



National Center for Science and
Engineering Statistics

InfoBrief

Businesses Reported an 11.8% Increase to Nearly a Half Trillion Dollars for U.S. R&D Performance During 2019

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Businesses spent \$493 billion on research and development performance in the United States in 2019, an 11.8% increase from 2018 ([table 1](#)). Funding from the companies' own sources was \$429 billion in 2019, a 13.5% increase from 2018. Funding from other sources was \$64 billion, about the same as in 2018. This is the second year that there has been double-digit annual growth in the level of national domestic R&D performance,¹ which is especially notable because of the low rate of inflation during the period 2017–19. This robust rate of growth may continue based on the large increase in the amount that companies projected they would spend from their own funds for domestic R&D performance during 2020 despite the COVID-19 pandemic.² Data for this InfoBrief are from the 2019 Business Enterprise Research and Development Survey (BERD), developed and cosponsored by the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF) and by the U.S. Census Bureau, which collected and tabulated data for the survey.³

R&D Performance, by Type of R&D, Industry Sector, and Source of Funding

In 2019, of the \$493 billion that companies spent on R&D, \$32 billion (7%) was spent on basic research, \$74 billion (15%) on applied research, and \$387 billion (78%) on development. The distribution was similar to the 2018 distribution (7%, 15%, and 79%, respectively) ([table 1](#)). In 2019, companies in manufacturing industries performed \$286 billion (58%) of *domestic R&D*, defined as R&D performed in the 50 states and Washington, DC ([table 2](#)). Most of the funding came from these companies' own funds (87%). Companies in nonmanufacturing industries performed \$207 billion of domestic R&D (42% of total domestic R&D performance), 87% of which was paid for from companies' own funds.

The U.S. federal government was a large source of *external funding for R&D* (also referred to as *R&D paid for by others*) across all industries. Of the \$64 billion paid for by others, the federal government accounted for \$22 billion, most of which came from the Department of Defense (\$15 billion). (Data are available in the full set of data tables.) Ninety-one percent of federal government funding went toward aerospace products and parts (North American Industry Classification System [NAICS] code 3364) (\$8 billion), computer and electronic products (NAICS 334) (\$6 billion), and professional, scientific,

and technical services (NAICS 54) (\$6 billion). Other large sources of external funding were other U.S. companies (\$21 billion) and foreign companies—including foreign parent companies of U.S. subsidiaries (\$20 billion). The distribution of this external nonfederal R&D funding was spread more broadly across multiple industries ([table 2](#)). (See “[Survey Information and Data Availability](#)” for information on the availability of data tables with full industry detail.)

Table 1**Funds spent for business R&D performed in the United States, by type of R&D, source of funds, and size of company: 2017–19**

(Millions of dollars)

Selected characteristic and company size	2017	2018	2019
Domestic R&D performance ^a	400,100	441,036	492,956
Type of R&D ^b			
Basic research	24,829	28,980	32,239
Applied research	62,132	65,222	74,031
Development	313,139	346,834	386,686
Paid for by the company ^c	339,036	377,806	428,968
Basic research	18,732	22,312	25,916
Applied research	49,149	53,229	59,697
Development	271,155	302,264	343,355
Paid for by others	61,065	63,230	63,989
Basic research	6,097	6,668	6,324
Applied research	12,984	11,993	14,333
Development	41,984	44,570	43,332
Source of funds			
Federal	24,277	i 24,685	21,941
Other ^d	36,788	38,545	42,048
Size of company (number of domestic employees)			
Small companies ^e			
10–19	3,311	4,390	5,501
20–49	9,435	11,252	12,418
Medium companies			
50–99	10,141	12,321	14,021
100–249	17,216	18,547	19,793
Large companies			
250–499	14,103	19,645	18,883
500–999	17,871	17,657	23,969
1,000–4,999	65,112	68,578	75,671
5,000–9,999	40,198	45,337	50,811
10,000–24,999	73,485	84,420	88,263
25,000 or more	149,227	158,889	183,626

i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

^a Domestic R&D performance is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by the respondent company.

