



National Center for Science and  
Engineering Statistics

# Business Enterprise Research and Development: 2019

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## General Notes

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The Business Enterprise Research and Development (BERD) Survey is the primary source of information on domestic and global research and development expenditures and the R&D workforce for companies operating in the 50 U.S. states and the District of Columbia. The survey is conducted annually by the Census Bureau in accordance with an interagency agreement with the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation. NCSES 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, another survey cosponsored with the Census Bureau, and the 2017 and 2018 business R&D data collections reported in this report series were renamed the Business Research and Development Survey. For the data collection in this report, the survey was renamed for international comparability. The BERD Survey [questionnaires](#), [reports](#), and [data](#) can be found at <https://www.nsf.gov/statistics/industry/>.

The results of the survey are used to assess trends in the performance and funding of R&D. Government agencies, corporations, and research organizations use the data to investigate productivity, formulate tax policy, and compare individual company performance with industry averages. Individual researchers in industry and academia use the data to investigate a variety of topics and to prepare professional papers, dissertations, and books. Total R&D expenditure statistics are used by the Bureau of Economic Analysis for inclusion in its System of National Accounts and Foreign Direct Investment programs.

Further, statistics from the BERD Survey make it possible to evaluate more fully the status of R&D in the United States and to compare the R&D activities of the United States with those of other nations. The usefulness of the information collected in this survey is enhanced by linking it to the Census Bureau's Longitudinal Establishment and Enterprise Microdata file, which contains information on the outputs and inputs of companies' manufacturing plants. Response to this survey is mandatory and confidential under Title 13 of the United States Code.

For the BERD Survey, data are collected from a probability sample of for-profit companies, which are classified in select manufacturing and nonmanufacturing industries. The BERD Survey is administered both to companies known to have performed R&D and to companies with no known history of R&D activity. The survey is sent to a single coordinator within each company, but it is organized into sections that help the coordinator collect specific types of information from different experts (human resources, accounting, R&D managers, etc.) in the company. Foreign-owned companies are instructed to report only for company operations owned by the U.S. subsidiary and, for purposes of the survey, to treat the foreign owners as if they were unrelated third parties.

The target population for the BERD Survey consists of all for-profit companies that have 10 or more paid employees in the United States, that have at least one establishment in business during the survey year and located in the United States, and that are classified in certain industries, with a particular focus on those companies that perform R&D in the United States. A company is defined as one or more establishments under common domestic ownership or control.

The Census Bureau's Business Register (BR) contains information on more than 7.3 million establishments with paid employees. It serves as the primary input to the sampling frame from which the sample is selected. For companies with more than one establishment, data are summed to the company level to assign an industry classification code and a measure of size, which are used in designing the sample. Companies are excluded from the frame if they are classified in an industry that is outside the scope of the BERD Survey or if they have fewer than 10 employees, based on their prior year aggregated annual payroll and employment data.

In addition to single-year tables for 2019 ([table 1](#) through [table 65](#)), this report includes tables containing statistics for multiple years. In these tables, most prior year statistics have been revised since originally published. Revised statistics include adjustments based on information obtained after the original statistics were prepared. For any given year, after the tables are published, the statistical file used to produce the tables stays open for about 1 year before it is permanently closed. During that year, respondents may provide updated data; also, information from other Census Bureau surveys or publicly available sources may become available. The new data and information are evaluated and tested; if appropriate, revisions are made to the statistical file. The multiyear tables in this report ([table 66](#) through [table 73](#)) were prepared using the 2019 BERD Survey statistical file and revised BRDIS statistical files for 2008–18.

Also in this report are tables designed to enable comparisons between U.S. BERD Survey statistics and those of other nations ([table 74](#) through [table 76](#)). There are three tables corresponding to the three principal measures of domestic R&D in the U.S. BERD Survey—that is, R&D paid for by the respondent company and others outside of the company and performed by the respondent company, R&D paid for and performed by the respondent company, and R&D paid for by others and performed by the company. In each table, an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is *included* in U.S. BERD Survey domestic R&D, and then adding capital expenditures relating to R&D operations, which is *excluded* from U.S. BERD Survey domestic R&D. Also shown in each table are the differences between U.S. BERD Survey estimates in this report and the adjusted internationally comparable estimates for domestic R&D.

Beginning with the tables for the 2017 survey year, the disclosure avoidance is now handled differently than it had been in prior years' tables. Cell suppression is a disclosure avoidance technique that protects the confidentiality of individual survey units by withholding cell values from release and replacing the cell value with a symbol. This technique was used in SIRD and BRDIS tables; data in affected cells were replaced with a "D." For most of the tables in this report, disclosure avoidance is accomplished by replacing cells with an estimate range. Confidentiality is maintained while the usefulness of the statistics is enhanced because most of the completely suppressed cells in past years' tables have been eliminated. For cases where confidentiality cannot be maintained even with the new estimate range technique, a "D" is substituted.

Terms used in business accounting and incorporated throughout the tables are defined in the section "[Technical Notes](#)." The information and statistics in this report supersede information and statistics in previously published reports.

## Data Tables

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TABLE 1

**Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2019**

(Millions of U.S. dollars and thousands of employees)

Question	Survey item	Aggregate amount
Company and financial information (US\$millions)		
1.12	Worldwide net sales and operating revenues	14,897,629
1.13	Net sales and operating revenues from domestic operations	11,180,864
	R&D paid for by the company and performed by the company and others	
2.1	Worldwide R&D paid for by the company (expense), total	614,273
2.3	Worldwide R&D paid for by the company (expense), adjustments	43,255
2.4/2.7c	Worldwide R&D paid for by the company and performed by the company and others	571,019
2.7a	Domestic R&D paid for by the company and performed by the company and others	466,504
2.7b	Foreign R&D paid for by the company and performed by the company and others	104,515
2.5	Indirect R&D charges to be recouped from the U.S. federal government (IR&D, or independent R&D) <sup>a</sup>	6,190
2.8m(1)	Domestic R&D paid for by the company and performed by the company and others	466,504
2.8a(1)	Salaries, wages, and fringe benefits	231,648
2.8b(1)	Stock-based compensation	38,284
2.8c(1)	Leased or temporary staffing, including on-site contractors, working on R&D	19,261
2.8d(1)	Expensed equipment (not capitalized)	6,738
2.8e(1)	Materials and supplies	26,298
2.8f(1)	Leased facilities and equipment	7,405
2.8g(1)	Depreciation and amortization on R&D property, plant, equipment, and intangible assets	17,058
2.8h(1)	Royalties and licensing fees	8,894
2.8i(1)	Collaborative R&D payments	5,717
2.8j(1)	Contract R&D	31,819
2.8k(1)	Other purchased services	12,400
2.8l(1)	All other costs	60,981
2.9(3)	Worldwide R&D paid for by the company and performed by others	48,107
2.9(1)	Domestic R&D paid for by the company and performed by others	37,537
2.9(2)	Foreign R&D paid for by the company and performed by others	10,570
2.10(3)	Worldwide R&D paid for and performed by the company	522,912
2.10(1)	Domestic R&D paid for and performed by the company	428,968
2.10(2)	Foreign R&D paid for and performed by the company	93,944
2.9(3) + 2.10(3) + 3.4(3) + 3.5(3)	Worldwide R&D paid for by the company and others and performed by the company and others	654,757
2.10(3) + 3.5(3)	Worldwide R&D paid for by the company and others and performed by the company	597,420
2.9(1) + 2.10(1) + 3.4(1) + 3.5(1)	Domestic R&D paid for by the company and others and performed by the company and others	538,835
2.10(1) + 3.5(1)	Domestic R&D paid for by the company and others and performed by the company	492,956
	Domestic R&D paid for and performed by the company	
2.14	Performed at largest domestic location	258,722
2.16	Performed at second-largest domestic location	39,905
2.18	Domestic R&D paid for by foreign operations or subsidiaries and performed by the company <sup>a</sup>	27,117
2.19	Foreign R&D paid for by domestic operations or subsidiaries and performed by the company <sup>a</sup>	18,150
2.20i/2.9(1)	Domestic R&D paid for by the company and performed by others	37,537
2.20a	Companies in the United States	31,827
2.20b	Your company's foreign parent or owner	1,347
2.20c	Companies outside the United States	3,251
2.20d	U.S. federal government agencies or laboratories	64
2.20e	U.S. state and local government agencies or laboratories	24
2.20f	U.S. universities, colleges, and academic researchers	439
2.20g	All other organizations in the United States	465
2.20h	All other organizations outside the United States	120

TABLE 1

**Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2019**

(Millions of U.S. dollars and thousands of employees)

Question	Survey item	Aggregate amount
2.22	Monetary gifts made by the company to U.S. universities and colleges <sup>a</sup>	78
	Projected worldwide R&D expense paid for and performed by the company in 2020	
2.23(3)	Worldwide R&D to be paid for and performed by the company	606,520
2.23(1)	Domestic R&D to be paid for and performed by the company	499,435
2.23(2)	Foreign R&D to be paid for and performed by the company	107,085
2.24	Projected R&D services and projected payments for collaborative R&D	38,256
3.1j/3.2c	Worldwide R&D paid for by others and performed by the company and others	83,738
3.1a	R&D reimbursed by the company's foreign parent or owner	19,820
3.1b	Collaborative R&D reimbursed by business partners	8,975
3.1c	R&D paid for by grants (government or private foundation)	5,203
3.1d	Defense R&D goods or services provided as a prime contractor or subcontractor to the federal government and/or government contractors	16,563
3.1e	Medical clinical trial Phase I–III services provided to others not owned by the company	20,748 i
3.1f	Medical R&D services, other than clinical trials, provided to others not owned by the company	2,634
3.1g	Nondefense custom software development or computer systems designed for others not owned by the company	610
3.1h	Prototype development, production, and testing for customer's products	2,109
3.1i	All other R&D services provided to the federal government or to others not owned by the company	7,076 i
3.2c/3.1j	Worldwide R&D paid for by others and performed by the company and others	83,738
3.2a	Domestic R&D paid for by others and performed by the company and others	72,331
3.2b	Foreign R&D paid for by others and performed by the company and others	11,407 i
3.3m(1)	Domestic R&D paid for by others and performed by the company and others	72,331
3.3a(1)	Salaries, wages, and fringe benefits	36,350
3.3b(1)	Stock-based compensation	760
3.3c(1)	Leased or temporary staffing, including on-site contractors	2,090
3.3d(1)	Expensed equipment (not capitalized)	453
3.3e(1)	Materials and supplies	8,127 i
3.3f(1)	Leased facilities and equipment rental payments	831
3.3g(1)	Depreciation and amortization on R&D property, plant, equipment, and intangible assets	1,803
3.3h(1)	Royalties and licensing fees	343
3.3i(1)	Collaborative R&D payments	2,698
3.3j(1)	Contract R&D	5,644
3.3k(1)	Other purchased services	4,479 i
3.3l(1)	All other costs	8,751
3.4(3)	Worldwide R&D paid for and performed by others	9,230
3.4(1)	Domestic R&D paid for and performed by others	8,342
3.4(2)	Foreign R&D paid for and performed by others	887
3.5(3)	Worldwide R&D paid for by others and performed by the company	74,508
3.5(2)	Foreign R&D paid for by others and performed by the company	10,519 i
3.5(1)	Domestic R&D paid for by others and performed by the company	63,989
3.8a	Other companies in the United States	21,461
3.8b	Your company's foreign parent or owner	17,563
3.8c	Other companies outside the United States	1,991
3.8d/3.11j/3.12c	U.S. federal government agencies or laboratories	21,941
3.8e	U.S. state and local government agencies or laboratories	100 - 192
3.8f	Foreign government agencies or laboratories	123
3.8g	U.S. universities, colleges, and academic researchers	47
3.8h	Universities, colleges, and academic researchers outside the United States	3 - 16
3.8i	All other organizations in the United States	627 - 719
3.8j	All other organizations outside the United States	32 - 44

TABLE 1

**Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2019**

(Millions of U.S. dollars and thousands of employees)

Question	Survey item	Aggregate amount
3.11j/3.8d/3.12c	Federally funded R&D performed by the company	21,941
3.11a	Department of Defense	15,141
3.11b	Department of Energy	519
3.11c	National Aeronautics and Space Administration	4,534
3.11d	National Institutes of Health	519
3.11e	Department of Homeland Security	124
3.11f	Department of Transportation	30
3.11g	Environmental Protection Agency	1
3.11h	National Science Foundation	8
3.11i	Other U.S. federal agencies	1,064
3.12c/3.8d/3.11j	Federally funded R&D performed by the company by type of agreement	21,941
3.12a	Contracts	20,844
3.12b	Grants and all other agreements	1,097
	Domestic R&D paid for by others and performed by the company	
3.16	Performed at largest domestic location	31,436
3.18	Performed at second-largest domestic location	5,354
3.19	Domestic R&D paid for by U.S. federal government agencies or laboratories and performed by others	2,133
	Projected R&D to be paid for by others and performed by the company in 2020	
3.20	Worldwide R&D to be paid for by others and performed by the company	85,666
3.21	Domestic R&D to be paid for by others and performed by the company	66,881
3.22	Domestic R&D to be paid for by the U.S. federal government and performed by the company	21,811
4.1	Total domestic capital expenditures	781,625
4.2/4.3f	Domestic capital expenditures for R&D	29,106
4.3a	Land acquisition	237
4.3b	Buildings and land improvement	3,739
4.3c	Equipment	15,663
4.3d	Capitalized software	5,475
4.3e	All other capital expenditures for R&D	3,992
5.1	Worldwide R&D paid for and performed by the company and others directed toward business areas or product lines new to the company	67,132
5.2/2.10(1)	Domestic R&D paid for and performed by the company	428,968
	Type of R&D (character of work)	
5.4b	Basic research	25,916
5.4a	Applied research	59,697
5.3b	Development	343,355
	Application areas	
5.5	Energy applications	24,054
5.6	Environmental protection applications	10,405
5.7	Defense applications	13,290
5.8	Health or medical applications	108,075
5.9	Agricultural applications	8,078
	Technology focus areas	
5.10	Software products and software embedded in other projects or products	189,553
5.11	Biotechnology	62,952
5.12	Nanotechnology	21,626
5.13	Artificial intelligence	14,038
5.15c	Foreign R&D paid for and performed by the company	93,944
5.15a	Research	14,324
5.15b	Development	79,620
5.16/3.5(1)	Domestic R&D paid for by others and performed by the company	63,989

