was 1.2 million in 2003 and 1.1 million in 2004. Other sales and employment estimates by detailed industry are given in table 3.

R&D Funds and Company Size

Smaller companies, those with fewer than 25,000 employees, performed 62% of industrial R&D in the United States during 2004 (table 4). More specifically, companies with fewer than 500 employees, while reporting only 11% of sales of R&D-performing firms and 14% of domestic employment, performed 18% of all industrial R&D and employed 25% of the scientists

[1] *Company* is defined as a business organization of one or more establishments under common ownership or control. The Survey of Industrial Research and Development is conducted jointly by the National Science Foundation (NSF) and the U.S. Bureau of the Census. All estimates from the survey are subject to both sampling and nonsampling errors (see technical notes in the annual reports at http://www.nsf.gov/statistics/industry).

TABLE 1. Funds expended for industrial R&D performance by source of funds and size of company: 2003 and 2004

Selected characteristic	2003	2004	2003	2004
	Current $millions		2000 constant $millions	
Total industrial R&D performance	200,724 r	208,301	188,828	190,927
Source of funds				
Company and other nonfederal	182,926 r	188,035	172,085	172,351
Federal	17,798 r	20,266	16,743	18,576
Size of company (number of employees)				
5–24	5,578	6,295	5,247	5,770
25–49	6,449	5,906	6,067	5,413
50–99	4,829	6,456	4,543	5,918
100–249	9,559	11,045	8,992	10,124
250–499	9,536	8,380	8,971	7,681
500–999	10,383	10,821	9,768	9,918
1,000–4,999	30,484	31,475	28,677	28,850
5,000–9,999	15,434	18,191	14,519	16,674
10,000–24,999	26,817 r	31,208	25,228	28,605
25,000 or more	81,654 r	78,523	76,815	71,973
Domestic net sales[a]	5,745,754 r	5,601,729	5,405,225	5,134,490

r = estimate significantly revised since initially published in *Increase in U.S. Industrial R&D Expenditures Reported for 2003 Makes Up for Earlier Decline,* NSF 06-305.

[a] Dollar values for goods sold or services rendered by R&D-performing companies to customers outside the company, including the federal government, less such items as returns, allowances, freight charges, and excise taxes. Excludes domestic intracompany transfers and sales by foreign subsidiaries but includes transfers to foreign subsidiaries and export sales to foreign companies.

NOTES: Detail may not add to total because of rounding. 2000 gross domestic product (GDP) implicit price deflators were used to convert current to constant dollars. Excludes data for federally funded research and development centers.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Industrial Research and Development: 2003 and 2004.

and engineers who worked on R&D. Companies with at least 500 but with fewer than 25,000 employees reported 47% of sales and 44% of employment, performed 44% of all R&D, and employed 46% of R&D scientists and engineers. Very large firms with 25,000 or more employees reported 43% of sales and 42% of employment, performed 38% of all R&D, and employed 29% of R&D scientists and engineers. Other R&D costs and sales and employment estimates by size of company are given in table 4.

R&D Performance by State

During 2004, six states accounted for 50% of the industrial R&D performed in the United States. Companies in California, Michigan, Massachusetts, New Jersey, Texas, and Washington (listed by decreasing level) reported aggregate R&D expenditures of $104 billion (table 5). Of that amount, $97 billion accounted for 52% of company-funded R&D performed in the United States. California, Massachusetts, Connecticut, Virginia, Maryland, and Florida (the top six states listed by decreasing level), reported $12.1 billion of federally funded R&D, which accounted for 60% of the U.S. total. Other R&D costs by state and source of funds are given in table 5.

Data Notes

Estimates in this *InfoBrief* were derived from the annual Survey of Industrial Research and Development. The survey is cosponsored by the National Science Foundation and the U.S. Census Bureau, and Census is the collection and tabulation agent for the survey. The survey is a nationally representative sample of all for-profit companies, publicly or privately held and

TABLE 2. Funds for industrial R&D performed in the United States, by source, by industry: 2004
(Millions of dollars)