^b R&D comprises creative and systematic work undertaken in order to increase the stock of knowledge and to devise new applications of available knowledge. This includes (1) activities aimed at acquiring new knowledge or understanding without specific immediate commercial applications or uses (basic research), (2) activities aimed at solving a specific problem or meeting a specific commercial objective (applied research), and (3) systematic work, drawing on research and practical experience and resulting in additional knowledge, which is directed to producing new processes or to improving existing products—goods or services—or processes (development).

^c Includes foreign subsidiaries of U.S. companies.

^d Includes companies located inside and outside the United States; U.S. state government agencies and laboratories; U.S. universities, colleges, and academic researchers; and all other organizations located inside and outside the United States.

^e Includes only companies with 10 or more domestic employees.

Note(s):

Detail may not add to total because of rounding. Beginning in survey year 2018, companies that performed or funded less than \$50,000 of R&D were excluded from tabulation. These companies in aggregate represented a very small share of total R&D expenditures in prior years. Had the companies under this threshold been included in the 2018 estimates, they would have contributed approximately \$90 million to overall R&D expenditures. Excludes data for federally funded research and development centers.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

Table 2**Funds spent for business R&D performed in the United States, by source of funds, selected industry, and company size: 2019**

(Millions of dollars)

Industry, NAICS code, and company size	All R&D ^a	Paid for by the company ^b	Paid for by others					All other organizations ^d
			Total	Federal	Companies		All other organizations ^d	
					Domestic	Foreign ^c		
All industries, 21–33, 42–81	492,956	428,968	63,989	21,941	21,461	19,554	1,033	
Manufacturing industries, 31–33	285,674	248,109	37,564	16,023	5,470	15,749	322	
Chemicals, 325	97,063	87,288	9,775	289	1,967	7,459	60	
Pharmaceuticals and medicines, 3254	87,619	78,652	8,966	269	1,938	6,707	52	
Other 325	9,444	8,636	809	20	29	752	8	
Machinery, 333	15,184	13,930	1,254	193	371	689	1	
Computer and electronic products, 334	86,729	75,570	11,159	5,802	1,679	3,604	74	
Electrical equipment, appliance, and components, 335	5,263	4,886	377	27	30	317	3	
Transportation equipment, 336	45,375	31,505	13,870	9,652	1,031	3,020	167	
Motor vehicles, bodies, trailers, and parts, 3361–63	24,117	20,883	3,233	38-481	0-374	2,754	D	
Aerospace products and parts, 3364	18,358	8,900	9,458	8,454	658	176-257	D	
Other 336	2,900	1,722	1,179	D	D	D	D	
Manufacturing nec, other 31–33	36,060	34,930	1,129	60	392	660	17	
Nonmanufacturing industries, 21–23, 42–81	207,283	180,858	26,425	5,918	15,991	3,805	711	
Information, 51	110,227	109,062	1,165	185	81	860	39	
Software publishers, 5112	32,958	32,386	572	57	4	476	35	
Other 51	77,269	76,676	593	128	77	384	4	
Finance and insurance, 52	8,917	8,890	28	0	28	0	0	
Professional, scientific, and technical services, 54	53,233	29,131	24,103	5,685	15,076	2,674	668	
Computer systems design and related services, 5415	21,046	18,395	2,651	454	489	1,503	205	
Scientific research and development services, 5417	21,669	3,265	18,403	3,343	13,741	1,002	317	
Other 54	10,518	7,471	3,049	1,888	846	169	146	
Nonmanufacturing nec, Other 21–23, 42–81	34,906	33,775	1,129	48	806	271	4	
Size of company (number of domestic employees)								
Small companies ^e								
10–19	5,501	4,432	1,070	502	315	141	112	
20–49	12,418	10,040	2,378	811	766	660	141	
Medium companies								
50–99	14,021	11,492	2,529	697	796	784	252	
100–249	19,793	16,520	3,274	988	1,029	1,147	110	
Large companies								
250–499	18,883	15,356	3,527	1,393	623	1,405	106	
500–999	23,969	21,549	2,420	248	566	1,592	14	
1,000–4,999	75,671	64,475	11,196	1,710	1,924	7,500	62	

Table 2**Funds spent for business R&D performed in the United States, by source of funds, selected industry, and company size: 2019**

(Millions of dollars)

Industry, NAICS code, and company size	All R&D ^a	Paid for by the company ^b	Paid for by others					
			Total	Federal	Companies		All other organizations ^d	
					Domestic	Foreign ^c		
5,000–9,999	50,811	44,728	6,083	977	3,908	i 1,141	57	
10,000–24,999	88,263	74,385	13,878	i 1,717	i 7,183	i 4,918	60	
25,000 or more	183,626	165,991	17,635	12,897	i 4,352	268	118	

D = suppressed to avoid disclosure of confidential information; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

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

^a All R&D is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by the respondent company.