TABLE 1

**Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2019**

(Millions of U.S. dollars and thousands of employees)

Question	Survey item	Aggregate amount	
	Type of R&D (character of work)		
5.18b	Basic research	6,324	
5.18a	Applied research	14,333	
5.17b	Development	43,332	
	Application areas		
5.19	Energy applications	2,108	i
5.20	Environmental protection applications	1,390	i
5.21	Defense applications	20,041	
5.22	Health or medical applications	25,691	i
5.23	Agricultural applications	627	
	Technology focus areas		
5.24	Software products and software embedded in other projects or products	11,306	
5.25	Biotechnology	14,841	
5.26	Nanotechnology	1,858	i
5.27	Artificial intelligence	1,313	i
	Federally funded R&D performed by the company		
	Type of R&D (character of work)		
5.30b	Basic research	2,313	i
5.30a	Applied research	4,883	
5.29b	Development	14,745	
	Technology focus areas		
5.31	Software products and software embedded in other projects or products	5,089	i
5.33c	Foreign R&D paid for by others and performed by the company	10,519	i
5.33a	Research	2,742	
5.33b	Development	7,778	i
Employees (thousands)			
	Worldwide		
1.8/1.9(3)	Total employees	32,296	
6.1b(3)	Non-R&D employees	29,620	
6.1a(3)	R&D employees	2,676	
6.4a(3)	Female	745	
6.4b(3)	Male	1,931	
6.5a(3)	Researchers	1,815	
6.5b(3)	Technicians	614	
6.5c(3)	Support staff	246	
	Domestic		
1.9(1)	Total employees	21,213	
6.1b(1)	Non-R&D employees	19,381	
6.1a(1)	R&D employees	1,832	
6.4a(1)	Female	488	
6.4b(1)	Male	1,344	
6.5a(1)	Researchers	1,232	
6.5b(1)	Technicians	426	
6.5c(1)	Support staff	174	
	Foreign		
1.9(2)	Total employees	11,083	
6.1b(2)	Non-R&D employees	10,239	
6.1a(2)	R&D employees	844	
6.4a(2)	Female	256	

TABLE 1

**Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2019**

(Millions of U.S. dollars and thousands of employees)

Question	Survey item	Aggregate amount
6.4b(2)	Male	587
6.5a(2)	Researchers	584
6.5b(2)	Technicians	188
6.5c(2)	Support staff	72
	Researchers with PhD	
6.6(3)	Worldwide	165
6.6(1)	Domestic	130
6.6(2)	Foreign	36
	Full-time equivalent	
6.7d	R&D employees	1,677
6.7a	Full-time R&D employees	1,384
6.7b	Full-time employees not solely working on R&D	277
6.7c	Part-time employees working on R&D	17
6.8d	Researchers	1,147
6.8a	Full-time R&D employees	989
6.8b	Full-time employees not solely working on R&D	150
6.8c	Part-time employees working on R&D	8
6.9	Non-U.S. citizens employed as researchers under temporary visa <sup>a</sup>	66
6.10d(1)	Total leased and temporary employees working on R&D	264 i
6.10a(1)	Researchers	171 i
6.5b(1)	Technicians	60 i
6.5c(1)	Support staff	32 i

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

<sup>a</sup> Statistics are based on companies in the United States that reported to the survey. No systematic item imputation was applied. These statistics include an adjustment to the weight to account for unit nonresponse.

**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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.



TABLE 2

**Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
All industries	21-23, 31-33, 42-81	597,420	522,912	74,508	492,956	428,968	63,989	104,464	93,944	10,519 i
Manufacturing industries	31-33	350,024	311,115	38,909	285,674	248,109	37,564	64,351	63,006	1,345
Food	311	5,015	4,770	245	4,180	3,937	243	835	833	2
Beverage and tobacco products	312	1,755	1,644	111 i	1,082	971	111 i	674	674	0
Textile, apparel, and leather products	313-16	1,061	1,030	31	904	873	31	157	157	0
Wood products	321	193	187	6	186	180	6	7	7	0
Paper	322	1,165	1,165	*	1,064	1,064	*	101	101	* i
Printing and related support activities	323	429 i	429 i	0	420 i	420 i	0	9 i	9 i	0
Petroleum and coal products	324	1,477 - 1,481	1,375	102 - 106	1,306	1,203	103	171 - 176	172	0 - 3 i
Chemicals	325	115,631	105,612	10,020	97,063	87,288	9,775	18,568	18,323	245
Basic chemicals	3251	3,102	2,938	164	2,360	2,198	162	742	740	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,695	1,609	85	1,172	1,092	80	523	518	5
Pesticide, fertilizer, and other agricultural chemicals	3253	2,272 - 2,297	1,932	340 - 365	1,822 - 1,846	1,501	320 - 345	450	431	20
Pharmaceuticals and medicines	3254	103,487	94,306	9,181	87,619	78,652	8,966	15,868	15,654	214
Soap, cleaning compound, and toilet preparation	3256	3,517	3,354	164	2,760	2,596	164	757	757	0
Paint, coating, adhesive, and other chemicals	3255, 3259	1,532 - 1,560	1,473	59 - 87	1,305 - 1,333	1,249	56 - 84	227	224	4
Plastics and rubber products	326	3,359	3,265	94	2,856	2,770	85	503	494	9
Nonmetallic mineral products	327	1,701 i	1,665 i	35	1,508 i	1,473 i	35	192 i	192 i	0
Primary metals	331	740	722	19	665	649	16	76	73	2
Fabricated metal products	332	3,163	2,899	264	2,885	2,632	254	278	267	11
Machinery	333	19,435	18,147	1,288	15,184	13,930	1,254	4,251	4,218	34
Agricultural implement	33311	2,778	2,768	11	1,921	1,913	9	857	855	2 i
Semiconductor machinery	333242	5,374	4,750	623	4,459	3,854	604	915	896	19
Engine, turbine, and power transmission equipment	3336	1,931	1,715	216	1,301	1,096	205	630	619	11
Other machinery	other 333	9,353	8,915	438	7,503	7,067	436	1,850	1,848	1 i

TABLE 2

**Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Computer and electronic products	334	112,180	100,510	11,671	86,729	75,570	11,159	25,452	24,940	512
Communications equipment	3342	15,907 - 15,912	14,804	1,103 - 1,107	12,595	11,495	1,100	3,312 - 3,316	3,309	3 - 7
Semiconductor and other electronic components	3344	48,189	44,784	3,405	35,183	31,975	3,208	13,007	12,809	198
Navigational, measuring, electromedical, and control instruments	3345	21,512	14,573	6,939	17,562	10,912	6,650	3,950	3,661	288
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,621	4,393	229	3,342	3,117	225	1,280	1,276	3
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	10,541	4,021	6,520	9,662	3,400	6,262	878	621	258
Other measuring and controlling device	other 3345	6,350	6,160	191	4,558	4,395	163	1,792	1,764	28
Other computer and electronic products	other 334	26,567 - 26,571	26,348	220 - 223	21,388	21,188	201	5,179 - 5,183	5,160	19 - 22
Electrical equipment, appliances, and components	335	7,006	6,599	407	5,263	4,886	377	1,743	1,713	30
Transportation equipment	336	53,187	38,868	14,319	45,375	31,505	13,870	7,812	7,363	449
Motor vehicles, bodies, trailers, and parts	3361-63	31,110	27,550	3,559	24,117	20,883	3,233	6,993	6,667	326
Aerospace products and parts	3364	18,943	9,392	9,551	18,358	8,900	9,458	585	493	93
Aircraft, aircraft engine, and aircraft parts	336411-13	17,476	8,833	8,643	16,891	8,341	8,550	585	492	93
Guided missile, space vehicle, and related parts	336414-15, 336419	1,467	559	908	1,467	559	908	*	*	0
Military armored vehicle, tank, and tank component	336992	35	25	10	35	25	10	0	0	0
Other transportation	other 336	3,099	1,901	1,198	2,865	1,697	1,168	234	204	30
Furniture and related products	337	444	442	2	409	407	2	35	35	0
Miscellaneous	339	22,077 - 22,084	21,786	292 - 298	18,596	18,352	244	3,482 - 3,488	3,434	48 - 54
Medical equipment and supplies	3391	19,083	18,835	248	16,014	15,812	202	3,069	3,023	46

TABLE 2

**Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Other miscellaneous manufacturing	3399	2,995 - 3,002	2,951	44 - 50	2,582	2,540	42	413 - 419	411	2 - 8
Nonmanufacturing industries	21-23, 42-81	247,396	211,797	35,600	207,283	180,858	26,425	40,113	30,939	9,175 i
Mining, quarrying, oil and gas extraction, and support activities	21	3,307	3,096	211	2,717	2,535	183	589	561	28 i
Utilities	22	284	246	38	275	237	38	9	9	0
Wholesale trade	42	1,304	1,217	87	1,191	1,104	87	113	113	0
Electronic shopping and electronic auctions	454111-12	3,200 - 20,013 i	3,157 - 19,970 i	43 - 61	3,131 - 15,818 i	3,088 - 15,775 i	43 - 61	69 - 4,198 i	69 - 4,198 i	0
Transportation and warehousing	48-49	9,952 i	9,566 i	386	9,890 i	9,504 i	386	62	62	0
Information	51	129,277	128,064	1,213	110,227	109,062	1,165	19,051	19,002	48
Publishing	511	39,968	39,348	620	33,019	32,447	572	6,949	6,901	48
Newspaper, periodical, book, and directory publishers	5111	61	61	*	61	61	*	0	0	0
Software publishers	5112	39,907	39,287	620	32,958	32,386	572	6,949	6,901	48
Telecommunications	517	3,856	3,823	33	3,733	3,700	33	124	123	*
Data processing, hosting, and related services	518	36,449	36,045	404	30,558	30,154	404	5,891	5,891	* i
Other information	other 51	49,004	48,849	155	42,917	42,761	155	6,087	6,087	0
Finance and insurance	52	10,092	9,982	110	8,917	8,890	28	1,175	1,092	83
Real estate and rental and leasing	53	1,476	1,476	0	1,371	1,371	0	104	104	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	48	48	0	45	45	0	4	4	0
Other real estate and rental and leasing	other 53	1,427	1,427	0	1,326	1,326	0	101	101	0
Professional, scientific, and technical services	54	68,023	34,908	33,115	53,233	29,131	24,103	14,790	5,778	9,012 i
Architectural, engineering, and related services	5413	4,244	2,323	1,921	4,207	2,288	1,919	37	35	2
Computer systems design and related services	5415	26,416	23,689	2,727	21,046	18,395	2,651	5,370	5,294	76
Scientific research and development services	5417	30,675	3,364	27,311 i	21,669	3,265	18,403	9,006 i	99	8,908 i
Research and development in biotechnology	541711	9,250	1,129	8,121	6,457	1,083	5,374	2,793	46	2,748

TABLE 2

**Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	20,651 i	2,206	18,444 i	14,446 i	2,155	12,291 i	6,205 i	51	6,153 i
Research and development in the social sciences and humanities	541720	774	29	745	766	27	738	8	1	7
Other professional, scientific, and technical services	other 54	6,688	5,532	1,156	6,312	5,182	1,129	376	349	27
Health care services	621-23	2,289	1,952	338	2,265	1,928	337	24	23	* i
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,382 - 18,191	1,322 - 18,133	37 - 62	1,380 - 14,067	1,322 - 14,012	34 - 58	2 - 4,124	0 - 4,121	3
All companies (number of domestic employees)	-	597,420	522,912	74,508	492,956	428,968	63,989	104,464	93,944	10,519 i
Small companies										
10-19 <sup>a</sup>	-	5,639	4,560	1,079	5,501	4,432	1,070	138	128	10
20-49	-	12,875	10,484	2,392	12,418	10,040	2,378	457	443	14 i
Medium companies										
50-99	-	14,758	12,165	2,593	14,021	11,492	2,529	737	674	64
100-249	-	21,986	18,498	3,487	19,793	16,520	3,274	2,192	1,979	214
Large companies										
250-499	-	21,592	17,995	3,597	18,883	15,356	3,527	2,709	2,639	70
500-999	-	26,922	24,356	2,566	23,969	21,549	2,420	2,953	2,807	146
1,000-4,999	-	92,224	80,615	11,609	75,671	64,475	11,196	16,553	16,140	413
5,000-9,999	-	62,775	54,556	8,220	50,811	44,728	6,083	11,965	9,828	2,137 i
10,000-24,999	-	111,876	92,569	19,307 i	88,263	74,385	13,878 i	23,612	18,183	5,429 i
25,000 or more	-	226,773	207,115	19,658	183,626	165,991	17,635	43,148	41,124	2,024