Industry and company size	NAICS codes	All R&D	Federal	Company and other
All industries	21–23, 31–33, 42, 44–81	208,301	20,266	188,035
Manufacturing industries	31–33	147,288	15,401	131,887
Food	311	2,254	5	2,249
Paper, printing, and support activities	322, 323	D	D	2,308
Petroleum and coal products	324	1,603	9	1,595
Chemicals	325	D	D	39,070
Basic chemicals	3251	2,393	80	2,312
Resin, synthetic rubber, fibers, and filament	3252	2,096	16	2,080
Pharmaceuticals and medicines	3254	31,477	33	31,444
Other chemicals	other 325	D	D	3,234
Plastics and rubber products	326	D	D	1,879
Fabricated metal products	332	1,512	47	1,465
Machinery	333	6,579	105	6,473
Computer and electronic products	334	48,296	7,605	40,691
Computers and peripheral equipment	3341	5,734	27	5,707
Communications equipment	3342	D	D	8,433
Semiconductor and other electronic components	3344	D	D	17,524
Navigational, measuring, electromedical, and control instruments	3345	15,214	7,332	7,882
Other computer and electronic products	other 334	1,148	3	1,144
Electrical equipment, appliances, and components	335	2,664	42	2,622
Transportation equipment	336	D	D	26,019
Motor vehicles, trailers, and parts	3361–63	15,677	67	15,610
Aerospace products and parts	3364	13,086	3,862	9,224
Other transportation equipment	other 336	D	D	1,185
Miscellaneous manufacturing	339	4,388	39	4,348
Medical equipment and supplies	3391	3,343	30	3,313
Other miscellaneous manufacturing	other 339	1,045	10	1,035
Other manufacturing	312-16, 321, 327, 331, 337	D	D	3,169
Nonmanufacturing industries	21–23, 42, 44–81	61,013	4,865	56,148
Construction	23	1,481	15	1,466
Wholesale trade	42	D	D	1,540
Retail trade	44, 45	1,596	0	1,596
Information	51	22,593	307	22,285
Publishing	511	D	D	17,273
Newspaper, periodical, book, and database	5111	763	0	763
Software	5112	D	D	16,510
Broadcasting and telecommunications	513	2,215	0	2,215
Other information	other 51	D	D	2,797
Finance, insurance, and real estate	52, 53	1,708	0	1,708
Professional, scientific, and technical services	54	28,709	4,464	24,245
Architectural, engineering, and related services	5413	4,265	1,970	2,295
Computer systems design and related services	5415	11,575	378	11,197
Scientific R&D services	5417	11,355	1,972	9,383
Other professional, scientific, and technical services	other 54	1,514	144	1,370
Health care services	621–23	500	5	495
Other nonmanufacturing	21-2, 48-9, 55-6, 61, 624, 71-2, 81	D	D	2,813

D = suppressed to avoid disclosure of confidential information; i = more than 50% of the value is imputed.

NOTES: The method used to assign industry classifications has changed; industry-specific estimates for 2004 are not directly comparable with those for previous years (see Data Notes). Detail may not add to total because of rounding. Excludes data for federally funded research and development centers.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Industrial Research and Development: 2004.

TABLE 3. Sales and employment for companies that performed industrial R&D in the United States, by industry: 2004