^b Includes foreign subsidiaries of U.S. companies (\$27.1 billion).

^c Includes foreign parent companies of U.S. subsidiaries (\$17.6 billion) and unaffiliated companies (\$2.0 billion). Excludes funds from foreign subsidiaries to U.S. companies paid for through intercompany transactions (\$27.1 billion).

^d Includes U.S. state government agencies and laboratories (< \$0.2 billion); U.S. universities, colleges, and academic researchers (\$0.05 billion); and all other organizations located inside (< \$0.8 billion) and outside the United States (< \$0.05 billion).

^e Includes only companies with 10 or more domestic employees.

Note(s):

Detail may not add to total because of rounding. Beginning in survey year 2018, companies that performed or funded less than \$50,000 of R&D were excluded from tabulation. These companies in aggregate represented a very small share of total R&D expenditures in prior years. Had the companies under this threshold been included in the 2018 estimates, they would have contributed approximately \$90 million to overall R&D expenditures. Industry classification was based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Excludes data for federally funded research and development centers. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

Sales, R&D Intensity, and Employment of Companies That Performed or Funded R&D

U.S. companies that performed or funded R&D reported domestic net sales of \$11 trillion in 2019 (table 3).⁴ For all industries, the R&D intensity was 4.4%; for manufacturers, 5.0%; and for nonmanufacturers, 3.8%. Manufacturing industries with high levels of R&D intensity in 2019 were pharmaceuticals and medicines (NAICS 3254) (16.3%), computer and electronic products (NAICS 334) (12.8%), and aerospace products and parts (NAICS 3364) (6.5%). Among the nonmanufacturing industries, industries with high levels of R&D intensity were scientific research and development services (NAICS 5417) (26.7%), software publishers (NAICS 5112) (17.7%), and computer systems design and related services (NAICS 5415) (10.7%).

Table 3**Sales, R&D, R&D intensity, and employment for companies that performed or funded business R&D in the United States, by selected industry and company size: 2019**

(Millions of dollars, percent R&D intensity, and thousands of employees)

Industry, NAICS code, and company size	Domestic net sales (\$millions) ^a	All R&D (\$millions) ^b	R&D intensity (%) ^c	Domestic employment (thousands) ^d	
				Total	R&D ^e
All industries, 21–33, 42–81	11,180,864	492,956	4.4	21,213	1,832
Manufacturing industries, 31–33	5,675,165	285,674	5.0	10,100	962
Chemicals, 325	1,161,526	97,063	8.4	1,451	186
Pharmaceuticals and medicines, 3254	536,020	87,619	16.3	648	139
Other 325	625,506	9,444	1.5	803	47
Machinery, 333	363,337	15,184	4.2	869	95
Computer and electronic products, 334	678,010	86,729	12.8	1,167	264
Electrical equipment, appliance, and components, 335	142,538	5,263	3.7	319	25
Transportation equipment, 336	1,164,905	45,375	3.9	1,835	183
Motor vehicles, bodies, trailers, and parts, 3361–63	805,202	24,117	3.0	1,040	108
Aerospace products and parts, 3364	280,327	18,358	6.5	612	61
Other 336	79,376	2,900	3.6	183	14
Manufacturing nec, other 31–33	2,164,849	36,060	1.7	4,459	209
Nonmanufacturing industries, 21–23, 42–81	5,505,700	207,283	3.8	11,113	870
Information, 51	1,435,124	110,227	7.7	2,107	359
Software publishers, 5112	186,003	32,958	17.7	355	109
Other 51	1,249,121	77,269	6.2	1,752	250
Finance and insurance, 52	1,568,443	8,917	0.6	1,795	54
Professional, scientific, and technical services, 54	486,234	53,233	10.9	1,421	299
Computer systems design and related services, 5415	197,389	21,046	10.7	482	99
Scientific research and development services, 5417	81,094	21,669	26.7	300	98
Other 54	207,751	10,518	5.0	639	102
Nonmanufacturing nec, other 21–23, 42–81	2,015,899	34,906	1.7	5,790	158
Size of company (number of domestic employees)					
Small companies ^f					
10–19	22,272	5,501	24.7	79	35
20–49	108,914	12,418	11.4	257	83
Medium companies					
50–99	120,557	14,021	11.6	356	85
100–249	267,171	19,793	7.4	719	127
Large companies					
250–499	300,032	18,883	6.3	760	105
500–999	371,248	23,969	6.5	859	100
1,000–4,999	1,475,601	75,671	5.1	2,854	305
5,000–9,999	1,141,851	50,811	4.4	1,677	182
10,000–24,999	2,115,325	88,263	4.2	3,518	267
25,000 or more	5,257,895	183,626	3.5	10,135	542