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 3

**Worldwide R&D paid for by the company and others and performed by the company, by industry, company size, and worldwide R&D program size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	R&D program size					
		All companies	Less than \$1 million	\$1 million–\$9.999 million	\$10 million–\$49.999 million	\$50 million–\$99.999 million	\$100 million or more
All industries	21–23, 31–33, 42–81	597,420	4,942	33,242	42,216	29,813	487,208
Manufacturing industries	31–33	350,024	2,764	15,855	22,465	18,557	290,383
Food	311	5,015	172	621	762	441	3,019 i
Beverage and tobacco products	312	1,755	42	84	65	188 i	1,376
Textile, apparel, and leather products	313–16	1,061	51	208	273	297	232
Wood products	321	193	19	93	81	0	0
Paper	322	1,165	11	137	132	0	884
Printing and related support activities	323	429 i	26	285	118 i	0	0
Petroleum and coal products	324	1,477 - 1,481	13	67	10 - 581	273	542 - 1,120
Chemicals	325	115,631	361	2,946	7,344	6,937	98,044
Basic chemicals	3251	3,102	46	383	638	535	1,501
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,695	46	157	167	50 - 256	1,067 - 1,277
Pesticide, fertilizer, and other agricultural chemicals	3253	2,272 - 2,297	0 - 24	86	90	0	2,098
Pharmaceuticals and medicines	3254	103,487	77	1,903	5,921	6,038	89,548
Soap, cleaning compound, and toilet preparation	3256	3,517	76	188	134	60	3,059
Paint, coating, adhesive, and other chemicals	3255, 3259	1,532 - 1,560	89 - 119	229	394	50 - 256	559 - 774
Plastics and rubber products	326	3,359	165	772	907	607	908
Nonmetallic mineral products	327	1,701 i	36	146	287	86	1,146 i
Primary metals	331	740	33	230	385	92	0
Fabricated metal products	332	3,163	456	1,136	730	652	189
Machinery	333	19,435	426	2,228	2,202	1,379	13,201
Agricultural implement	33311	2,778	46	128	174	86	2,344
Semiconductor machinery	333242	5,374	0 - 106	128	211	50 - 156	4,881
Engine, turbine, and power transmission equipment	3336	1,931	19 i	126	195	71	1,519
Other machinery	other 333	9,353	255 - 363	1,845	1,621	1,066 - 1,174	4,456
Computer and electronic products	334	112,180	363	2,802	3,754	2,843	102,418
Communications equipment	3342	15,907 - 15,912	45 - 54	338	644	746	14,132
Semiconductor and other electronic components	3344	48,189 i	59	917	1,450	1,182	44,580 i
Navigational, measuring, electromedical, and control instruments	3345	21,512	218	1,245	1,364	538	18,148
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,621 i	36	312	576	270	3,428 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	10,541	33	187	314	55	9,952
Other measuring and controlling device	other 3345	6,350	149	747	473	213	4,768
Other computer and electronic products	other 334	26,567 - 26,571	33 - 41	301	296	377	25,558

TABLE 3

**Worldwide R&D paid for by the company and others and performed by the company, by industry, company size, and worldwide R&D program size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	R&D program size					
		All companies	Less than \$1 million	\$1 million–\$9.999 million	\$10 million–\$49.999 million	\$50 million–\$99.999 million	\$100 million or more
Electrical equipment, appliances, and components	335	7,006	209	588	987	977	4,246
Transportation equipment	336	53,187	108	1,698	2,401	2,198	46,782
Motor vehicles, bodies, trailers, and parts	3361–63	31,110	0 - 95	748	1,587	1,292 - 1,390	27,387
Aerospace products and parts	3364	18,943	i 13	703	548	716	16,963
Aircraft, aircraft engine, and aircraft parts	336411–13	17,476	i 10	429	351	716	15,970
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467	4	273	i 197	0	993
Military armored vehicle, tank, and tank component	336992	35	1	34	0	0	0
Other transportation	other 336	3,099	0 - 95	214	266	91 - 189	2,432
Furniture and related products	337	444	32	129	219	64	0
Miscellaneous	339	22,077 - 22,084	240	1,685	1,245 - 1,817	1,524	16,812 - 17,391
Medical equipment and supplies	3391	19,083	118	1,185	1,236	1,290	15,254
Other miscellaneous manufacturing	3399	2,995 - 3,002	121	500	10 - 581	235	1,558 - 2,137
Nonmanufacturing industries	21–23, 42–81	247,396	2,178	17,387	19,751	11,256	196,824
Mining, quarrying, oil and gas extraction, and support activities	21	3,307	26	i 363	10 - 1,817	0	1,100 - 2,909
Utilities	22	284	0 - 32	73	131	50 - 82	0
Wholesale trade	42	1,304	423	882	0	0	0
Electronic shopping and electronic auctions	454111–12	3,200 - 20,013	i 14	71	10 - 1,817	50 - 231	1,067 - 19,785
Transportation and warehousing	48–49	9,952	i 19	125	514	101	9,193
Information	51	129,277	377	5,198	6,973	6,945	109,785
Publishing	511	39,968	186	1,734	1,598	1,239	35,211
Newspaper, periodical, book, and directory publishers	5111	61	5	18	38	0	0
Software publishers	5112	39,907	180	1,716	1,560	1,239	35,211
Telecommunications	517	3,856	38	154	530	180	2,954
Data processing, hosting, and related services	518	36,449	119	2,778	4,297	5,040	24,214
Other information	other 51	49,004	34	531	548	485	47,406
Finance and insurance	52	10,092	14	350	1,257	387	8,085
Real estate and rental and leasing	53	1,476	9	27	64	0	1,376
Lessors of nonfinancial intangible assets (except copyrighted works)	533	48	4	i 10	35	0	0
Other real estate and rental and leasing	other 53	1,427	5	17	30	0	1,376
Professional, scientific, and technical services	54	68,023	1,180	8,018	8,369	3,282	47,173
Architectural, engineering, and related services	5413	4,244	288	1,548	993	517	899
Computer systems design and related services	5415	26,416	650	3,003	2,640	841	19,283
Scientific research and development services	5417	30,675	116	2,566	3,172	1,466	23,354

TABLE 3

**Worldwide R&D paid for by the company and others and performed by the company, by industry, company size, and worldwide R&D program size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	R&D program size					
		All companies	Less than \$1 million	\$1 million–\$9.999 million	\$10 million–\$49.999 million	\$50 million–\$99.999 million	\$100 million or more
Research and development in biotechnology	541711	9,250	26	660	786	382	7,396
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	20,651	89	1,868	2,307	1,084	15,304
Research and development in the social sciences and humanities	541720	774	2	38	80	0	654
Other professional, scientific, and technical services	other 54	6,688	126	901	1,565	458	3,637
Health care services	621–23	2,289	43	1,192	610	213	231
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,382 - 18,191	37 - 78	1,089	10 - 1,817	50 - 231	100 - 17,005
All companies (number of domestic employees)	–	597,420	4,942	33,242	42,216	29,813	487,208
Small companies							
10–19 <sup>a</sup>	–	5,639	1,093	4,009	392	146	0
20–49	–	12,875	1,729	7,997	2,914	235	0
Medium companies							
50–99	–	14,758	960	5,765	6,240	1,315	478
100–249	–	21,986	697	7,259	8,110	3,580	2,340
Large companies							
250–499	–	21,592	288	3,404	6,240	5,223	6,437
500–999	–	26,922	95	2,083	6,026	6,718	12,000
1,000–4,999	–	92,224	73	2,203	8,714	8,680	72,554
5,000–9,999	–	62,775	3	164	1,850	2,281	58,477
10,000–24,999	–	111,876	2	245	1,120	1,166	109,343
25,000 or more	–	226,773	1	115	609	468	225,580

i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. R&D program size classifications are based on R&D performance. 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.



TABLE 4

**Companies with worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by source of funds, industry, and company size: 2019**

(Number of companies)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
All industries	21-23, 31-33, 42-81	28,430	26,450	4,310	28,270	26,270	4,250	3,050	2,920	300
Manufacturing industries	31-33	15,210	14,450	2,170	15,180	14,410	2,140	1,470	1,430	170
Food	311	870	860	70	870	860	60	50	50	10
Beverage and tobacco products	312	350	350	10 i	350	350	10 i	10	10	0
Textile, apparel, and leather products	313-16	240	210	70	240	210	70	30	30	0
Wood products	321	80	80	10	80	80	10	10 i	10 i	0
Paper	322	90	90	10 i	90	90	10	20	20	10 i
Printing and related support activities	323	200	200	0	200	200	0	10 i	10 i	0
Petroleum and coal products	324	80	70	10	80	70	10	10	10	10 i
Chemicals	325	2,340	2,260	380	2,330	2,260	370	320	310	40
Basic chemicals	3251	240	240	40	240	240	40	60	60	10 i
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	170	20	180	170	20	20	20	10 i
Pesticide, fertilizer, and other agricultural chemicals	3253	150	150	10	150	150	10	20	20	10
Pharmaceuticals and medicines	3254	1,060	1,010	280	1,060	1,000	270	200	190	30 i
Soap, cleaning compound, and toilet preparation	3256	270	260	30	270	260	30	20	20	0
Paint, coating, adhesive, and other chemicals	3255, 3259	470	460	30	460	460	30	30	30	10
Plastics and rubber products	326	790	770	110	790	770	110	70	70	10 i
Nonmetallic mineral products	327	170	170	20	170	160	20	20	20	0
Primary metals	331	200	200	30	200	200	30	20	20	10
Fabricated metal products	332	1,840	1,690	200	1,840	1,690	200	60	60	10 i
Machinery	333	2,250	2,090	340	2,240	2,080	340	170	160	20 i
Agricultural implement	33311	190	190	20	190	180	20	20	20	10 i
Semiconductor machinery	333242	80	60	40	80	60	40	20	20	10
Engine, turbine, and power transmission equipment	3336	110	100	40	110	100	40	20	20	10 i
Other machinery	other 333	1,890	1,770	250	1,880	1,760	250	120	120	10 i
Computer and electronic products	334	2,290	2,170	390	2,280	2,160	380	340	330	50
Communications equipment	3342	300	290	30	300	290	30	60	50	10 i
Semiconductor and other electronic components	3344	640	560	170	640	550	160	110	110	30
Navigational, measuring, electromedical, and control instruments	3345	1,140	1,120	180	1,140	1,120	170	120	120	20
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	220	60	230	220	60	30	30	10 i



TABLE 4

**Companies with worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by source of funds, industry, and company size: 2019**

(Number of companies)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	190	40	190	190	40	20	20	10 i
Other measuring and controlling device	other 3345	740	720	90	740	720	90	80	80	10
Other computer and electronic products	other 334	220	220	30	220	220	30	70	70	10
Electrical equipment, appliances, and components	335	900	880	70	900	880	60	90	90	20 i
Transportation equipment	336	1,090	980	350 i	1,090	970	350 i	130	120	40
Motor vehicles, bodies, trailers, and parts	3361-63	550	530	100	540	530	100	90	80	20
Aerospace products and parts	3364	380 i	290	230 i	380 i	290	230 i	30	30	10
Aircraft, aircraft engine, and aircraft parts	336411-13	200	180	60	200	180	60	30	30	10
Guided missile, space vehicle, and related parts	336414-15, 336419	190 i	110 i	170 i	190 i	110 i	170 i	10	10	0
Military armored vehicle, tank, and tank component	336992	30	30	10	30	30	10	0	0	0
Other transportation	other 336	150	140	20	150	140	20	20	20	10
Furniture and related products	337	190	190	10	190	190	10	20	20	0
Miscellaneous	339	1,310	1,280	190	1,310	1,280	190	180	170	20
Medical equipment and supplies	3391	790	770	140	790	770	140	110	100	20
Other miscellaneous manufacturing	3399	520	520	50 i	520	520	50 i	80	80	10
Nonmanufacturing industries	21-23, 42-81	13,230	12,010	2,140	13,100	11,880	2,120	1,590	1,500	130
Mining, quarrying, oil and gas extraction, and support activities	21	160	150	30	160	150	30	30	20	10 i
Utilities	22	40	40	10	40	40	10	10	10	0
Wholesale trade	42	1,620	1,560	130	1,560	1,500	130	180 i	180 i	0
Electronic shopping and electronic auctions	454111-12	60	60	10	60	60	10	10 i	10 i	0
Transportation and warehousing	48-49	130	130	10	130	130	10	20 i	20 i	0
Information	51	3,110	3,020	230	3,090	3,000	210	710	700	30
Publishing	511	1,100	1,050	90	1,080	1,040	80	230	230	20
Newspaper, periodical, book, and directory publishers	5111	40	40	10	40	40	10	0	0	0
Software publishers	5112	1,060	1,020	90	1,040	1,000	80	230	230	20
Telecommunications	517	210	210	40	210	210	40	30	30	10
Data processing, hosting, and related services	518	1,480	1,440	70	1,480	1,440	60	390	390	10 i
Other information	other 51	340	330	40	340	330	40	70	70	0
Finance and insurance	52	220	220	10 i	220	220	10	50	50	10