Industry and company size	NAICS codes	Domestic net sales	Domestic employment[a]	R&D scientists and engineers[b]
		$millions	Thousands	
All industries	21–23, 31–33, 42, 44–81	5,601,729	14,820	1,111.3
Manufacturing industries	31–33	3,871,294	9,399	717.0
Food	311	347,396	876	11.7
Paper, printing, and support activities	322, 323	155,801	475	14.6 i
Petroleum and coal products	324	408,956	169	D
Chemicals	325	595,292	1,073	118.6
Basic chemicals	3251	109,200	179	10.6
Resin, synthetic rubber, fibers, and filament	3252	67,610	100	9.4
Pharmaceuticals and medicines	3254	315,180	469	79.9
Other chemicals	other 325	103,302	325	18.6
Plastics and rubber products	326	120,670	429	14.1
Fabricated metal products	332	102,935	482	15.7
Machinery	333	178,618	665	62.6
Computer and electronic products	334	506,103	1,373	273.3
Computers and peripheral equipment	3341	122,494	247	45.1
Communications equipment	3342	88,381	210	49.9
Semiconductor and other electronic components	3344	162,398	411	97.4
Navigational, measuring, electromedical, and control instruments	3345	110,416	450	74.6 i
Other computer and electronic products	other 334	22,415	55	6.2
Electrical equipment, appliances, and components	335	95,715	345	19.4
Transportation equipment	336	946,474	1,956	134.1
Motor vehicles, trailers, and parts	3361–63	643,079	1,039	89.2
Aerospace products and parts	3364	228,018	622	37.9
Other transportation equipment	other 336	75,377	295	7.0
Miscellaneous manufacturing	339	89,515	355	21.8
Medical equipment and supplies	3391	56,713	211	13.9
Other miscellaneous manufacturing	other 339	32,802	143	7.9
Other manufacturing	312-16, 321, 327, 331, 337	323,818	1,201	D
Nonmanufacturing industries	21–23, 42, 44–81	1,730,435	5,421	394.3
Construction	23	56,118	160	0.8
Wholesale trade	42	68,879	155	15.5
Retail trade	44, 45	191,632	603	D
Information	51	445,652	1,233	131.5
Publishing	511	90,234	343	98.5
Newspaper, periodical, book, and database	5111	19,230	105	4.8
Software	5112	71,004	238	93.7
Broadcasting and telecommunications	513	291,646	697	10.9
Other information	other 51	63,772	192	22.0
Finance, insurance, and real estate	52, 53	440,122	857	22.3
Professional, scientific, and technical services	54	185,812	957	174.1
Architectural, engineering, and related services	5413	34,885	157	41.4
Computer systems design and related services	5415	95,541	485	74.5
Scientific R&D services	5417	31,729	163	44.7
Other professional, scientific, and technical services	other 54	23,658	152	13.5
Health care services	621–23	27,638	160	6.0 i
Other nonmanufacturing	21-2, 48-9, 55-6, 61, 624, 71-2, 81	314,582	1,297	D

D = suppressed to avoid disclosure of confidential information; i = more than 50% of the value is imputed.

[a] Data recorded on March 12, 2004 represent employment figures for the current year.

[b] Data recorded in January 2005 represent employment figures for the previous year.

NOTES: The method used to assign industry classifications has changed; industry-specific estimates for 2004 are not directly comparable with those for previous years (see Data Notes). Detail may not add to total because of rounding. Excludes data for federally funded research and development centers.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Industrial Research and Development: 2004.

TABLE 4. Funds for industrial R&D, sales, and employment for companies performing industrial R&D in the United States, by company size: 2004

Industry and company size	All R&D	Federal	Company and other	Domestic net sales	Domestic employment[a]	R&D scientists and engineers[b]
	$millions				Thousands	
Company size (employees)						
All companies	208,301	20,266	188,035	5,601,729	14,820	1,111.3
5–24	6,295	685	5,610	111,868 i	240	66.2
25–49	5,906	612	5,293	46,138	236	43.4
50–99	6,456	608	5,849	101,559	356	44.1
100–249	11,045	1,058	9,987	180,436	635	73.1
250–499	8,380	547	7,832	152,243	545	52.3
500–999	10,821	762	10,060	217,014	610	59.3
1,000–4,999	31,475	493	30,982	828,300	2,325	173.8
5,000–9,999	18,191	2,018	16,173	571,170	1,373	96.6
10,000–24,999	31,208	1,561	29,647	993,497	2,243	178.9
25,000 or more	78,523	11,923	66,600	2,399,505	6,258	323.6

i = more than 50% of the value is imputed.

[a] Data recorded on March 12, 2004 represent employment figures for the current year.

[b] Data recorded in January 2005 represent employment figures for the previous year.

NOTES: Detail may not add to total because of rounding. Excludes data for federally funded research and development centers.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Industrial Research and Development: 2004.

with five or more employees, that performed R&D within the 50 United States and the District of Columbia. Approximately 32,000 companies are surveyed each year and the overall response rate is approximately 80%. The primary focus of the survey is U.S. industry as a performer of, rather than a source of funds for, research and development. Beginning in 1989, the amount of federally funded R&D reported by performers began to diverge from the amount reported by federal agencies. For 2004, federal agencies reported obligations of $102.7 billion in total R&D to all R&D performers and obligations of $38.9 billion to industrial R&D performers. These totals compare with $93.4 billion in federal funding reported by all performers of R&D and with $20.3 billion reported by industrial R&D performers. Although NSF has not found a definitive explanation for this divergence, the National Research Council notes that comparing federal outlays (as opposed to obligations) for R&D to performer expenditures results in a smaller discrepancy.[2] For 2004, federal agencies reported R&D outlays of $97.3 billion to all R&D performers.