i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

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

^a Dollar values are for goods sold or services rendered by R&D-performing or R&D-funding companies located in the United States to customers outside of the company, including the U.S. federal government, foreign customers, and the company's foreign subsidiaries. Included are revenues from a company's foreign operations and subsidiaries and from discontinued operations. If a respondent company is owned by a foreign parent company, sales to the parent company and to affiliates not owned by the respondent company are included. Excluded are intracompany transfers, returns, allowances, freight charges, and excise, sales, and other revenue-based taxes.

^b All R&D is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by

the respondent company.

^c R&D intensity is the cost of domestic R&D paid for by the respondent company and others outside of the company and performed by the company divided by domestic net sales of companies that performed or funded R&D.

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

^e Includes researchers, R&D managers, technicians, clerical staff, and others assigned to R&D groups.

^f Includes only companies with 10 or more domestic employees.

Note(s):

Detail may not add to total because of rounding. Beginning in survey year 2018, companies that performed or funded less than \$50,000 of R&D were excluded from tabulation. These companies in aggregate represented a very small share of total R&D expenditures in prior years. Had the companies under this threshold been included in the 2018 estimates, they would have contributed approximately \$90 million to overall R&D expenditures. Estimates of aggregate sales and total domestic employment would have been similarly affected. Industry classification was based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Excludes data for federally funded research and development centers.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

Businesses that performed or funded R&D employed 21.2 million people in the United States in 2019 (table 3).

Approximately 1.8 million (9%) were business R&D employees. Not surprisingly, industries with high levels of R&D intensity also had high numbers of R&D employees: computer and electronic products (NAICS 334) (264,000 R&D employees), pharmaceuticals and medicines (NAICS 3254) (139,000), and aerospace products and parts (NAICS 3364) (61,000). Nonmanufacturing industry groups with high numbers of R&D employees were software publishers (NAICS 5112) (109,000 R&D employees), and computer systems design and related services (NAICS 5415) (99,000), and scientific R&D services (NAICS 5417) (98,000).

Of the 1.8 million people working on R&D in companies that performed or funded business R&D in 2019, 1.3 million were men, and 0.5 million were women; 54% of the men and 49% of the women worked in manufacturing industries (table 4). Researchers—that is, scientists, engineers, and their managers—accounted for 1.2 million of the 1.8 million R&D workers (67%), and 130,000 (11%) of these held PhD degrees. R&D technicians numbered 426,000, and there were 174,000 grouped as other supporting staff.

Table 4

Domestic employment, R&D employment by sex and work activity, R&D researchers by level of education, and full-time equivalent researcher employment for companies that performed or funded business R&D in the United States, by industrial sector: 2019

(Thousands of employees)

Industry and NAICS code	Domestic employment ^a	R&D employment									
		Total	Male	Female	Researchers ^b		Technicians and equivalent staff	Other supporting staff ^c	Full-time equivalent ^d		
					Total	With PhD			Total	Researchers ^b	
All industries, 21–33, 42–81	21,213	1,832	1,344	488	1,232	130	426	174	1,677	1,147	
Manufacturing industries, 31–33	10,100	962	720	241	652	79	206	105	878	611	
Nonmanufacturing industries, 21–23, 42–81	11,113	870	624	247	580	51 ⁱ	221	69	799	536	

ⁱ = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = North American Industry Classification System.

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

^b Includes R&D scientists and engineers and their managers.

