



Business R&D Performance Remained Virtually Unchanged in 2010

by Raymond M. Wolfe¹

Companies spent \$279 billion on research and development performed in the United States during 2010, an amount that was essentially unchanged from the \$282 billion spent during 2009 (table 1).² Funding from the companies' own sources was \$225 billion during 2009 and \$222 billion during 2010; funding from other sources was \$57 billion in both years (table 2).³ 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 the Census Bureau.

R&D Performance by Industrial Sector and Source of Funding

During 2010, companies in manufacturing industries performed \$197 billion of domestic R&D (70.5% of total domestic R&D performance) (table 2).⁴ Most of the funding was from companies' own funds (81.1%). Companies in nonmanufacturing industries performed \$82 billion of domestic R&D (29.5% of total domestic R&D performance), 75.5% of which was paid for from companies' own funds. The U.S. federal government

TABLE 1. Funds spent for business R&D performed in the United States, by source of funds and size of company: 2008–10

(Millions of U.S. dollars)

Selected characteristic	2008	2009	2010
Domestic R&D performance ^a	290,680	282,393	278,977
Source of funds			
Paid for by the company	232,505	224,920	221,706
Paid for by others	58,176	57,473	57,271
Federal	36,360	39,573	34,199
Other ^b	21,816	17,900	23,072
Size of company (number of domestic employees)			
5–24 ^c	14,280	11,794	12,573
25–49	9,626	9,692	8,625
50–99	9,351	13,282	8,855
100–249	14,662	12,747	11,866
250–499	10,219	11,204	10,283
500–999	11,886	10,119	10,117
1,000–4,999	46,336	44,008	48,228
5,000–9,999	24,764	21,864	27,463
10,000–24,999	48,737	51,037	41,835
25,000 or more	100,820	96,645	99,133

^a For companies that reported worldwide R&D expense or worldwide R&D costs funded by others; see "Survey Information and Data Availability" for more information.

^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.

^c After the 2008 Business R&D and Innovation Survey sample was selected and surveyed, an error was identified that resulted in the exclusion of 226,884 single-establishment companies with five paid employees from the sample frame. Most of the excluded establishments were classified in industries with low R&D intensities, such as construction, retail trade, and the service sectors. Based on the available information for these small single-establishment companies, their contribution to the 2008 R&D estimates is estimated to be negligible.

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: 2009 and 2010

(Millions of U.S. dollars)

Industry and NAICS code	All R&D	Paid for by the company	Paid for by others				
			Total	Companies		All other organizations ^b	
				Federal	Domestic		Foreign ^a
2009							
All industries, 21–33, 42–81 ^c	282,393	224,920	57,473	39,573	9,567	7,647	685
Manufacturing industries, 31–33	195,144	158,225	36,920	28,825	3,345	4,532	218
Chemicals, 325	53,328	49,876	3,452	207	1,263	1,961	D
Pharmaceuticals and medicines, 3254	44,936	41,751	3,185	113	1,247	1,813	11
Other 325	8,392	8,125	267	94	16	148	D
Machinery, 333	9,138	8,782	356	150	133	67	D
Computer and electronic products, 334	56,436	48,865	7,571	5,210	738	1,578	D
Electrical equipment, appliance, and components, 335	3,334	3,105	228	70	55	66	D
Transportation equipment, 336	48,337	24,223	24,114	23,023	757	251	D
Automobiles, trailers, and parts, 3361–63	D	10,853	D	D	D	D	D
Aerospace products and parts, 3364	34,554	12,384	22,170	21,524	596	D	D
Other 336	D	986	D	D	D	D	D
Manufacturing nec, other 31–33	24,570	23,374	1,199	165	399	609	D
Nonmanufacturing industries, 21–23, 42–81	87,248	66,695	20,553	10,749	6,223	3,115	467
Information, 51	33,806	32,995	811	194	349	233	34
Software publishers, 5112	26,395	25,729	666	176	267	191	32
Other 51	7,411	7,266	145	18	82	42	2
Finance and insurance, 52	1,912	1,904	8	1	6	0	0
Professional, scientific, and technical services, 54	44,946	26,031	18,915	10,461	5,531	2,505	168
Computer systems design and related services, 5415	12,560	10,742	1,818	1,240	449	122	7
Scientific R&D services, 5417	17,270	7,981	9,289	2,657	4,397	2,110	125
Other 54	15,116	7,308	7,808	6,564	685	273	36
Nonmanufacturing nec, other 21–23, 42–81	6,584	5,765	819	93	337	377	265
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 i	20,191 i	1,016	541	89
Automobiles, trailers, and parts, 3361–63	D	10,098	D	D	D	D	D
Aerospace products and parts, 3364	29,854	10,152	19,702 i	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

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 owners of foreign-owned companies.

^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 that reported worldwide R&D expense or worldwide R&D costs funded by others; see "Survey Information and Data Availability" for more information.

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.