TABLE 4

**Companies with worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by source of funds, industry, and company size: 2019**

(Number of companies)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Real estate and rental and leasing	53	50	50	0	50	50	0	10	10	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	20	0	20	20	0	10	10	0
Other real estate and rental and leasing	other 53	30	30	0	30	30	0	10	10	0
Professional, scientific, and technical services	54	6,540	5,590	1,600	6,500	5,540	1,600	580	500	100
Architectural, engineering, and related services	5413	1,470	1,180	440	1,450	1,160	440	70	40	40
Computer systems design and related services	5415	3,040	2,900	240	3,020	2,880	240	340	340	10
Scientific research and development services	5417	1,240	850	730	1,230	850	730	100	60	50
Research and development in biotechnology	541711	310	210	170	310	210	170	20	20	10
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	630	550	900	630	550	70	50	40
Research and development in the social sciences and humanities	541720	30	20	20	30	20	20	10	10	10
Other professional, scientific, and technical services	other 54	810	670	210	810	670	210	80	70	20
Health care services	621-23	680	560	140	680	560	140	10	10	10
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	690	680	20	680	670	20	30	30	10
All companies (number of domestic employees)	-	28,430	26,450	4,310	28,270	26,270	4,250	3,050	2,920	300
Small companies										
10-19 <sup>a</sup>	-	5,520	5,020	1,040	5,490	4,990	1,040	220	190	50
20-49	-	8,020	7,270	1,320	7,980	7,220	1,310	550	520	40
Medium companies										
50-99	-	5,000	4,770	600	4,960	4,720	590	430	420	30
100-249	-	4,610	4,390	630	4,580	4,350	620	450	430	50
Large companies										
250-499	-	2,150	2,070	230	2,140	2,050	230	320	310	20
500-999	-	1,230	1,180	140	1,230	1,180	130	310	300	20
1,000-4,999	-	1,340	1,230	240	1,330	1,230	220	490	480	50
5,000-9,999	-	240	230	50	240	230	50	130	130	20
10,000-24,999	-	220	220	60	220	220	60	120	120	30
25,000 or more	-	140	140	40	130	130	40	80	80	20

i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Statistics are based on companies in the United States that reported to the survey. No systematic item imputation was applied. Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

**Source(s):**

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

TABLE 5

**Worldwide R&D paid for by the company and performed by the company and others, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Performed by the company	Performed by others
All industries	21-23, 31-33, 42-81	571,019	522,912	48,107
Manufacturing industries	31-33	354,917	311,115	43,802
Food	311	5,036	4,770	266
Beverage and tobacco products	312	1,931	1,644	286
Textile, apparel, and leather products	313-16	1,047	1,030	17
Wood products	321	198	187	11
Paper	322	1,175	1,165	10
Printing and related support activities	323	436	429	7
Petroleum and coal products	324	1,722	1,375	346
Chemicals	325	138,470	105,612	32,859
Basic chemicals	3251	3,035	2,938	96
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,648	1,609	38
Pesticide, fertilizer, and other agricultural chemicals	3253	2,228	1,932	297
Pharmaceuticals and medicines	3254	126,282	94,306	31,977
Soap, cleaning compound, and toilet preparation	3256	3,741	3,354	387
Paint, coating, adhesive, and other chemicals	3255, 3259	1,536	1,473	63
Plastics and rubber products	326	3,345	3,265	80
Nonmetallic mineral products	327	1,714	1,665	49
Primary metals	331	745	722	24
Fabricated metal products	332	2,937	2,899	38
Machinery	333	18,708	18,147	561
Agricultural implement	33311	3,066	2,768	298
Semiconductor machinery	333242	4,756	4,750	6
Engine, turbine, and power transmission equipment	3336	1,735	1,715	21
Other machinery	other 333	9,151	8,915	236
Computer and electronic products	334	103,418	100,510	2,909
Communications equipment	3342	15,881	14,804	1,077
Semiconductor and other electronic components	3344	45,574	44,784	790
Navigational, measuring, electromedical, and control instruments	3345	15,168	14,573	594
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,541	4,393	148
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,306	4,021	285
Other measuring and controlling device	other 3345	6,321	6,160	161
Other computer and electronic products	other 334	26,795	26,348	447
Electrical equipment, appliances, and components	335	6,763	6,599	164
Transportation equipment	336	43,959	38,868	5,091
Motor vehicles, bodies, trailers, and parts	3361-63	31,879	27,550	4,329
Aerospace products and parts	3364	10,097	9,392	705
Aircraft, aircraft engine, and aircraft parts	336411-13	9,420	8,833	587
Guided missile, space vehicle, and related parts	336414-15, 336419	677	559	118
Military armored vehicle, tank, and tank component	336992	25	25	0
Other transportation	other 336	1,958	1,901	58
Furniture and related products	337	470	442	28
Miscellaneous	339	22,843	21,786	1,058
Medical equipment and supplies	3391	19,801	18,835	966
Other miscellaneous manufacturing	3399	3,042	2,951	91
Nonmanufacturing industries	21-23, 42-81	216,102	211,797	4,305
Mining, quarrying, oil and gas extraction, and support activities	21	3,255	3,096	159
Utilities	22	417	246	171

TABLE 5

**Worldwide R&D paid for by the company and performed by the company and others, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Performed by the company	Performed by others
Wholesale trade	42	1,270	1,217	53
Electronic shopping and electronic auctions	454111-12	3,282 - 20,096	3,157 - 19,970	125
Transportation and warehousing	48-49	9,609	9,566	43
Information	51	130,517	128,064	2,453
Publishing	511	40,650	39,348	1,302
Newspaper, periodical, book, and directory publishers	5111	65	61	4
Software publishers	5112	40,585	39,287	1,297
Telecommunications	517	4,246	3,823	423
Data processing, hosting, and related services	518	36,377	36,045	332
Other information	other 51	49,244	48,849	396
Finance and insurance	52	10,385	9,982	403
Real estate and rental and leasing	53	1,491	1,476	15
Lessors of nonfinancial intangible assets (except copyrighted works)	533	57	48	9
Other real estate and rental and leasing	other 53	1,434	1,427	7
Professional, scientific, and technical services	54	35,611	34,908	703
Architectural, engineering, and related services	5413	2,426	2,323	103
Computer systems design and related services	5415	23,865	23,689	175
Scientific research and development services	5417	3,723	3,364	359
Research and development in biotechnology	541711	1,260	1,129	131
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,434	2,206	228
Research and development in the social sciences and humanities	541720	29	29	*
Other professional, scientific, and technical services	other 54	5,598	5,532	66
Health care services	621-23	2,027	1,952	76
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,425 - 18,237	1,322 - 18,133	104
All companies (number of domestic employees)	-	571,019	522,912	48,107
Small companies				
10-19 <sup>a</sup>	-	5,199	4,560	639
20-49	-	12,028	10,484	1,544
Medium companies				
50-99	-	14,713	12,165	2,548
100-249	-	20,847	18,498	2,349
Large companies				
250-499	-	19,984	17,995	1,989
500-999	-	26,685	24,356	2,330
1,000-4,999	-	86,167	80,615	5,552
5,000-9,999	-	61,158	54,556	6,602
10,000-24,999	-	104,453	92,569	11,884
25,000 or more	-	219,784	207,115	12,669

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 6

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2019**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Amount
All business activities	21100-81000	571,019
Oil and gas extraction	21100	902
Mining	21200	93 - 4,956
Support activities for mining, including oil and gas	21300	1,650
Utilities	22100	415
Construction	23000	899
Food manufacturing	31100	5,513
Beverage manufacturing	31210	723
Tobacco manufacturing	31220	807
Textile, apparel, and leather products manufacturing	31990	965
Wood products manufacturing	32100	225 - 5,087
Paper manufacturing	32200	1,791
Printing and related support activities	32300	477
Petroleum refineries	32401	525 - 5,388
Asphalt paving, roofing, and saturated materials manufacturing	32402	134
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	106 - 4,969
Basic chemicals manufacturing	32510	3,267
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,803
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	2,919
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	81,409
In vitro diagnostic substances manufacturing	32542	1,591
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	40,986
Soap, cleaning compound, and toilet preparations manufacturing	32591	3,196
Paint, adhesive, and other chemical manufacturing	32592	1,747
Plastics and rubber products manufacturing	32600	3,506
Clay and glass products manufacturing	32710	1,511
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	546
Primary metal manufacturing	33100	851
Fabricated metal products manufacturing	33200	3,129
Agricultural machinery and equipment manufacturing	33311	2,458
Construction machinery manufacturing	33312	1,871
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,300
Semiconductor machinery manufacturing	33321	4,687
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,406
Photographic and photocopying equipment manufacturing	33331	147 - 5,010
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	2,169
Digital cameras manufacturing	33333	463
Engine, turbine, and power transmission equipment manufacturing	33360	3,146
Metalworking and other general purpose machinery manufacturing	33390	2,861
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	25,296
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	11,254
Radio, television, and wireless communication equipment manufacturing	33422	2,475
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	2,293
Audio and video equipment manufacturing	33430	1,714
Semiconductor and other electronic components manufacturing	33440	46,556
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	4,656
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	3,198
Measuring and control instruments manufacturing (not listed elsewhere)	33459	5,370
Electrical equipment, appliances, and components manufacturing	33500	6,455

TABLE 6

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2019**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Amount
Motor vehicles manufacturing	33610	21,793
Motor vehicle body and trailer manufacturing	33620	154 - 5,017
Motor vehicle parts manufacturing	33630	9,439
Aircraft manufacturing	33641	5,404
Aircraft engine and engine parts manufacturing	33642	1,474
Other aircraft parts and auxiliary equipment manufacturing	33643	1,347
Guided missiles, space vehicles, and related parts manufacturing	33644	1,140
Railroad rolling stock manufacturing	33651	210 - 5,073
Ship and boat building	33660	182 - 5,045
Motorcycle, bicycle, and parts manufacturing	33691	437
Military armored vehicle, tank, and tank components manufacturing	33692	381
All other transportation equipment manufacturing	33699	496
Furniture and related products manufacturing	33700	517
Medical equipment and supplies manufacturing	33910	18,875
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	3,117
Merchant wholesalers, durable goods	42300	727
Merchant wholesalers, nondurable goods	42400	1,029
Wholesale electronic markets and agents and brokers (business to business)	42500	32 - 4,895 i
Retail trade (except electronic shopping and electronic auctions)	44000	279 - 5,142
Electronic shopping and electronic auctions	45411	0 - 15,636 i
Transportation	48000	9,072
Couriers, messengers, and express delivery services	49200	290
Warehousing and storage	49300	162 i
Newspaper, periodical, book, and directory publishers (except Internet)	51110	88
Software publishers (except Internet)	51120	31,585
Motion picture and sound recording (except Internet)	51200	52 - 4,915
Broadcasting (except Internet)	51500	500
Wired telecommunications carriers	51710	428
Wireless telecommunications carriers (except satellite)	51720	2,641
Satellite telecommunications	51740	486
Other telecommunications (not listed elsewhere)	51790	610
Data processing, hosting, and related services	51800	10,108
Cloud computing applications and Internet-based software services	51801	33,022
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	53,120
Finance: banking and credit intermediation	52200	5,718
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,654
Insurance carriers and related activities	52400	2,607
Real estate	53100	398
Rental and leasing services	53200	1,067
Lessors of nonfinancial intangible assets, including patent licensing	53300	71
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	2,117
Architectural, engineering, and related services	54130	2,720
Specialized design services	54140	111 - 4,974
Computer systems design and related services	54150	22,598
Management, scientific, and technical consulting services	54160	2,004
Research and development services in social sciences and humanities	54172	28
Research and development services in biotechnology	54173	1,151
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	2,885
Advertising and related services	54180	1,261 i



TABLE 6

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2019**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Amount
Professional, scientific, and technical services (not listed elsewhere)	54190	1,264
Management of companies and enterprises	55100	0 - 15,636
Administrative and support services	56100	3,576
Waste management and remediation services	56200	16 - 4,879
Offices of physicians	62110	196
Medical and diagnostic laboratories	62150	2,104
Other ambulatory health care services (ambulance, dental, home health care)	62199	146 - 5,009
Hospitals and nursing care facilities	62200	0 - 15,636
Social assistance services	62400	0 - 15,636
Arts, entertainment, and recreation	71000	479
Accommodation and food services	72000	79 - 4,942
Other services (not listed elsewhere)	81000	514
Undistributed	-	0

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

<sup>a</sup> Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

<sup>b</sup> Business codes and descriptions are based on 2012 North American Industry Classification System industry definitions.

