



Business R&D Performance in the United States Increased in 2011

by Raymond M. Wolfe¹

Companies spent \$294 billion on research and development performed in the United States during 2011, compared with \$279 billion during 2010 (table 1). Funding from the companies' own sources was \$222 billion during 2010 and \$239 billion during 2011; funding from other sources was \$57 billion in 2010 and \$55 billion in 2011 (table 2). Data for this InfoBrief are from the Business R&D and Innovation Survey (BRDIS), which was developed and cosponsored by the National Science Foundation and Census Bureau.

R&D Performance by Industrial Sector and Source of Funding

During 2011, companies in manufacturing industries performed \$201 billion (68%) of domestic R&D, defined as R&D performed in the 50 states and the District of Columbia (table 2). Most of the funding was from companies' own funds (81%). Companies in nonmanufacturing industries performed \$93 billion of domestic R&D (32% of total domestic R&D performance), 81% of which was paid for from companies' own funds. The U.S. federal government was the chief source of outside funding (also referred to as R&D paid for by others) for R&D across all industries. Of the \$55

billion paid for by others, the federal government contributed \$31 billion, most of which came from the Department of Defense (\$26 billion) (data not shown). Aerospace products and parts

(North American Industry Classification System [NAICS] 3364), professional, scientific, and technical services (NAICS 54), and computer and electronic products (NAICS 334) received

TABLE 1. Funds spent for business R&D performed in the United States, by source of funds and size of company: 2010–11

(Millions of U.S. dollars)

Selected characteristic	2010	2011
Domestic R&D performance ^a	278,977	294,093
Source of funds		
Paid by the company	221,706	238,768
Paid by others	57,271	55,324
Federal	34,199	31,309
Other ^b	23,072	24,015
Size of company (number of domestic employees)		
5–24	12,573	10,981
25–49	8,625	10,861
50–99	8,855	9,468
100–249	11,866	12,528
250–499	10,283	12,955
500–999	10,117	10,027
1,000–4,999	48,228	50,485
5,000–9,999	27,463	24,951
10,000–24,999	41,835	49,214
25,000 or more	99,133	102,623

i = > 50% of value imputed.

^a For companies located in the United States that performed or funded R&D.

^b Includes companies located inside and outside the United States, U.S. state government agencies and laboratories, foreign government agencies and laboratories, and all other organizations located inside and outside the United States.

NOTES: Detail may not add to total because of rounding. Excludes data for federally funded research and development centers. Business R&D and Innovation Survey does not include companies with fewer than five employees.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Business R&D and Innovation Survey.

TABLE 2. Funds spent for business R&D performed in the United States, by source of funds and selected industry: 2010 and 2011
(Millions of U.S. dollars)