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 \$57 billion paid for by others, the federal government contributed \$34 billion. Most of the funds (\$29 billion) came from the Department of Defense.⁵ Aerospace products and parts (North American Industry Classification System [NAICS] 3364) and professional, scientific, and technical services (NAICS 54) received about three-quarters of federal government R&D funding. Next among funders were other U.S. for-profit companies (\$11 billion) and foreign companies (\$11 billion), including foreign parents of U.S. subsidiaries (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 and operating revenues of \$9 trillion in 2010 (table 3).⁶ For all industries, the R&D intensity (ratio of domestic R&D performance to domestic net sales) was 3.2%; for manufacturers, 4.1%; and for nonmanufacturers, 2.1%. Manufacturing industries with high R&D intensity in 2010 were pharmaceuticals and medicines (NAICS 3254), 12.7%, and aerospace products and parts (NAICS 3364), 9.7%. Among the nonmanufacturing industries, two with high ratios were scientific R&D services (NAICS 5417), 14.2%, and software publishers (NAICS 5112), 9.7%.

Businesses that performed or funded R&D employed 18.6 million people in the United States during 2010. Some 1.4 million (7.6%) were R&D employees.⁷

TABLE 3. Sales and employment for companies that performed or funded business R&D, by selected industry and company size: 2010

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	8,818,081	3.2	18,638	1,412
Manufacturing industries, 31–33	4,845,584	4.1	10,260	849
Chemicals, 325	1,017,360	5.7	1,439	169
Pharmaceuticals and medicines, 3254	387,932	12.7	538	120
Other 325	629,428	1.4	901	49
Machinery, 333	257,089	3.9	800	65
Computer and electronic products, 334	623,950	9.6	1,393	266
Electrical equipment, appliance, and components, 335	111,576	3.0	351	29
Transportation equipment, 336	913,573	4.7	1,670	155
Motor vehicles, trailers, and parts, 3361–63	548,168	D	709	50
Aerospace products and parts, 3364	307,624	9.7	766	81
Other 336	57,781	D	195	24
Manufacturing nec, other 31–33	1,922,036	1.2	4,607	165
Nonmanufacturing industries, 21–23, 42–81	3,972,497	2.1	8,378	563
Information, 51	802,714	4.6	1,770	208
Software publishers, 5112	269,454	9.7	509	141
Other 51	533,260	2.0	1,261	67
Finance and insurance, 52	1,323,538	0.2	1,490	16
Professional, scientific, and technical services, 54	485,847	6.9	1,564	260
Computer systems design and related services, 5415	179,010 i	6.2 i	434	114
Scientific R&D services, 5417	104,267	14.2	209	80
Other 54	202,570	3.9	921	66
Nonmanufacturing nec, other 21–23, 42–81	1,360,398	0.7	3,554	79
Size of company (number of domestic employees)				
5–24	99,210	12.7	450	115
25–49	125,774	6.9	506	75
50–99	147,427	6.0	561	79
100–249	288,005	4.1	1,020	102
250–499	330,500	3.1	732	70
500–999	317,704	3.2	745	58
1,000–4,999	1,195,200	4.0	2,628	217
5,000–9,999	1,345,492	2.0	1,651	130
10,000–24,999	1,666,206	2.5	2,555	176
25,000 or more	3,302,562	3.0	7,788	390

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

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

^a Excludes intracompany transfers and sales by foreign subsidiaries but includes transfers to foreign subsidiaries and export sales to foreign companies.

^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 that reported worldwide R&D expense or worldwide R&D costs funded by others; see “Survey Information and Data Availability” for more information.

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, 2010.

Not surprisingly, two manufacturing industries with high numbers of R&D employees in 2010 were pharmaceuticals and medicines (120,000 R&D employees) and aerospace products and parts (81,000 R&D employees), and two nonmanufacturing industries with high numbers of R&D employees were software publishers (141,000) and computer

systems design and related services (114,000) (table 3).

R&D Performance by State

During 2010, companies reported \$222 billion of domestic R&D paid for by the company. Businesses in California alone accounted for 24.1% of the nation's business R&D in 2010 (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 2010, were New Jersey (6.3%), Washington (5.9%), Texas (5.3%), Illinois (5.2%), Massachusetts (5.0%), Michigan (4.8%), Pennsylvania (3.8%), New York (3.7%), and Minnesota (2.6%).