**Note(s):**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 7

**Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Performed by the company	Performed by others
All industries	21–23, 31–33, 42–81	83,738	74,508	9,230
Manufacturing industries	31–33	46,404	38,909	7,496
Food	311	256	245	12
Beverage and tobacco products	312	114	111	3
Textile, apparel, and leather products	313–16	31	31	0
Wood products	321	6	6	*
Paper	322	1	*	*
Printing and related support activities	323	0	0	0
Petroleum and coal products	324	105	102 - 106	0 - 3
Chemicals	325	15,645	10,020	5,625
Basic chemicals	3251	165	164	1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	85 - 140	85	0 - 55
Pesticide, fertilizer, and other agricultural chemicals	3253	360 - 374	340 - 365	0 - 33
Pharmaceuticals and medicines	3254	14,721	9,181	5,540
Soap, cleaning compound, and toilet preparation	3256	195	164	31
Paint, coating, adhesive, and other chemicals	3255, 3259	59 - 113	59 - 87	0 - 47
Plastics and rubber products	326	137	94	43
Nonmetallic mineral products	327	35	35	*
Primary metals	331	21	19	3
Fabricated metal products	332	285	264	21
Machinery	333	1,347	1,288	59
Agricultural implement	33311	11	11	0
Semiconductor machinery	333242	662	623	38
Engine, turbine, and power transmission equipment	3336	231	216	15
Other machinery	other 333	443	438	5
Computer and electronic products	334	12,275	11,671	604
Communications equipment	3342	1,139	1,103 - 1,107	32 - 36
Semiconductor and other electronic components	3344	3,472	3,405	66
Navigational, measuring, electromedical, and control instruments	3345	7,432	6,939	493
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	239	229	10
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,960	6,520	440
Other measuring and controlling device	other 3345	233	191	43
Other computer and electronic products	other 334	232	220 - 223	10 - 13
Electrical equipment, appliances, and components	335	409	407	2
Transportation equipment	336	15,401	14,319	1,082
Motor vehicles, bodies, trailers, and parts	3361–63	3,761	3,559	201
Aerospace products and parts	3364	10,428	9,551	877
Aircraft, aircraft engine, and aircraft parts	336411–13	9,520	8,643	877
Guided missile, space vehicle, and related parts	336414–15, 336419	908	908	0
Military armored vehicle, tank, and tank component	336992	10	10	0
Other transportation	other 336	1,202	1,198	3
Furniture and related products	337	2	2	*
Miscellaneous	339	335	292 - 298	36 - 43
Medical equipment and supplies	3391	284	248	36
Other miscellaneous manufacturing	3399	50	44 - 50	0 - 7

TABLE 7

**Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Performed by the company	Performed by others
Nonmanufacturing industries	21–23, 42–81	37,334	35,600	1,734
Mining, quarrying, oil and gas extraction, and support activities	21	211	211	*
Utilities	22	49	38	11
Wholesale trade	42	90	87	3
Electronic shopping and electronic auctions	454111–12	43 - 61	43 - 61	0
Transportation and warehousing	48–49	386	386	0
Information	51	1,289	1,213	76
Publishing	511	667	620	47
Newspaper, periodical, book, and directory publishers	5111	*	*	0
Software publishers	5112	667	620	47
Telecommunications	517	36	33	3
Data processing, hosting, and related services	518	424	404	20
Other information	other 51	161	155	6
Finance and insurance	52	111	110	* i
Real estate and rental and leasing	53	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0
Other real estate and rental and leasing	other 53	0	0	0
Professional, scientific, and technical services	54	34,756	33,115	1,641
Architectural, engineering, and related services	5413	2,292	1,921	370
Computer systems design and related services	5415	2,774	2,727	47
Scientific research and development services	5417	28,452	27,311	i 1,141
Research and development in biotechnology	541711	8,243	8,121	122
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	19,341	i 18,444	i 897
Research and development in the social sciences and humanities	541720	867	745	122
Other professional, scientific, and technical services	other 54	1,238	1,156	82
Health care services	621–23	341	338	4
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	37 - 62	37 - 62	0
All companies (number of domestic employees)	–	83,738	74,508	9,230
Small companies				
10–19 <sup>a</sup>	–	1,229	1,079	150
20–49	–	2,753	2,392	362
Medium companies				
50–99	–	2,979	2,593	386
100–249	–	3,851	3,487	364
Large companies				
250–499	–	4,002	3,597	405
500–999	–	2,777	2,566	211
1,000–4,999	–	14,093	11,609	2,484
5,000–9,999	–	9,163	8,220	943
10,000–24,999	–	21,568	19,307	i 2,261
25,000 or more	–	21,322	19,658	1,664

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 8

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders <sup>a</sup>			Domestic R&D performers <sup>b</sup>		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
All industries	21–23, 31–33, 42–81	14,897,629	11,180,864	3,716,765	14,253,081	10,627,588	3,625,493
Manufacturing industries	31–33	8,202,736	5,675,165	2,527,572	8,083,975	5,594,377	2,489,598
Food	311	778,392	561,592	216,800	777,972	561,172	216,800
Beverage and tobacco products	312	266,203	167,169	99,033	234,334	167,169	67,165
Textile, apparel, and leather products	313–16	93,677	64,883	28,795	93,330	64,536	28,795
Wood products	321	42,764	39,815	2,949	42,546	39,597	2,949
Paper	322	115,005	87,338	27,667	113,880	87,136	26,743
Printing and related support activities	323	68,259 i	58,316 i	9,943 i	68,259 i	58,316 i	9,943 i
Petroleum and coal products	324	503,166	286,579	216,587	503,166	286,579	216,587
Chemicals	325	1,602,955	1,161,526	441,429	1,600,810	1,159,765	441,045
Basic chemicals	3251	363,627	300,539	63,088	363,627	300,539	63,088
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	106,740	64,108	42,632	106,740	64,108	42,632
Pesticide, fertilizer, and other agricultural chemicals	3253	95,707	84,556	11,151	95,673	84,522	11,151
Pharmaceuticals and medicines	3254	733,143	536,020	197,122	732,059	534,959	197,100
Soap, cleaning compound, and toilet preparation	3256	201,274	112,889	88,385	201,274	112,889	88,385
Paint, coating, adhesive, and other chemicals	3255, 3259	102,464	63,413	39,051	101,437	62,747	38,690
Plastics and rubber products	326	257,562	200,238	57,324	256,084	198,761	57,324
Nonmetallic mineral products	327	71,067	55,132	15,935 i	60,062	46,046	14,016 i
Primary metals	331	151,020	123,828	27,193	149,813	122,620	27,193
Fabricated metal products	332	170,530	130,549	39,981	168,293	128,658	39,635
Machinery	333	567,290	363,337	203,952	565,719	362,718	203,001
Agricultural implement	33311	82,237	47,403	34,834	81,540	47,108	34,432
Semiconductor machinery	333242	44,310	24,680	19,629	44,310	24,680	19,629
Engine, turbine, and power transmission equipment	3336	65,642	36,617	29,025	65,642	36,617	29,025
Other machinery	other 333	375,101	254,637	120,464	374,226	254,312	119,914
Computer and electronic products	334	1,217,221	678,010	539,211	1,216,687	677,658	539,030
Communications equipment	3342	131,370	88,064	43,306	131,080	87,774	43,306
Semiconductor and other electronic components	3344	394,412	206,402	188,010	394,181	206,352	187,829
Navigational, measuring, electromedical, and control instruments	3345	271,168	183,042	88,127	271,162	183,035	88,127
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	51,965	29,901	22,064	51,958	29,894	22,064
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	106,313	76,145	30,169	106,313	76,145	30,169

TABLE 8

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders <sup>a</sup>			Domestic R&D performers <sup>b</sup>		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Other measuring and controlling device	other 3345	112,890	76,997	35,894	112,890	76,997	35,894
Other computer and electronic products	other 334	420,270	200,502	219,768	420,264	200,496	219,768
Electrical equipment, appliances, and components	335	219,868	142,538	77,330	219,805	142,474	77,330
Transportation equipment	336	1,519,757	1,164,905	354,852	1,455,556	1,102,104	353,452
Motor vehicles, bodies, trailers, and parts	3361-63	1,099,951	805,202	294,749	1,035,750	742,401	293,349
Aerospace products and parts	3364	323,341	280,327	43,014	323,341	280,327	43,014
Aircraft, aircraft engine, and aircraft parts	336411-13	314,711	271,821	42,889	314,711	271,821	42,889
Guided missile, space vehicle, and related parts	336414-15, 336419	8,630	8,506	125	8,630	8,506	125
Military armored vehicle, tank, and tank component	336992	963	963	0	963	963	0
Other transportation	other 336	95,502	78,412	17,089	95,502	78,412	17,089
Furniture and related products	337	45,381	40,782	4,599	45,314	40,715	4,599
Miscellaneous	339	512,620	348,628	163,991	512,344	348,353	163,991
Medical equipment and supplies	3391	354,397	245,191	109,206	354,122	244,916	109,206
Other miscellaneous manufacturing	3399	158,222	103,437	54,785	158,222	103,437	54,785
Nonmanufacturing industries	21-23, 42-81	6,694,893	5,505,700	1,189,193	6,169,106	5,033,211	1,135,895
Mining, quarrying, oil and gas extraction, and support activities	21	326,360	181,130	145,230	326,360	181,130	145,230
Utilities	22	324,549	317,985	6,564	257,178	250,615	6,564
Wholesale trade	42	132,106	125,430	6,677	127,821	122,212	5,609
Electronic shopping and electronic auctions	454111-12	270,483 - 428,858	270,484	0 - 158,373	270,483 - 428,858	270,484	0 - 158,373
Transportation and warehousing	48-49	369,527	281,963	87,564	369,014	281,466	87,548
Information	51	1,852,384	1,435,124	417,259	1,832,964	1,420,447	412,516
Publishing	511	285,932	187,092	98,841	284,966	186,130	98,836
Newspaper, periodical, book, and directory publishers	5111	1,116	1,089	27	1,054	1,027	27
Software publishers	5112	284,817	186,003	98,814	283,913	185,103	98,809
Telecommunications	517	530,754	510,517	20,237	529,508	509,272	20,236
Data processing, hosting, and related services	518	606,746	478,977	127,769	606,640	478,961	127,678
Other information	other 51	428,951	258,538	170,413	411,850	246,084	165,766
Finance and insurance	52	1,678,912	1,568,443	110,468	1,426,187	1,323,379	102,808
Real estate and rental and leasing	53	12,557	9,252	3,305	12,552	9,247	3,305
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1,048	1,024	24	1,044	1,020	24
Other real estate and rental and leasing	other 53	11,509	8,228	3,281	11,509	8,228	3,281

TABLE 8

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders <sup>a</sup>			Domestic R&D performers <sup>b</sup>		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Professional, scientific, and technical services	54	700,442	486,234	214,208	695,900	482,364	213,536
Architectural, engineering, and related services	5413	124,288	102,324	21,964	122,569	100,905	21,664
Computer systems design and related services	5415	335,408	197,389	138,018	333,200	195,512	137,688
Scientific research and development services	5417	98,632	81,094	17,539	98,314	80,775	17,539
Research and development in biotechnology	541711	35,636	31,250	4,386	35,612	31,226	4,386
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	61,710	48,646	13,064	61,440	48,375	13,064
Research and development in the social sciences and humanities	541720	1,287	1,199	88	1,262	1,174	88
Other professional, scientific, and technical services	other 54	142,114	105,428	36,686	141,817	105,172	36,645
Health care services	621-23	135,069	134,658	410	134,828	134,418	410
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	734,128 - 892,507	694,995	39,134 - 197,512	557,446 - 715,821	557,447	0 - 158,373
All companies (number of domestic employees)	-	14,897,629	11,180,864	3,716,765	14,253,081	10,627,588	3,625,493
Small companies							
10-19 <sup>c</sup>	-	22,697	22,272	426	22,225	21,822	403
20-49	-	114,158	108,914	5,244	111,381	107,012	4,369
Medium companies							
50-99	-	126,146	120,557	5,589	121,993	118,064	3,930
100-249	-	324,503	267,171	57,332	289,065	264,042	25,023
Large companies							
250-499	-	338,682	300,032	38,651	330,756	294,480	36,277
500-999	-	440,795	371,248	69,547	435,634	366,154	69,480
1,000-4,999	-	1,945,194	1,475,601	469,594	1,923,534	1,455,656	467,878
5,000-9,999	-	1,498,357	1,141,851	356,506	1,451,157	1,101,217	349,940
10,000-24,999	-	3,108,788	2,115,325	993,464	3,051,470	2,058,006	993,464
25,000 or more	-	6,978,308	5,257,895	1,720,413	6,515,865	4,841,134	1,674,731

i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics are representative of companies located in the United States that performed or funded R&D.<sup>b</sup> Statistics are representative of companies located in the United States that performed R&D.<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Domestic sales are the amount of sales that originated from domestic operations. Foreign sales are the amount of sales that originated from foreign operations. Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.