Industry and NAICS code	All R&D	Paid for by the company	Paid for by others					
			Total	Federal	Companies		All other organizations ^b	
					Domestic	Foreign ^a		
2010								
All industries, 21–33, 42–81 ^c	278,977	221,706	57,271	34,199	i	11,013	11,015	1,044
Manufacturing industries, 31–33	196,712	159,579	37,133	26,739	i	3,655	6,375	364
Chemicals, 325	58,038	53,555	4,483	180		D	D	D
Pharmaceuticals and medicines, 3254	49,415	45,398	4,017	99		D	D	D
Other 325	8,623	8,157	466	81		D	D	D
Machinery, 333	9,955	9,384	571	98		176	282	15
Computer and electronic products, 334	59,875	51,223	8,652	5,935	i	911	1,767	39
Electrical equipment, appliance, and components, 335	3,321	3,141	180	84		D	D	D
Transportation equipment, 336	42,913	21,076	21,837	20,191	i	1,016	541	89
Motor vehicles, trailers, and parts, 3361–63	D	10,098	D	D		D	D	D
Aerospace products and parts, 3364	29,854	10,152	19,702	18,921	i	635	D	D
Other 336	D	826	D	D		D	D	D
Manufacturing nec, other 31–33	22,610	21,200	1,410	251		D	D	D
Nonmanufacturing industries, 21–23, 42–81	82,265	62,127	20,138	7,460		7,358	4,532	788
Information, 51	36,853	36,085	768	152		244	D	D
Software publishers, 5112	26,982	26,387	595	140		134	D	D
Other 51	9,871	9,698	173	12		110	D	D
Finance and insurance, 52	2,109	2,109	0	0		0	0	0
Professional, scientific, and technical services, 54	33,690	15,438	18,252	6,829		6,906	3,801	716
Computer systems design and related services, 5415	11,050	9,416	1,634	712		397	348	177
Scientific R&D services, 5417	12,140	2,851	11,968	3,279		5,344	3,144	201
Other 54	10,500	3,171	4,650	2,838		1,165	309	338
Nonmanufacturing nec, other 21–23, 42–81	9,613	8,495	1,118	479		208	D	D
2011								
All industries, 21–33, 42–81 ^c	294,093	238,768	55,324	31,309	i	11,124	12,007	884
Manufacturing industries, 31–33	201,361	163,340	38,021	24,698	i	4,196	8,870	257
Chemicals, 325	55,324	49,988	5,337	110		1,320	3,867	40
Pharmaceuticals and medicines, 3254	45,949	41,111	4,838	52		1,285	3,474	27
Other 325	9,375	8,877	499	58		35	393	13
Machinery, 333	14,709	13,578	1,131	522		423	D	D
Computer and electronic products, 334	62,704	53,664	9,040	5,161		1,087	2,726	66
Electrical equipment, appliance, and components, 335	3,595	3,417	178	76		24	74	4
Transportation equipment, 336	40,880	20,275	20,605	D	i	1,086	D	D
Motor vehicles, trailers, and parts, 3361–63	D	11,737	D	D		D	D	D
Aerospace products and parts, 3364	26,054	7,585	18,469	17,806	i	592	D	D
Other 336	D	D	D	D		D	D	D
Manufacturing nec, other 31–33	24,149	22,418	1,730	D		256	D	D
Nonmanufacturing industries, 21–23, 42–81	92,731	75,428	17,303	6,611		6,928	3,138	626
Information, 51	41,865	41,014	851	D		321	D	D
Software publishers, 5112	27,965	27,280	685	136		D	D	D
Other 51	13,900	13,734	166	D		D	D	D
Finance and insurance, 52	3,457	3,310	146	0		145	1	0
Professional, scientific, and technical services, 54	38,219	23,368	14,851	5,848		6,227	2,213	563
Computer systems design and related services, 5415	13,259	11,706	1,553	598		626	209	120
Scientific R&D services, 5417	15,301	6,170	9,131	3,226		3,834	1,833	238
Other 54	9,659	5,492	4,167	2,024		1,767	171	205
Nonmanufacturing nec, other 21–23, 42–81	9,190	7,736	1,455	D		235	D	D

D = suppressed to avoid disclosure of confidential information; i = > 50% of value imputed.

NAICS = North American Industry Classification System; nec = not elsewhere classified.

^a Includes foreign parent companies of U.S. subsidiaries.

^b Includes U.S. state government agencies and laboratories, foreign government agencies and laboratories, and all other organizations located inside and outside the United States.

^c Includes companies located in the United States that performed or funded R&D.

NOTES: Detail may not add to total because of rounding. Industry classification was based on dominant business code for domestic R&D performance where available. For companies that did not report business codes, classification used for sampling was assigned. Excludes data for federally funded research and development centers.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Business R&D and Innovation Survey.

92% of federal government R&D funding. Next among funders were foreign companies, including foreign parent companies of U.S. subsidiaries (\$12 billion) and other U.S. companies (\$11 billion) (table 2) (see “Survey Information and Data Availability” for information on industry classification).

Sales, R&D Intensity, and Employment of R&D Performers

U.S. companies that performed or funded R&D reported domestic net sales of \$9 trillion in 2011 (table 3).² For all industries, the R&D intensity (ratio of domestic R&D performance to domestic net sales) was 3.2%; for manufacturers, 3.9%; and for nonmanufacturers, 2.3%. Manufacturing industries with high levels of R&D intensity in 2011 were pharmaceuticals and medicines (NAICS 3254) (11.8%), aerospace products and parts (NAICS 3364) (11.3%), and computer and electronic products (NAICS 334) (9.9%). Among the nonmanufacturing industries, industries with high levels of R&D intensity were scientific R&D services (NAICS 5417) (24.4%), software publishers (NAICS 5112) (9.5%), and computer system design and related services (NAICS 5415) (7.8%).

Businesses that performed or funded R&D employed 19.3 million people in the United States during 2011. Some 1.5 million (7.6%) were R&D employees.³ Not surprisingly, manufacturing industries with high numbers of R&D employees in 2011 were computer and electronic products (NAICS 334) (258,000 R&D employees), pharmaceuticals and medicines (NAICS 3254) (107,000), and aerospace products and parts (NAICS 3364) (72,000).