TABLE 4. Funds spent for business R&D performed in the United States, by source of funds and state: 2010
(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	278,977	221,706	57,271	Montana	145	123	22 i
Alabama	1,449	628	821	Nebraska	527	491	36 e
Alaska	74	D	D	Nevada	709	646	63
Arizona	4,054	2,841	1,213 i	New Hampshire	1,818	841	977
Arkansas	276	245	31 e	New Jersey	15,925	13,916	2,009
California	64,914	53,327	11,587	New Mexico	546	231	315 i
Colorado	3,899	3,270	629	New York	10,954	8,126	2,828
Connecticut	6,498	5,482	1,017	North Carolina	5,749	4,688	1,060
Delaware	2,144	D	D	North Dakota	236	211	25
District of Columbia	235	84 e	151	Ohio	6,857	5,134	1,723
Florida	5,127	3,045	2,083	Oklahoma	478	422	57 e
Georgia	3,644	2,931	713 i	Oregon	4,396	4,188	208
Hawaii	257	173	84	Pennsylvania	9,246	8,412	834
Idaho	1,120 i	810 i	309	Rhode Island	531	448	82
Illinois	12,221	11,500	721	South Carolina	1,316	944	372 i
Indiana	4,985	4,219	766	South Dakota	120	99	21
Iowa	1,950	1,516	433	Tennessee	1,244	1,113	131
Kansas	1,492	1,039	454	Texas	14,384	11,850	2,535
Kentucky	889	820	69	Utah	2,066	1,419	647
Louisiana	428	340	88	Vermont	313	278	35
Maine	251	228	24	Virginia	4,655	2,340	2,315 i
Maryland	4,384	2,538	1,847	Washington	13,545	13,022	523
Massachusetts	14,020	11,139	2,882	West Virginia	240	191	49
Michigan	12,144	10,750	1,394	Wisconsin	3,927	3,399	528
Minnesota	6,246	5,677	569	Wyoming	39 e	32 e	7 e
Mississippi	243	170	73	Undistributed funds ^b	17,960	12,534	5,426
Missouri	8,106 i	D	D				

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

^a Includes companies that reported worldwide R&D expense or worldwide R&D costs funded by others; see "Survey Information and Data Availability" for more information.

^b Includes data reported on Form BRDI-1 not allocated to a specific state. Data reported on Forms BRDI-1A and BRDI-1B, the questionnaires 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, 2010.

R&D Performance by Company Size

Small companies (5 to 499 domestic employees⁸) performed 18.7% of the nation's total business R&D in 2010. In these companies, the R&D intensity was 5.3%, compared with 3.2% for all companies (tables 1 and 3). Small companies accounted for 11.2% of sales and employed 17.5% of those who worked for R&D-performing or R&D-funding companies. Of the 1.4 million R&D employees engaged in business R&D in the United States, 31.2% worked for small companies. By contrast, the largest companies (25,000 or more domestic employees) accounted for 37.5% of sales and performed 35.5% of the nation's total business R&D in 2010, and their R&D intensity was 3.0%. The largest companies employed 41.8% of those who worked for R&D-performing or R&D-funding companies, including 27.6% of the U.S. R&D employees.

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/>).

For 2009, a total of 43,022 companies, representing 2,090,201 companies in the population, were selected for the sample; for 2010, a total of 42,965 companies were sampled, representing 2,013,448 companies. The actual numbers of companies that remained within the scope of the survey between sample selection and tabulation were 40,300 for 2009 and 39,968 for 2010. 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, 73.1% were considered to have met the criteria for a complete response to the 2009 survey; 71.4% met the 2010 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.

Detailed information about the BRDIS samples and methodology and comparisons with its predecessor, the Survey of Industrial Research and Development, are available at <http://www.nsf.gov/statistics/srvyindustry/>. Previously published InfoBriefs on topics covered by BRDIS are available at <http://www.nsf.gov/statistics/industry/>, and the full set of detailed statistical tables from the 2010 cycle of BRDIS will be available there in the report *Business R&D and Innovation: 2008–10*. Individual detailed tables, relative standard errors, and imputation rates from the 2010 survey may be available in advance of the full report. For further information, please contact the author.

BRDIS microdata can be accessed only at the secure Research Data Centers administered by the Center for Economic Studies at the Census Bureau. To learn more about the Research Data Centers and how to apply for data use, please visit <http://www.census.gov/ces/main/contact.html>.

Notes

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neering Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 (rwolfe@nsf.gov; 703-292-7789).

2. *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. Money amounts in this InfoBrief are expressed in current U.S. dollars and are not adjusted for inflation. For information about BRDIS, see NRC 2005, NSB 2012, and NSF/SRS 2008.

3. The 2008 and 2009 figures in this InfoBrief were released earlier—see NSF/NCSES 2012. The 2010 figures are the initial release of the final statistics from the latest cycle of BRDIS and are the focus of the remainder of this InfoBrief. More detailed final statistics from the 2010 cycle will be available in *Business R&D and Innovation: 2008–10* and in forthcoming InfoBriefs.

4. Throughout the text and tables in this InfoBrief, *domestic R&D* refers to business R&D performed in the 50 United States and Washington, D.C.

5. Statistics by U.S. federal government agency are from the full set of detailed statistical tables. For further information, please contact the author.

6. 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.

7. 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.

8. BRDIS does not include companies with fewer than five domestic employees. Preliminary work is underway on a new survey, the Micro-business Innovation Science and Technology Survey, that will include companies with fewer than five employees.

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