TABLE 9

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2019**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Sales		
		Worldwide	Domestic	Foreign
All business activities	21100–81000	14,897,629	11,180,864	3,716,765
Oil and gas extraction	21100	134,817	76,461	58,356
Mining	21200	18,446	16,249	2,197
Support activities for mining, including oil and gas	21300	89,977	52,988	36,989
Utilities	22100	304,374	299,499	4,875
Construction	23000	94,478	86,185	8,293
Food manufacturing	31100	779,512	565,706	213,805
Beverage manufacturing	31210	119,563	78,304	41,260
Tobacco manufacturing	31220	70,749	38,302	32,447
Textile, apparel, and leather products manufacturing	31990	77,152	52,980	24,172
Wood products manufacturing	32100	41,886	35,775	6,111
Paper manufacturing	32200	157,322	121,784	35,538
Printing and related support activities	32300	65,659 i	55,322 i	10,337 i
Petroleum refineries	32401	565,617	362,033	203,584
Asphalt paving, roofing, and saturated materials manufacturing	32402	18,425	12,625	5,800
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	11,434	10,453	981
Basic chemicals manufacturing	32510	229,696	162,308	67,388
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	111,490	71,464	40,026
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	67,393	55,221	12,172
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	556,641	390,793	165,848
In vitro diagnostic substances manufacturing	32542	16,743	9,203	7,540
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	125,658	110,171	15,487
Soap, cleaning compound, and toilet preparations manufacturing	32591	178,605	98,956	79,648
Paint, adhesive, and other chemical manufacturing	32592	122,390	79,963	42,427
Plastics and rubber products manufacturing	32600	208,281	147,611	60,670
Clay and glass products manufacturing	32710	39,831	24,278	15,553 i
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	46,774	40,945	5,829
Primary metal manufacturing	33100	152,375	124,730	27,645
Fabricated metal products manufacturing	33200	181,995	131,704	50,291
Agricultural machinery and equipment manufacturing	33311	64,372	36,555	27,817
Construction machinery manufacturing	33312	80,265	49,639	30,626
Mining, oil, and gas field machinery and equipment manufacturing	33319	68,949	41,577	27,372
Semiconductor machinery manufacturing	33321	45,318	24,628	20,690
Industrial machinery manufacturing (except semiconductor machinery)	33322	38,121	28,420	9,702
Photographic and photocopying equipment manufacturing	33331	836	710	127
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	115,672	80,311	35,361
Digital cameras manufacturing	33333	3,382	1,765	1,617
Engine, turbine, and power transmission equipment manufacturing	33360	107,601	55,906	51,695
Metalworking and other general purpose machinery manufacturing	33390	101,485	75,149	26,336
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	457,916	212,050	245,866
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	79,503	44,013	35,490
Radio, television, and wireless communication equipment manufacturing	33422	37,126	30,687	6,439 i

TABLE 9

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2019**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Sales		
		Worldwide	Domestic	Foreign
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	16,059	14,584	1,476
Audio and video equipment manufacturing	33430	16,217	7,917	8,299
Semiconductor and other electronic components manufacturing	33440	465,467	224,875	240,592
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	49,345	31,332	18,014
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	73,069	62,412	10,658
Measuring and control instruments manufacturing (not listed elsewhere)	33459	84,362	55,700	28,662
Electrical equipment, appliances, and components manufacturing	33500	222,663	145,801	76,861
Motor vehicles manufacturing	33610	529,227	406,293	122,934
Motor vehicle body and trailer manufacturing	33620	45,991	44,214	1,777
Motor vehicle parts manufacturing	33630	278,559	182,796	95,763
Aircraft manufacturing	33641	144,831	139,088	5,743
Aircraft engine and engine parts manufacturing	33642	54,264	32,679	21,585
Other aircraft parts and auxiliary equipment manufacturing	33643	58,491	47,652	10,839
Guided missiles, space vehicles, and related parts manufacturing	33644	35,217	32,444	2,774
Railroad rolling stock manufacturing	33651	13,506	8,091	5,415
Ship and boat building	33660	24,057	21,988	2,069
Motorcycle, bicycle, and parts manufacturing	33691	10,979	6,948	4,031
Military armored vehicle, tank, and tank components manufacturing	33692	15,405	13,848	1,557
All other transportation equipment manufacturing	33699	17,730	16,191	1,539
Furniture and related products manufacturing	33700	51,330	46,013	5,317
Medical equipment and supplies manufacturing	33910	301,096	200,226	100,869
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	119,361	89,861	29,501
Merchant wholesalers, durable goods	42300	165,955	149,138	16,817
Merchant wholesalers, nondurable goods	42400	602,072	445,786	156,286
Wholesale electronic markets and agents and brokers (business to business)	42500	5,340	5,089	251
Retail trade (except electronic shopping and electronic auctions)	44000	662,471	582,203	80,268
Electronic shopping and electronic auctions	45411	168,456 - 333,088	168,457	0 - 164,630
Transportation	48000	387,986	299,235	88,751
Couriers, messengers, and express delivery services	49200	2,034	2,014	20
Warehousing and storage	49300	15,949	8,413	7,536
Newspaper, periodical, book, and directory publishers (except Internet)	51110	7,147	5,585	1,562
Software publishers (except Internet)	51120	237,902	143,184	94,718
Motion picture and sound recording (except Internet)	51200	46,587	43,317	3,270
Broadcasting (except Internet)	51500	185,587	145,898	39,689
Wired telecommunications carriers	51710	139,262	137,035	2,226
Wireless telecommunications carriers (except satellite)	51720	264,976	264,971	5
Satellite telecommunications	51740	51,337	51,267	70
Other telecommunications (not listed elsewhere)	51790	19,438	13,883	5,555
Data processing, hosting, and related services	51800	98,036	69,214	28,822
Cloud computing applications and Internet-based software services	51801	218,846	169,605	49,241
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	219,808	124,726	95,082
Finance: banking and credit intermediation	52200	629,562	574,882	54,679
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	97,896	67,833	30,063

TABLE 9

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2019**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Sales		
		Worldwide	Domestic	Foreign
Insurance carriers and related activities	52400	1,069,279	1,031,450	37,830 i
Real estate	53100	17,104	16,881	223
Rental and leasing services	53200	12,743	8,259	4,484
Lessors of nonfinancial intangible assets, including patent licensing	53300	1,671	1,614	56
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	29,565	26,427	3,139
Architectural, engineering, and related services	54130	127,409	110,906	16,502
Specialized design services	54140	12,640	3,752	8,888
Computer systems design and related services	54150	238,778	149,589	89,189
Management, scientific, and technical consulting services	54160	57,882	49,880	8,002 i
Research and development services in social sciences and humanities	54172	1,233	1,144	89
Research and development services in biotechnology	54173	13,214	9,066	4,148
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	49,481	38,427	11,054 i
Advertising and related services	54180	84,177 - 248,809	84,178	0 - 164,630
Professional, scientific, and technical services (not listed elsewhere)	54190	23,046	19,061	3,986 i
Management of companies and enterprises	55100	13,249	13,209	40
Administrative and support services	56100	89,404	62,356	27,048
Waste management and remediation services	56200	11,623	11,342	281
Offices of physicians	62110	102,792	102,792	0
Medical and diagnostic laboratories	62150	38,599	34,462	4,136 i
Other ambulatory health care services (ambulance, dental, home health care)	62199	22,807	22,613	194
Hospitals and nursing care facilities	62200	25,795	25,795	0
Social assistance services	62400	108	108	0
Arts, entertainment, and recreation	71000	37,623	31,887	5,736
Accommodation and food services	72000	84,334	56,337	27,997
Other services (not listed elsewhere)	81000	109,756	90,936	18,820 i
Less: intersegment eliminations	-	182,972	117,720	65,252
Undistributed	-	0	0	0

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

<sup>a</sup> Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

<sup>b</sup> Business codes and descriptions are based on 2012 North American Industry Classification System industry definitions.

**Note(s):**

Domestic sales are the amount of sales that originated from domestic operations. Foreign sales are the amount of sales that originated from foreign operations. Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 10

## Domestic R&amp;D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
All industries	21-23, 31-33, 42-81	492,956	267,998	39,045	21,352	7,190	34,426	8,236	18,861	9,238	16,879	69,732
Manufacturing industries	31-33	285,674	145,807	11,847	10,640	3,567	29,600	4,202	12,419	8,878	10,459	48,253
Food	311	4,180	2,582	69	92	14	470	72	181	1	186	514
Beverage and tobacco products	312	1,082	562	10	44	3	91	12	52	0	72	237
Textile, apparel, and leather products	313-16	904	569	17	22	10	198	5	14	*	12	57
Wood products	321	186	144	0	4	*	21	9	2	0	2	5 i
Paper	322	1,064	435	*	6 i	1 i	485	7 i	8 i	1 i	12 i	108
Printing and related support activities	323	420 i	285 i	0	4 i	1	64	8 i	5	* i	7	46
Petroleum and coal products	324	1,306	666	*	17	7	41	4	40 - 49	*	295	223 - 239
Chemicals	325	97,063	40,466	4,582	5,557	719	8,598	1,552	3,961	7,410	4,904	19,314
Basic chemicals	3251	2,360	1,381	4	43	18	242	42	167	23	146	294
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172	789	1	46	2	99	14	73	3	53	94
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846	951	*	257	2	162	109	104 - 133	27	64	128 - 160
Pharmaceuticals and medicines	3254	87,619	34,813	4,565	5,124	686	7,834	1,346	3,451	7,357	4,601	17,843
Soap, cleaning compound, and toilet preparation	3256	2,760	1,645	12	75	1	161	26	97	*	23	719
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333	887	*	13	10	100	15	42 - 71	*	18	203 - 234
Plastics and rubber products	326	2,856	1,655	22	49	44	458	20	85	6	97	420
Nonmetallic mineral products	327	1,508 i	847 i	6	15	20 i	227 i	20 i	61 i	0	47 i	265 i
Primary metals	331	665	370	4	5	3	161	1	27	4	39	51
Fabricated metal products	332	2,885	1,891	58	106	44	422	16	47	9	44	249 i
Machinery	333	15,184	8,772	262	581	134	2,129	183	605	35	331	2,154
Agricultural implement	33311	1,921	1,037	0	136	4	256	6	35	3	41	403
Semiconductor machinery	333242	4,459	2,337	201	27	5	509	119	351	*	148	762
Engine, turbine, and power transmission equipment	3336	1,301	778	5	21	19	142	13	50	11	14 i	248
Other machinery	other 333	7,503	4,620	56	397	105 i	1,222	45	168	21	129	741 i
Computer and electronic products	334	86,729	45,997	6,253	1,629	1,566	6,111	1,766	5,366	777	2,424	14,840
Communications equipment	3342	12,595	7,468	705	401	187	306	931	574	17	186	1,820

TABLE 10

**Domestic R&D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Semiconductor and other electronic components	3344	35,183	17,781	1,754	459	301	2,628	319	2,784	460	504	8,193
Navigational, measuring, electromedical, and control instruments	3345	17,562	11,240	346	574	204	1,982	140	333	10	371	2,362
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342	1,899	191	137	46	193	76	73	2	180	546
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662	6,346	66	345	76	1,400	34	162	5	73	1,155
Other measuring and controlling device	other 3345	4,558	2,995	89	92	82	390	31	98	3	118	660
Other computer and electronic products	other 334	21,388	9,509	3,447	195	874	1,195	375	1,675	290	1,363	2,465
Electrical equipment, appliances, and components	335	5,263	3,331	106	230	65	483	103	135	10	176	625
Transportation equipment	336	45,375	26,379	18	1,448	571	8,120	303	1,153	504	769	6,108
Motor vehicles, bodies, trailers, and parts	3361-63	24,117	15,202	3	1,123	514	3,288	261	967	471	183	2,104
Aerospace products and parts	3364	18,358	9,332	3 - 6	244	35	4,328	19	139 - 165	4	521	3,701 - 3,735
Aircraft, aircraft engine, and aircraft parts	336411-13	16,891	8,528	3	176	33	4,051	13	133	4	501	3,450
Guided missile, space vehicle, and related parts	336414-15, 336419	1,467	805	0 - 3	68	2	277	5	6 - 32	1	20	251 - 285
Military armored vehicle, tank, and tank component	336992	35	20 - 30	*	0 - 9	*	5	0 - 9	*	*	*	0 - 10
Other transportation	other 336	2,865	1,814 - 1,825	9 - 13	71 - 83	21	499	13 - 25	22 - 48	28	65	258 - 304
Furniture and related products	337	409	290	3	11	1	50	2	8	3	6	35
Miscellaneous	339	18,596	10,567	438	820	365	1,472	120	666 - 674	119	1,035	2,983 - 2,997
Medical equipment and supplies	3391	16,014	8,767	422	731	315	1,208	99	623	70	1,005	2,775
Other miscellaneous manufacturing	3399	2,582	1,800	15	89	51	263	21	43 - 52	50	30	209 - 223
Nonmanufacturing industries	21-23, 42-81	207,283	122,191	27,198	10,711	3,623	4,826	4,034	6,442	359	6,420	21,479
Mining, quarrying, oil and gas extraction, and support activities	21	2,717	1,636	0 - 292	158	17	333	35	92	2	78	77 - 370
Utilities	22	275	113	*	9	1	8	1	0 - 100	3	23	17 - 121
Wholesale trade	42	1,191	777	3	26	2	68	26	18	*	7	264