TABLE 3. Sales and employment for companies that performed or funded business R&D, by selected industry and company size: 2011

Industry and NAICS code	Domestic net sales ^a (US\$millions)	R&D intensity ^b (%)	Domestic employment ^c (thousands)	
			Total	R&D ^d
All industries, 21–33, 42–81 ^e	9,107,507	3.2	19,285	1,471
Manufacturing industries, 31–33	5,135,539	3.9	9,998	865
Chemicals, 325	1,157,864	4.8	1,479	160
Pharmaceuticals and medicines, 3254	388,664	11.8	549	107
Other 325	769,200	1.2	930	53
Machinery, 333	392,078	3.8	1,029	88
Computer and electronic products, 334	633,006	9.9	1,408	258
Electrical equipment, appliance, and components, 335	107,583	3.3	347	29
Transportation equipment, 336	850,469	4.8	1,521	145
Motor vehicles, trailers, and parts, 3361–63	562,786	D	738	61
Aerospace products and parts, 3364	231,137	11.3	635	72
Other 336	56,546	D	148	12
Manufacturing nec, other 31–33	1,994,539	1.2	4,214	185
Nonmanufacturing industries, 21–23, 42–81	3,971,968	2.3	9,287	606
Information, 51	916,379	4.6	1,876	232
Software publishers, 5112	293,407	9.5	511	143
Other 51	622,972	2.2	1,365	89
Finance and insurance, 52	942,891	0.4	1,499	26
Professional, scientific, and technical services, 54	443,343	8.6	1,977	270
Computer systems design and related services, 5415	169,229	i	597	103
Scientific R&D services, 5417	62,620	24.4	196	73
Other 54	211,494	4.6	1,184	94
Nonmanufacturing nec, other 21–23, 42–81	1,669,355	0.6	3,935	78
Size of company (number of domestic employees)				
5–24	139,361	7.9	457	111
25–49	145,329	7.5	470	77
50–99	169,250	5.6	543	86
100–249	297,813	4.2	1,057	113
250–499	389,954	3.3	1,109	94
500–999	384,006	2.6	750	61
1,000–4,999	1,188,739	4.3	3,064	233
5,000–9,999	1,032,304	2.4	1,916	113
10,000–24,999	1,934,059	2.5	2,689	204
25,000 or more	3,426,693	3.0	7,231	379

D = suppressed to avoid disclosure of confidential information; i = > 50% of value imputed.

NAICS = North American Industry Classification System; nec = not elsewhere classified.

^a Includes domestic net sales of companies that perform or fund R&D, transfers to foreign subsidiaries, and export sales to foreign companies; excludes intracompany transfers and sales by foreign subsidiaries.

^b R&D intensity = domestic R&D performance/domestic net sales.

^c Data recorded on 12 March represent employment figures for the year.

^d Includes scientists and engineers and their managers, as well as technicians, technologists, and support staff.

^e Includes companies located in the United States that performed or funded R&D.

NOTES: Detail may not add to total because of rounding. Industry classification was based on dominant business code for domestic R&D performance where available. For companies that did not report business codes, classification used for sampling was assigned. Excludes data for federally funded research and development centers. Business R&D and Innovation Survey does not include companies with fewer than five employees.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Business R&D and Innovation Survey, 2011.

Nonmanufacturing industries with high numbers of R&D employees were software publishers (NAICS 5112) (143,000), computer systems design and related services (NAICS 5415) (103,000), and scientific R&D services (NAICS 5417) (73,000) (table 3).

R&D Performance by State

During 2011, companies reported \$239 billion of domestic R&D paid for by the

company. Businesses in California alone accounted for 26.8% of this amount in 2011 (table 4). Other states with large amounts of company-funded business R&D, as reflected by the percentages of the national total they accounted for in 2011, were Connecticut (2.6%), Illinois (4.5%), Massachusetts (5.3%), Michigan (5.1%), New Jersey (5.0%), New York (3.8%), Pennsylvania (3.8%), Texas (5.4%), and Washington (5.7%).

R&D Performance by Company Size

Small companies (5 to 499 domestic employees) performed 19% of the nation's total business R&D in 2011. In these companies, the R&D intensity was 5.0%, compared with 3.0% for all other companies (tables 1 and 3). Small companies accounted for 13% of sales and employed 19% of those who worked for R&D-performing or R&D-

TABLE 4. Funds spent for business R&D performed in the United States, by source of funds and state: 2011
(Millions of U.S. dollars)