Beginning in the late 1990s, increasingly large amounts of R&D were attributed to the wholesale trade industries, resulting from the payroll-based methodology used to assign industry classifications and the change from the standard industrial classification (SIC) system to the North American Industrial Classification System (NAICS) in 1999. Such classification artifacts were of particular concern for companies traditionally thought of as pharmaceutical or computer-manufacturing firms. As these firms increasingly marketed their own products and more of their payroll involved employees in selling and distribution activities, the potential for the companies to be classified among the wholesale trade industries increased. To increase the relevance and usefulness of the industrial R&D statistics, NSF evaluated ways to ameliorate the negative effects of the industry classification methodology and change in classification systems. Beginning in 2004, in addition to firms originally assigned NAICS codes among the wholesale trade (NAICS 42) industries, firms in the information (NAICS 51); professional, scientific, and technical services (NAICS 54); and management of companies and enterprises (NAICS 55) industries using the

[2] National Research Council. 2005. *Measuring Research and Development Expenditures in the U.S. Economy*. Panel on Research and Development Statistics at the National Science Foundation, Committee on National Statistics, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

TABLE 5. Funds for industrial R&D performed in the United States, by state, by source of funds: 2004
(Millions of dollars)

State	All R&D	Federal	Company and other	State	All R&D	Federal	Company and other
United States	208,301	20,266	188,035	Montana	70	3 e	67
Alabama	1,227	583	644	Nebraska	383	6 e	377
Alaska	35 e	8	28 e	Nevada	417	23	394
Arizona	2,570	245	2,325	New Hampshire	1,330	D	D
Arkansas	287	27	259	New Jersey	10,993	294	10,699
California	46,614	3,980 i	42,634	New Mexico	450	176	275
Colorado	4,008	118	3,890	New York	8,793	721	8,071
Connecticut	7,177	1,717	5,460	North Carolina	4,565	87	4,478
Delaware	1,059	14	1,045	North Dakota	379 i	2 e	377 i
District of Columbia	182 e	68	114 e	Ohio	5,516	395	5,121
Florida	3,486	1,270	2,216	Oklahoma	410	22	387
Georgia	2,160	58 e	2,102	Oregon	3,057	20 e	3,036
Hawaii	131	52	78	Pennsylvania	8,005	160	7,845
Idaho	681	11	670	Rhode Island	1,320 i	D	D
Illinois	8,554	267	8,286	South Carolina	961	37	924
Indiana	4,208	232	3,976	South Dakota	72	3 i	69
Iowa	963	7 e	956	Tennessee	1,630	322	1,308
Kansas	1,804 i	D	D	Texas	10,992	610	10,382
Kentucky	565	11 e	554	Utah	1,089	174	915
Louisiana	311	19 e	293	Vermont	423	34	389
Maine	213	D	D	Virginia	4,006	1,499 i	2,507
Maryland	3,826	1,286	2,540	Washington	8,840 i	146	8,694 i
Massachusetts	11,819	2,331 i	9,488	West Virginia	202	D	D
Michigan	15,170	204	14,966	Wisconsin	2,645	47	2,598
Minnesota	5,199	261	4,938	Wyoming	23	3	21
Mississippi	160	D	D				
Missouri	2,151	84 i	2,067	Undistributed funds[a]	7,169	44 i	7,125

D = data withheld to avoid disclosing operations of individual companies; e = more than 50 percent of the cell value is imputed due to raking of state data; i = more than 50 percent of the cell value is imputed.

[a] Includes data reported on Form RD-1 that were not allocated to a specific state. Data reported on the Form RD-1A, the questionnaire sent to small companies or companies new to the survey, were allocated to the state in the address on the company's survey form, which is usually the company's headquarters.

NOTES: Detail may not add to totals because of rounding. Excludes data for federally funded research and development centers.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Industrial Research and Development: 2004.

payroll-based methodology were manually reviewed by NSF and Census. These firms were reclassified based on primary R&D activity, which in most cases corresponded to their primary products or service activities. The result was that most of the R&D previously attributed to NAICS 42 and 55 industries was redistributed. For detailed information, see SRS InfoBrief, *Revised Industry Classification Better Reflects Structure of Business R&D in the United States,* forthcoming at http://www.nsf.gov/statistics.

The full set of detailed tables from this survey will be available in the report Survey of Industrial Research and Development, 2004 at http://www.nsf.gov/statistics/industry. Individual detailed tables from the 2004 survey may be available in advance of publication of the full report. For further information, contact

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