TABLE 10

## Domestic R&amp;D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Electronic shopping and electronic auctions	454111-12	3,131 - 15,818	16 - 9,465	0 - 2,447	117	0 - 192	57	0 - 228	0 - 793	0	5	0 - 4,141
Transportation and warehousing	48-49	9,890	3,310	4,683	521	51	156	94	71	34	290	680
Information	51	110,227	65,595	18,499	5,766	2,571	796	2,806	3,099	230	1,805	9,061
Publishing	511	33,019	21,046	4,001	1,576	281	432	334	382	91	1,279	3,596
Newspaper, periodical, book, and directory publishers	5111	61	55	*	2	1	*	*	*	0	1	2
Software publishers	5112	32,958	20,991	4,001	1,574	281	432	334	382	91	1,279	3,594
Telecommunications	517	3,733	2,742	39	609	15	79	40	33	1	128	45
Data processing, hosting, and related services	518	30,558	20,672	4,005	736	382	212	609	492	120	309	3,020
Other information	other 51	42,917	21,134	10,453	2,844	1,894	73	1,823	2,191	16	89	2,400
Finance and insurance	52	8,917	5,644	357	1,778	114	41	43	534	11	72	324
Real estate and rental and leasing	53	1,371	887	102	53	49	3	2	2 - 258	0	0	19 - 275
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	17	2	1	1	1	*	3	0	0	20
Other real estate and rental and leasing	other 53	1,326	870	100	53	48	2	2	0 - 255	0	0	0 - 255
Professional, scientific, and technical services	54	53,233	33,455	1,055	1,793	601	2,951	764	1,801	74	4,074	6,665
Architectural, engineering, and related services	5413	4,207	3,120	6	88	16	390	35	21	5	187	341
Computer systems design and related services	5415	21,046	14,921	721	717	346	494	191	722	23	337	2,575
Scientific research and development services	5417	21,669	10,899	201	686	136	1,665	428	838	36	3,407	3,373
Research and development in biotechnology	541711	6,457	3,051	70	177	16	453	119	181	19	1,298	1,072
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446	7,249	115	490	113	1,199	287	641	17	2,083	2,252
Research and development in the social sciences and humanities	541720	766	599	16	19	6	13	22	15	0	27	48
Other professional, scientific, and technical services	other 54	6,312	4,515	128	303	103	403	110	220	10	143	376
Health care services	621-23	2,265	1,309	55	233	30	303	37	35	1	33	229

TABLE 10

**Domestic R&D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,380 - 14,067	0 - 9,453	0 - 2,447	257 i	0 - 192	110	0 - 230	0 - 794	5	32	0 - 4,146 i
All companies (number of domestic employees)	-	492,956	267,998	39,045	21,352	7,190	34,426	8,236	18,861	9,238	16,879	69,732
Small companies												
10-19 <sup>a</sup>	-	5,501	3,210	57 i	314	61	723	99	113	42	318	565 i
20-49	-	12,418	7,929	175	436	88	1,222	301	221	58	416	1,573
Medium companies												
50-99	-	14,021	8,026	416	495	134	1,471	323	270	321	836	1,731
100-249	-	19,793	12,233	718	712	202	1,946	363	466	150	881	2,121
Large companies												
250-499	-	18,883	11,044	933	826	376	1,859	366	413	119	626	2,319
500-999	-	23,969	13,514	1,167	1,107	239	1,766	462	739	1,297	627	3,051
1,000-4,999	-	75,671	43,445	7,191	2,589	964	4,453	1,099	2,745	742	2,795	9,649
5,000-9,999	-	50,811	26,130	2,833	2,180	438	2,990	796	2,268	4,341	1,344 i	7,490
10,000-24,999	-	88,263	45,843	7,329	3,928	936	6,456	847	4,058	833	4,783 i	13,250
25,000 or more	-	183,626	96,626	18,225	8,764	3,752	11,542	3,582	7,567	1,334	4,253	27,982

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&amp;D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. 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&amp;D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.



TABLE 11

## Domestic R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more
All industries	21-23, 31-33, 42-81	492,956	5,501	12,418	14,021	19,793	18,883	23,969	75,671	50,811	88,263	183,626
Manufacturing industries	31-33	285,674	2,301	5,455	7,925	11,137	10,478	14,808	45,577	35,737	59,274	92,981
Food	311	4,180	25	29	98	243	196	208	592	237	1,696	856
Beverage and tobacco products	312	1,082	15	18	16	10	116	26	21	213	101	546
Textile, apparel, and leather products	313-16	904	22	68	9	40	26	14	190	282	86	166
Wood products	321	186	0	4	5	22	5	13	45	85	7	0
Paper	322	1,064	2	12	6	29	24	10	76	119	341	446
Printing and related support activities	323	420	123	4	18	22	52	11	29	72	89	0
Petroleum and coal products	324	1,306	1	4	0 - 140	34	39	129	44	0 - 279	0 - 193	457 - 1,050
Chemicals	325	97,063	947	2,251	4,577	4,938	4,282	5,450	14,084	13,522	30,612	16,401
Basic chemicals	3251	2,360	0 - 48	103	42 - 56	141 - 161	103	149	1,146	263 - 349	308	14 - 21
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172	0 - 48	14	26	98	32	64	170	0	717 - 772	0
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846	21	22	33	39	26	25	512	695 - 783	362 - 476	0
Pharmaceuticals and medicines	3254	87,619	859	2,048	4,330	4,446	3,980	5,128	11,411	12,099	27,236	16,080
Soap, cleaning compound, and toilet preparation	3256	2,760	21	14	49	117	50	33	348	379	1,567	181
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333	0 - 48	49	82 - 99	77 - 97	91	51	498	0	251 - 366	120 - 127
Plastics and rubber products	326	2,856	9	53	159	227	240	323	701	633	336	174
Nonmetallic mineral products	327	1,508	*	10	27	29	14	190	168	56	1,014	0
Primary metals	331	665	3	17	16	108	24	46	234	98	110	9
Fabricated metal products	332	2,885	136	230	294	544	352	420	666	154	88	0
Machinery	333	15,184	159	657	639	1,038	555	779	2,967	4,003	1,387	3,000
Agricultural implement	33311	1,921	4	48	13	49	20	82	270	141	0	1,294
Semiconductor machinery	333242	4,459	0 - 126	62	47	88	45	154	1,267	2,666 - 2,799	0	0
Engine, turbine, and power transmission equipment	3336	1,301	19	51	3	35	56	75	91	622	350	0
Other machinery	other 333	7,503	10 - 136	496	576	865	434	469	1,339	440 - 575	1,037	1,706
Computer and electronic products	334	86,729	275	1,362	1,113	1,859	2,481	3,781	15,071	10,043	13,974	36,769



TABLE 11

## Domestic R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)													
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more			
Communications equipment	3342	12,595	0-120	227	36-301	218	371	910	2,568	2,137	i	280-1,523	4,218-5,850		
Semiconductor and other electronic components	3344	35,183	i	0-120	538	274	1,016	1,537	1,508	5,643	5,634	i	9,717	9,192-9,320	i
Navigational, measuring, electromedical, and control instruments	3345	17,562	156	i	557	536	494	430	858	3,872	602	2,736	i	7,321	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342	76	i	132	235	129	131	534	1,186	0	918	i	0	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662	8	105	103	109	136	20	980	338	1,201	i	6,662		
Other measuring and controlling device	other 3345	4,558	72	320	198	256	162	303	1,705	264	617	659			
Other computer and electronic products	other 334	21,388	0-120	39	2-267	131	143	505	2,988	1,670	i	0-1,241	i	14,302-15,913	
Electrical equipment, appliances, and components	335	5,263	154	174	201	298	228	888	1,377	482	831	630			
Transportation equipment	336	45,375	252	i	140	250	889	1,003	1,651	5,223	3,804	4,205	27,959		
Motor vehicles, bodies, trailers, and parts	3361-63	24,117	12	14	0-84	392-513	838	1,057	3,390	2,653	i	1,967-2,451	13,106-13,796		
Aerospace products and parts	3364	18,358	i	234	i	85	143	342	109	401	1,610	572	1,748	13,114	i
Aircraft, aircraft engine, and aircraft parts	336411-13	16,891	i	15	63	73	255	107	401	571	544	1,748	13,114	i	
Guided missile, space vehicle, and related parts	336414-15, 336419	1,467	220	i	22	69	87	2	0	1,039	27	0	0		
Military armored vehicle, tank, and tank component	336992	35	6	*	24	1	5	0	0	0	0	0	0		
Other transportation	other 336	2,865	0	41	0-85	34-155	52	193	223	579	7-491	1,048-1,738			
Furniture and related products	337	409	0	4	27	33	22	35	116	157	15	0			
Miscellaneous	339	18,596	177	417	339-479	775	819	834	3,972	1,505-1,785	4,196-4,390	4,980-5,562			
Medical equipment and supplies	3391	16,014	163	317	339	587	631	470	2,821	1,506	4,197	4,981			
Other miscellaneous manufacturing	3399	2,582	14	100	0-140	188	188	364	1,151	0-279	i	0-193	0-581		
Nonmanufacturing industries	21-23, 42-81	207,283	3,200	6,963	6,095	8,657	8,404	9,161	30,094	15,074	28,989	i	90,645		
Mining, quarrying, oil and gas extraction, and support activities	21	2,717	9	8	422	4	56	45	66	256	1,852	0			
Utilities	22	275	*	10	1	5	0	0-161	66	3	0-161	32-193			
Wholesale trade	42	1,191	99	543	135	231	132	i	23	19	i	0	11	i	0

TABLE 11

**Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more	
Electronic shopping and electronic auctions	454111-12	3,131 - 15,818	i 0	0 - 170	7	0 - 510	43 - 349	0 - 1,264	0 - 559	0 - 946	i 0	0 - 13,832	i
Transportation and warehousing	48-49	9,890	i 2	0 - 170	0 - 186	0 - 510	62	i 3 - 680	1,175	0 - 676	7,974	i 0 - 676	
Information	51	110,227	556	2,032	1,419	2,911	3,391	5,740	19,674	7,457	6,501	60,546	
Publishing	511	33,019	206	854	400	806	655	695	7,979	2,688	2,246	16,490	
Newspaper, periodical, book, and directory publishers	5111	61	4	1	6	4	44	2	0	0	0	0	
Software publishers	5112	32,958	202	854	394	803	611	693	7,979	2,688	2,246	16,490	
Telecommunications	517	3,733	35	60	135	114	169	87	68	59	23	2,982	
Data processing, hosting, and related services	518	30,558	0 - 316	880	824	1,642	2,132	3,827	8,615	4,097	2,552 - 2,876	5,669	
Other information	other 51	42,917	0 - 316	237	61	349	435	1,131	3,011	613	1,354 - 1,679	35,405	
Finance and insurance	52	8,917	78	0 - 170	0 - 186	224	598	264	1,572	902	1,960	2,960 - 3,323	
Real estate and rental and leasing	53	1,371	*	10	3	7	35	24	1,293	0	0	0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	*	7	2	i 1	35	0	0	0	0	0	
Other real estate and rental and leasing	other 53	1,326	0	2	1	6	0	24	1,293	0	0	0	
Professional, scientific, and technical services	54	53,233	1,739	4,190	3,740	4,610	3,253	1,796	5,226	5,501	9,902	i 13,275	
Architectural, engineering, and related services	5413	4,207	290	436	453	775	520	150	441	407	i 157	578	
Computer systems design and related services	5415	21,046	452	1,845	1,202	1,148	811	765	2,639	i 288	3,672	8,226	
Scientific research and development services	5417	21,669	914	1,538	1,497	2,054	1,381	700	1,517	3,366	i 5,985	i 2,716	
Research and development in biotechnology	541711	6,457	293	439	462	318	i 230	134	0	0	1,866	2,716	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446	i 616	1,082	982	1,702	1,144	566	1,240	i 2,996	i 4,119	i 0	
Research and development in the social sciences and humanities	541720	766	6	17	54	34	8	0	277	370	0	0	
Other professional, scientific, and technical services	other 54	6,312	83	372	587	633	540	182	629	1,441	88	1,755	
Health care services	621-23	2,265	695	0 - 171	181	150	532	3 - 271	438	1	0 - 267	0 - 268	

TABLE 11

**Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,380 - 14,067	23	0 - 173	2 - 191	8 - 519	0 - 305	0 - 1,264 i	10 - 570	11 - 958 i	359 - 793	0 - 13,640

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 12

**Domestic R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
All industries	21-23, 31-33, 42-81	492,956	32,239	74,031	386,686
Manufacturing industries	31-33	285,674	22,701	45,769	217,203
Food	311	4,180	226	801	3,152
Beverage and tobacco products	312	1,082	96	228	757
Textile, apparel, and leather products	313-16	904	74	128	703
Wood products	321	186	26	22	138
Paper	322	1,064	131 - 133	271 - 273	659
Printing and related support activities	323	420	24	70	325
Petroleum and coal products	324	1,306	237	425	644
Chemicals	325	97,063	13,869	19,120	64,075
Basic chemicals	3251	2,360	261	736	1,362
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172	191	293	688
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846	469	656	696 - 722
Pharmaceuticals and medicines	3254	87,619	12,766	16,713	58,139
Soap, cleaning compound, and toilet preparation	3256	2,760	104	460	2,196
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333	77	261	966 - 995
Plastics and rubber products	326	2,856	156	445	2,254
Nonmetallic mineral products	327	1,508	172	250	1,086
Primary metals	331	665	51	117	497
Fabricated metal products	332	2,885	179	608	2,099
Machinery	333	15,184	704	1,696	12,784
Agricultural implement	33311	1,921	124	243	1,554
Semiconductor machinery	333242	4,459	106	395	3,958
Engine, turbine, and power transmission equipment	3336	1,301	47	142	1,112
Other machinery	other 333	7,503	426	916	6,160
Computer and electronic products	334	86,729	2,175	11,587	72,967
Communications equipment	3342	12,595	355	1,410	10,830
Semiconductor and other electronic components	3344	35,183	776	3,876	30,531
Navigational, measuring, electromedical, and control instruments	3345	17,562	660	2,950	13,952
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342	124	975	2,242
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662	187	1,340	8,136
Other measuring and controlling device	other 3345	4,558	350	634	3,574
Other computer and electronic products	other 334	21,388	383	3,352	17,654
Electrical equipment, appliances, and components	335	5,263	370	713	4,179
Transportation equipment	336	45,375	3,486	7,332	34,557
Motor vehicles, bodies, trailers, and parts	3361-63	24,117	1,324 - 1,388	4,498 - 4,563	18,230
Aerospace products and parts	3364	18,358	2,041	2,543	13,774
Aircraft, aircraft engine, and aircraft parts	336411-13	16,891	2,034	2,517	12,339
Guided missile, space vehicle, and related parts	336414-15, 336419	1,467	7	25	1,435
Military armored vehicle, tank, and tank component	336992	35	*	0 - 11	24 - 36
Other transportation	other 336	2,865	58 - 122	215 - 291	2,516 - 2,529
Furniture and related products	337	409	40	73	296