State	All R&D	Paid for by the company	Paid for by others	State	All R&D	Paid for by the company	Paid for by others
United States ^a	294,093	238,768	55,324	Montana	136	118	18 e
Alabama	1,879	835	1,045	Nebraska	636	601	35
Alaska	84 e	52 e	33	Nevada	638	554	85
Arizona	4,931	3,776	1,155	New Hampshire	2,069	943	1,126
Arkansas	344	307	38	New Jersey	13,930	11,977	1,952
California	75,035	64,104	10,931	New Mexico	472	250	223
Colorado	4,310	3,642	668	New York	12,072	9,141	2,931
Connecticut	7,504	6,272	1,232	North Carolina	6,193	5,157	1,036
Delaware	2,097	1,453	643	North Dakota	261	236	25
District of Columbia	415	162 e	253 i	Ohio	6,993	5,403	1,590
Florida	5,988	3,855	2,133 i	Oklahoma	604	507	97 i
Georgia	3,839	3,303	536	Oregon	4,631	4,415	216
Hawaii	252	183	69	Pennsylvania	9,718	9,018	700
Idaho	1,171	871	301	Rhode Island	542	451	91
Illinois	12,038	10,764	1,275	South Carolina	1,399	949	450 i
Indiana	6,158	5,484	674 i	South Dakota	136	112	24
Iowa	2,314	1,736	578	Tennessee	1,434	1,279	155
Kansas	1,509	1,037	472	Texas	15,309	12,920	2,388
Kentucky	1,278	1,017	261	Utah	2,438	1,874	565
Louisiana	459	382	77 i	Vermont	374 i	329 i	44
Maine	295	264	31	Virginia	5,562	3,138	2,424 i
Maryland	5,101	2,867	2,235	Washington	14,558	13,659	899 i
Massachusetts	15,722	12,712	3,010	West Virginia	247	213	35
Michigan	13,660	12,156	1,504	Wisconsin	4,053	3,548	505 i
Minnesota	6,174	5,592	582	Wyoming	46 e	33 e	13
Mississippi	235	189	46	Undistributed funds ^b	D	6,111	D
Missouri	D	2,818	D				

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

^a Includes companies located in the United States that performed or funded R&D.

^b Includes data reported on Form BRDI-1 not allocated to a specific state. Data reported on Form BRDI-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, National Center for Science and Engineering Statistics, Business R&D and Innovation Survey, 2011.

funding companies. Of the 1.5 million R&D employees engaged in business R&D in the United States, 33% worked for small companies. By contrast, mid-size companies (those with 500 to 24,999 domestic employees) performed 46% of the nation's total business R&D in 2011, and their R&D intensity was 3.0%. They accounted for 50% of sales and employed 44% of those who worked for R&D-performing or R&D-funding companies, including 42% of R&D employees in the United States. The largest companies (25,000 or more domestic employees) performed 35% of the nation's total business R&D in 2011, and their R&D intensity was 3.0%. The largest companies employed 37% of those who worked for R&D-performing or R&D-funding companies, including 26% of R&D employees in the United States.

Survey Information and Data Availability

The sample for BRDIS was selected to represent all for-profit, nonfarm companies that have five or more domestic employees, that are publicly or privately held, and that perform or fund R&D or engage in innovative activities in the United States. Because the statistics from the survey are based on a sample, they are subject to both sampling and nonsampling errors (see technical notes in the annual reports at <http://www.nsf.gov/statistics/industry/>).

In this InfoBrief, money amounts are expressed in current U.S. dollars and are not adjusted for inflation. *Company* is defined as a business organization located in the United States, either U.S.-owned or a U.S. affiliate of a foreign parent, of one or more establishments under common ownership or control that performs or funds R&D.

For 2010, a total of 42,965 companies were sampled, representing 2,013,448 companies; for 2011, a total of 43,108 companies were sampled, representing 1,964,799 companies. The actual numbers of companies in the sample that remained within the scope of the survey between sample selection and tabulation were 39,968 for 2010 and 39,624 for 2011. These lower counts represent the number of companies that were determined to be within the scope of the survey after all data collected were processed. Reasons for the reduced counts include mergers, acquisitions, and instances where companies had gone out of business in the interim. Of these in-scope companies, 71.4% were considered to have met the criteria for a complete response to the 2010 survey; 69.2% met the 2011 survey response criteria. Industry classification was based on the dominant business activity for domestic R&D performance where available. For reporting units that did not report business activity codes for R&D, the classification used for sampling was assigned.

The full set of detailed tables from this survey will be available in the report *Business R&D and Innovation: 2011*, at <http://www.nsf.gov/statistics/industry/>. Individual detailed tables and tables with relative standard errors and imputation rates from the 2011 survey may be available in advance of the full report. For further information, contact the author.

Notes

1. Raymond M. Wolfe, Research and Development Statistics Program, National Center for Science and Engineering Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 (rwolfe@nsf.gov; 703-292-7789).
2. Determining the amount of *domestic net sales and operating revenues* was left to the reporting company, however guidance was given to exclude intra-company transfers and sales by foreign subsidiaries but include transfers to foreign subsidiaries and export sales to foreign companies.
3. Employment statistics in this InfoBrief are head counts. Full-time equivalent statistics are available in the detailed statistical tables. R&D employees include scientists and engineers and their managers, technicians, technologists, and support staff members who work on R&D or who provide direct support to R&D activities.

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