^c Includes clerical staff and others assigned to R&D groups.

^d The number of persons employed who were assigned full time to R&D, plus a prorated number of employees who worked on R&D only part of the time.

Note(s):

Detail may not add to total because of rounding. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D. These changes have affected the comparability of these estimates with estimates published for years prior to 2018. Industry classification was based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Excludes data for federally funded research and development centers. Also available in the full set of detailed statistical tables are statistics on domestic R&D employment, by state; foreign R&D personnel headcounts, by country; and headcounts of leased (i.e., external) R&D personnel, by function.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

The number of full-time equivalent (FTE) persons employed who were assigned full time to R&D plus a prorated number of employees who work on R&D only part of the time was 1.7 million, of which 1.1 million FTE employees were R&D researchers.

R&D Performance, by Company Size

Small- and medium-sized companies (10–249 domestic employees) performed 10% of the nation's total business R&D in 2019 ([table 1](#)).⁵ For these companies as a group, the R&D-to-sales ratio (or *R&D intensity*) was 10% ([table 1](#) and [table 3](#)). These companies accounted for 5% of sales and employed 7% of the 21.2 million employees who worked for R&D-performing or R&D-funding companies. They employed 18% of the 1.8 million employees engaged in business R&D in the United States.⁶

Large companies with 250–24,999 domestic employees performed 52% of the nation's total business R&D in 2019, and their R&D intensity was 4.8%. They accounted for 48% of sales, employed 46% of those who worked for R&D-performing or R&D-funding companies, and employed 52% of R&D employees in the United States.

The largest companies (25,000 or more domestic employees) performed 37% of the nation's total business R&D in 2019, and their R&D intensity was 3.5%. They accounted for 47% of sales, employed 48% of those who worked for R&D-performing or R&D-funding companies, and employed 30% of business R&D employees in the United States.

R&D Performance, by State

Business R&D is concentrated in a relatively small number of states, and the state location where large amounts of business R&D is performed remains stable from year to year. In 2019, of the \$493 billion of R&D performed in the United States, businesses in California alone accounted for 35% ([table 5](#)); they were responsible for 33% in 2018. Other states with large amounts of business R&D were Washington (8% of the national total in 2019; 7% in 2018), Massachusetts (6% in both years), Texas (5% in both years), Michigan (4%; 5%), New Jersey (4%; 5%), New York (4% in both years), Pennsylvania (3% in both years), and Illinois (3% in both years). In California, Illinois, Massachusetts, New Jersey, New York, and Pennsylvania, pharmaceuticals and medicines (NAICS 3254) was the largest R&D-performing industry group. Motor vehicles, bodies, trailers, and parts (NAICS 3361–63) had the highest share in Michigan; computer system design and related services (NAICS 5415) was largest in Texas, and software publishing (NAICS 5112) was highest in Washington.⁷

Table 5**Funds spent for business R&D performed in the United States, by state and source of funds: 2019**

(Millions of dollars)

State	All R&D ^a	Paid for by the company	Paid for by others	
United States	492,956	428,968	63,989	
Alabama	2,423	1,191	1,232	
Alaska	49	41	8	
Arizona	6,403	4,570	1,832	
Arkansas	461	397	64	
California	171,961	158,850	13,111	
Colorado	6,070	5,208	862	
Connecticut	7,421	6,171	1,250	
Delaware	2,156	1,436	720	
District of Columbia	412	277	135	
Florida	7,259	5,611	1,648	
Georgia	4,844	3,924	920	i
Hawaii	159	86	73	
Idaho	2,697	2,608	89	
Illinois	14,112	13,383	729	
Indiana	7,952	6,895	1,057	
Iowa	3,087	2,285	802	i
Kansas	2,748	1,857	891	i
Kentucky	1,481	939	541	
Louisiana	703	534	168	
Maine	417	373	44	
Maryland	5,852	4,248	1,604	
Massachusetts	30,843	25,955	4,888	
Michigan	21,283	18,918	2,364	
Minnesota	8,026	7,547	479	
Mississippi	324	276	48	
Missouri	6,344	4,150	2,194	i
Montana	205	176	29	
Nebraska	795	735	60	
Nevada	1,045	829	216	
New Hampshire	2,541	1,036	1,505	
New Jersey	20,390	16,648	3,742	
New Mexico	637	391	245	
New York	20,180	17,968	2,212	
North Carolina	13,249	9,188	4,061	i
North Dakota	349	340	9	
Ohio	10,642	7,087	3,555	i
Oklahoma	1,067	956	111	i
Oregon	7,890	7,606	284	
Pennsylvania	15,245	13,353	1,892	i
Rhode Island	715	664	52	
South Carolina	1,784	1,527	257	
South Dakota	194	170	24	
Tennessee	1,663	1,381	282	
Texas	23,906	20,916	2,990	
Utah	2,857	2,463	394	
Vermont	244	218	26	
Virginia	6,061	4,276	1,785	

Table 5**Funds spent for business R&D performed in the United States, by state and source of funds: 2019**

(Millions of dollars)

State	All R&D ^a		Paid for by the company		Paid for by others
Washington	37,330		35,823		1,507
West Virginia	246	i	219	i	27
Wisconsin	6,517		5,679		837
Wyoming	686		670		16
Undistributed funds ^b	1,034		916		117

i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

^a All R&D is the cost of domestic R&D paid for by the respondent company and others outside of the company and performed by the respondent company.

^b Includes data reported that were not allocated to a specific state by multi-establishment companies. For single-establishment companies, data reported were allocated to the state in the address used to mail the survey form.

Note(s):

Beginning in survey year 2018, companies that performed or funded less than \$50,000 of R&D were excluded from tabulation. These companies in aggregate represented a very small share of total R&D expenditures in prior years. Had the companies under this threshold been included in the 2018 estimates, they would have contributed approximately \$90 million to overall R&D expenditures. Excludes data for federally funded research and development centers.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2019.

Survey Information and Data Availability

The sample for BERD was selected to represent all for-profit, nonfarm companies that were publicly or privately held, had 10 or more employees in the United States, and performed or funded R&D either domestically or abroad. 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 detailed statistical tables reports at <https://www.nsf.gov/statistics/srvybrds/>.)

Beginning in survey year 2018, companies that performed or funded less than \$50,000 of R&D were excluded from tabulation. In prior years, companies that performed or funded any amount of R&D were tabulated. This change has affected the comparability of these estimates to those published in prior years. These companies in aggregate represented a very small share of total R&D expenditures in prior years, but they accounted for a larger share of the company count estimates. Had the companies under this threshold been included in the 2019 estimates, they would have contributed approximately \$90 million to overall R&D expenditures and would have added around 7,500 to the estimated number of U.S. companies with R&D expenditures. (Company counts are available in the full set of data tables.) It is assumed that this group of companies would have contributed similar levels of R&D and number of companies to the 2019 estimates.

In this InfoBrief, money amounts are expressed in current U.S. dollars and are not adjusted for inflation. A *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 company, of one or more establishments under common ownership or control.

For 2018, a total of 45,806 companies were sampled to represent the population of 1,115,950 companies; for 2019, a total of 46,000 companies were sampled, representing 1,125,000 companies. The actual numbers of reporting units in the sample that remained within the scope of the survey between sample selection and tabulation were 42,426 for 2018 and 42,500 for 2019. These lower counts represent the number of reporting units 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 fewer than 10 employees in the United States or had gone out of business in the interim. Of these in-scope reporting units, 73.0% were considered to have met the criteria for a complete response to the 2018 survey; 69.0% fulfilled the 2019 complete response criteria. Among the units with account managers—that is, the top R&D

companies based on prior year reported or imputed data that were assigned an analyst to act as a single point of contact for all communications—80.9% met the 2018 complete response criteria, and 80.0% met the 2019 criteria. Coverage of the previous year's known positive R&D stratum for 2018 was 85.2%; the coverage rate for 2019 was 83.0%. 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 estimation methodology for BERD state estimates takes the form of a hybrid estimator, combining the unweighted reported amount, by state, with a weighted amount apportioned (or *raked*) across states with relevant industrial activity. The hybrid estimator smooths the estimate over states with R&D activity, by industry, and accounts for real observed change within a state. [Table 5](#) shows the results of this estimation methodology for state estimates.

The full set of data tables from this survey will be available in the report [Business Enterprise Research and Development: 2019](#). Individual data tables and tables with relative standard errors and imputation rates from the 2019 survey are available from the author in advance of the full report. Statistics for new items added to the survey for 2019 are available in the full set of data tables, including whether or not companies filed for a state tax credit for research activities, the amount spent on artificial intelligence R&D, and counts of temporary and leased employees working on R&D.

Notes

- 1 See Wolfe R; National Center for Science and Engineering Statistics (NCSES). 2020. *U.S. Businesses Reported \$441 Billion for R&D Performance in the United States During 2018, a 10.2% Increase from 2017*. InfoBrief NSF 20-316. Alexandria, VA: National Science Foundation. Available at <http://ncses.nsf.gov/pubs/nsf20316>.
- 2 When responding to the 2019 survey, companies projected they would spend \$461 billion of their own funds for R&D performance in the United States during 2020. For more information about recent trends in national R&D, see Boroush M; National Center for Science and Engineering Statistics (NCSES). 2021. *U.S. R&D Increased by \$51 Billion, to \$606 Billion, in 2018; Estimate for 2019 Indicates a Further Rise to \$656 Billion*. InfoBrief NSF 21-324. Alexandria, VA: National Science Foundation. Available at <https://ncses.nsf.gov/pubs/nsf21324/>.
- 3 NCSES and its predecessor agencies has cosponsored an annual business R&D survey since 1953. The Survey of Industrial Research and Development (SIRD) collected data for 1953–2007, and its successor, the Business R&D and Innovation Survey (BRDIS), collected data for 2008–16. Beginning with 2017, the collection of innovation data was moved to the Annual Business Survey (ABS), another survey cosponsored with the U.S. Census Bureau, and BRDIS became the Business Research and Development Survey (BRDS). Beginning with 2019, the business R&D data collection reported here was renamed the Business Enterprise Research and Development Survey (BERD) for international comparability.
- 4 Determining the amount of domestic net sales and operating revenues was left to the reporting company. However, guidance was given to include revenues from foreign operations and subsidiaries and from discontinued operations and to exclude intracompany transfers, returns, allowances, freight charges, and excise, sales, and other revenue-based taxes.
- 5 Company size classifications changed for 2017 and subsequent years in response to the revised *Frascati Manual*; see Organisation for Economic Co-operation and Development (OECD). 2015. *Frascati Manual: Guidelines for Collecting and Reporting Data on Research and Experimental Development. The Measurement of Scientific, Technological, and Innovation Activities*. Paris: OECD Publishing. Available at https://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2015_9789264239012-en. Anderson and Kindlon (2019) provide estimates of R&D performance and employment using these new classifications over 2008–15. The authors also compare the trends to those observed in SIRD for the time prior to 2008. The ABS, also cosponsored by NCSES and the Census Bureau, collects R&D data from companies with fewer than 10 employees for 2017 and beyond. See Anderson G, Kindlon A; National Center for Science and Engineering Statistics (NCSES). 2019. *Indicators of R&D in Small Businesses: Data from the 2009–15 Business R&D and Innovation Survey*. InfoBrief NSF 19-316. Alexandria, VA: National Science Foundation. Available at <https://www.nsf.gov/statistics/2019/nsf19316/>.
- 6 Employment statistics in this InfoBrief are head counts unless they are designated as FTE estimates. R&D employees include researchers (defined as R&D scientists and engineers and their managers) and the technicians, technologists, and support staff members who work on R&D or who provide direct support to R&D activities.

7 In addition to statistics for all states and for all states by industry, below-state level statistics are available in the full set of data tables and in other InfoBriefs; see Shackelford B, Wolfe R; National Center for Science and Engineering Statistics (NCSES). 2019. *Over Half of U.S. Business R&D Performed in 10 Metropolitan Areas in 2015*. InfoBrief NSF 19-322. Alexandria, VA: National Science Foundation. Available at <https://www.nsf.gov/statistics/2019/nsf19322/>. Also see Shackelford B, Wolfe R; National Center for Science and Engineering Statistics (NCSES). 2020. *Businesses Performed 60% of Their U.S. R&D in 10 Metropolitan Areas in 2018*. InfoBrief NSF 21-331. Alexandria, VA: National Science Foundation. Available at <https://nces.nsf.gov/pubs/nsf21331>.

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