TABLE 12

**Domestic R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Miscellaneous	339	18,596	675 - 693	1,873 - 1,891	16,031
Medical equipment and supplies	3391	16,014	480	1,560	13,973
Other miscellaneous manufacturing	3399	2,582	195 - 212	313 - 330	2,058
Nonmanufacturing industries	21-23, 42-81	207,283	9,538	28,262	169,483
Mining, quarrying, oil and gas extraction, and support activities	21	2,717	248	633	1,837
Utilities	22	275	38	79	158
Wholesale trade	42	1,191	99	140	952
Electronic shopping and electronic auctions	454111-12	3,131 - 15,818	i 23	2,777 - 3,677	i 42 - 13,018
Transportation and warehousing	48-49	9,890	i 218	i 899	i 8,774
Information	51	110,227	3,816	8,690	97,721
Publishing	511	33,019	1,112	1,821	30,087
Newspaper, periodical, book, and directory publishers	5111	61	1	2	58
Software publishers	5112	32,958	1,111	1,818	30,029
Telecommunications	517	3,733	266	1,567	i 1,899
Data processing, hosting, and related services	518	30,558	1,727	2,806	26,024
Other information	other 51	42,917	711	2,495	39,710
Finance and insurance	52	8,917	289	1,223	7,405
Real estate and rental and leasing	53	1,371	270	415	686
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	3	39	3
Other real estate and rental and leasing	other 53	1,326	267	377	683
Professional, scientific, and technical services	54	53,233	4,161	11,731	37,341
Architectural, engineering, and related services	5413	4,207	303	1,373	2,531
Computer systems design and related services	5415	21,046	1,498	3,521	16,028
Scientific research and development services	5417	21,669	1,847	5,536	14,286
Research and development in biotechnology	541711	6,457	845	495	5,117
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446	i 581	4,809	9,056
Research and development in the social sciences and humanities	541720	766	421	232	i 113
Other professional, scientific, and technical services	other 54	6,312	513	i 1,302	i 4,497
Health care services	621-23	2,265	184	770	1,311
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,380 - 14,067	191	6 - 907	281 - 13,261
All companies (number of domestic employees)	-	492,956	32,239	74,031	386,686
Small companies					
10-19 <sup>a</sup>	-	5,501	377	1,116	4,008
20-49	-	12,418	931	2,888	8,600
Medium companies					
50-99	-	14,021	1,230	3,013	9,777
100-249	-	19,793	1,833	3,517	14,444
Large companies					
250-499	-	18,883	1,261	3,483	14,138
500-999	-	23,969	1,788	4,040	18,141
1,000-4,999	-	75,671	7,044	13,479	55,147
5,000-9,999	-	50,811	2,900	7,845	40,066
10,000-24,999	-	88,263	5,072	12,407	70,785

TABLE 12

**Domestic R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
25,000 or more	–	183,626	9,804	22,242	151,579

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 13

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2019**

(Millions of U.S. dollars)

State	Total	Paid for by the company	Paid for by others		
			Total	Federal	Nonfederal
All states	492,956	428,968	63,989	21,941	42,048
Alabama	2,423	1,191	1,232	1,155	77
Alaska	49	41	8	4	5
Arizona	6,403	4,570	1,832	1,106	726
Arkansas	461	397	64	28	36
California	171,961	158,850	13,111	4,713	8,397
Colorado	6,070	5,208	862	598	264
Connecticut	7,421	6,171	1,250	892	357
Delaware	2,156	1,436	720	5	715
District of Columbia	412	277	135	111	23
Florida	7,259	5,611	1,648	870	778
Georgia	4,844	3,924	920	97	822
Hawaii	159	86	73	19	54
Idaho	2,697	2,608	89	6	83
Illinois	14,112	13,383	729	74	655
Indiana	7,952	6,895	1,057	130	927
Iowa	3,087	2,285	802	641	161
Kansas	2,748	1,857	891	11	880
Kentucky	1,481	939	541	216	325
Louisiana	703	534	168	121	48
Maine	417	373	44	14	30
Maryland	5,852	4,248	1,604	1,042	563
Massachusetts	30,843	25,955	4,888	1,170	3,718
Michigan	21,283	18,918	2,364	237	2,127
Minnesota	8,026	7,547	479	101	378
Mississippi	324	276	48	19	30
Missouri	6,344	4,150	2,194	2,036	157
Montana	205	176	29	11	17
Nebraska	795	735	60	11	49
Nevada	1,045	829	216	34	183
New Hampshire	2,541	1,036	1,505	1,333	171
New Jersey	20,390	16,648	3,742	195	3,547
New Mexico	637	391	245	202	43
New York	20,180	17,968	2,212	759	1,453
North Carolina	13,249	9,188	4,061	140	3,920
North Dakota	349	340	9	2	7
Ohio	10,642	7,087	3,555	765	2,789
Oklahoma	1,067	956	111	41	70
Oregon	7,890	7,606	284	54	230
Pennsylvania	15,245	13,353	1,892	219	1,673
Rhode Island	715	664	52	36	16
South Carolina	1,784	1,527	257	86	171
South Dakota	194	170	24	4	20
Tennessee	1,663	1,381	282	55	228
Texas	23,906	20,916	2,990	772	2,219
Utah	2,857	2,463	394	78	316
Vermont	244	218	26	7	19
Virginia	6,061	4,276	1,785	1,324	461
Washington	37,330	35,823	1,507	252	1,255

TABLE 13

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2019**

(Millions of U.S. dollars)

State	Total	Paid for by the company	Paid for by others		
			Total	Federal	Nonfederal
West Virginia	246	i	27	10	17
Wisconsin	6,517		837	97	741
Wyoming	686		16	5	11
Undistributed <sup>a</sup>	1,034		117	34	84

e = > 50% of value is modeled—see Technical Notes; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

<sup>a</sup> 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):**

Detail may not add to total because of rounding. For a given estimate in this table, if the conditions are satisfied for both the "i" and "e" flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018.

**Source(s):**

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



TABLE 14

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and core-based statistical area: 2019**

(Millions of U.S. dollars)

Core-based statistical area (CBSA)	CBSA code	Total	Paid for by the company	Paid for by others
All locations		492,956	428,968	63,989
San Jose-Sunnyvale-Santa Clara, CA	41940	75,055	70,610	4,445
San Francisco-Oakland-Berkeley, CA	41860	58,258	56,280	1,977
Seattle-Tacoma-Bellevue, WA	42660	36,265	34,861	1,404
New York-Newark-Jersey City, NY-NJ-PA	35620	32,146	28,458	3,688 i
Boston-Cambridge-Newton, MA-NH	14460	28,368	23,938	4,430
Los Angeles-Long Beach-Anaheim, CA	31080	17,180 i	13,837 i	3,343 i
Detroit-Warren-Dearborn, MI	19820	16,206	14,852	1,354
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	37980	13,995	11,676	2,318
San Diego-Chula Vista-Carlsbad, CA	41740	13,410	11,183	2,227 i
Chicago-Naperville-Elgin, IL-IN-WI	16980	11,718	11,069	648
Austin-Round Rock-Georgetown, TX	12420	8,966 i	8,004 i	962
Dallas-Fort Worth-Arlington, TX	19100	7,835 i	6,566	1,269 i
Portland-Vancouver-Hillsboro, OR-WA	38900	7,517	7,325	192
Minneapolis-St. Paul-Bloomington, MN-WI	33460	7,276	6,794	482
Washington-Arlington-Alexandria, DC-VA-MD-WV	47900	7,272	5,016	2,256
Indianapolis-Carmel-Anderson, IN	26900	5,513	4,628	885
Durham-Chapel Hill, NC	20500	5,378 i	3,560	1,818 i
Houston-The Woodlands-Sugar Land, TX	26420	5,370	4,788	582
St. Louis, MO-IL	41180	5,358	3,213	2,145 i
Phoenix-Mesa-Chandler, AZ	38060	4,333 i	3,534 i	798 i
Cincinnati, OH-KY-IN	17140	4,091	2,801	1,290 i
Atlanta-Sandy Springs-Alpharetta, GA	12060	3,934	3,109	826 i
Norwich-New London, CT	35980	3,877	2,960	917
Raleigh-Cary, NC	39580	3,677	2,208	1,469 i
Trenton-Princeton, NJ	45940	2,699	1,271	1,427
Kansas City, MO-KS	28140	2,617	1,744	874 i
Oxnard-Thousand Oaks-Ventura, CA	37100	2,616	2,222	394 i
Denver-Aurora-Lakewood, CO	19740	2,600	2,413	187
Boise City, ID	14260	2,485	2,417	69
Milwaukee-Waukesha, WI	33340	2,347	2,271	76
Tampa-St. Petersburg-Clearwater, FL	45300	2,241	1,601	640 i
Baltimore-Columbia-Towson, MD	12580	2,210	1,614	596
Madison, WI	31540	2,158	1,573	585 i
Miami-Fort Lauderdale-Pompano Beach, FL	33100	2,131	1,871	259 i
Columbus, OH	18140	2,127 i	882	1,245 i
Sacramento-Roseville-Folsom, CA	40900	2,110 i	1,935 i	175
Manchester-Nashua, NH	31700	1,903	504	1,399
Boulder, CO	14500	1,645	1,513	131
Cleveland-Elyria, OH	17460	1,638	1,409	229
Providence-Warwick, RI-MA	39300	1,626 i	1,560 i	66
Tucson, AZ	46060	1,624 i	640 i	984 i
Bridgeport-Stamford-Norwalk, CT	14860	1,619	1,383	236
Pittsburgh, PA	38300	1,606	1,497	109 i
Worcester, MA-CT	49340	1,579	1,126	453
Huntsville, AL	26620	1,505	354	1,151
Salt Lake City, UT	41620	1,288	1,097	191 i
Charlotte-Concord-Gastonia, NC-SC	16740	1,284 i	1,147 i	137 i

TABLE 14

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and core-based statistical area: 2019**

(Millions of U.S. dollars)

Core-based statistical area (CBSA)	CBSA code	Total	Paid for by the company	Paid for by others
Kalamazoo-Portage, MI	28020	1,164	849	315
Cedar Rapids, IA	16300	1,113 i	367 i	746 i
New Haven-Milford, CT	35300	1,102	1,077	25
Albany-Schenectady-Troy, NY	10580	1,036	777	259 i
Provo-Orem, UT	39340	1,033	941	92
Orlando-Kissimmee-Sanford, FL	36740	1,031 i	772 i	259 i
Rochester, NY	40380	965	874	91 i
Akron, OH	10420	892	683	209 i
Corning, NY	18500	885 i	882 i	3 i
Grand Rapids-Kentwood, MI	24340	883	616	266
Peoria, IL	37900	868 i	856 i	12 i
Riverside-San Bernardino-Ontario, CA	40140	790	716	74 i
Richmond, VA	40060	788 i	638 i	151 i
Lancaster, PA	29540	759 i	699 i	61 i
Santa Maria-Santa Barbara, CA	42200	757 i	522	234 i
Greensboro-High Point, NC	24660	752 i	710 i	41
Columbus, IN	18020	704	621	84
Allentown-Bethlehem-Easton, PA-NJ	10900	703	660	43
Fort Collins, CO	22660	693 i	654 i	39
Hartford-East Hartford-Middletown, CT	25540	692	630	63
Las Vegas-Henderson-Paradise, NV	29820	657	619	38
Wilmington, NC	48900	654 i	183 i	471 i
Des Moines-West Des Moines, IA	19780	628 i	610 i	17 i
Cheyenne, WY	16940	622 i	622 i	1 e
Ann Arbor, MI	11460	614	368	245
Omaha-Council Bluffs, NE-IA	36540	605	559	45 i
Louisville-Jefferson County, KY-IN	31140	593	331	262
Colorado Springs, CO	17820	583 i	507 i	76
Palm Bay-Melbourne-Titusville, FL	37340	576 i	319	257 i
Buffalo-Cheektowaga, NY	15380	574 i	385	189 i
San Antonio-New Braunfels, TX	41700	568 i	480 i	89
Santa Rosa-Petaluma, CA	42220	564	547	16 i
Dayton-Kettering, OH	19430	541	286	255
Wichita, KS	48620	537	517	19
Charleston-North Charleston, SC	16700	534	390	143
Albuquerque, NM	10740	531	301	230
Jacksonville, FL	27260	513 i	473 i	41 i
Bloomington, IL	14010	510	491	19 i
Syracuse, NY	45060	480 i	411 i	69 i
Virginia Beach-Norfolk-Newport News, VA-NC	47260	464	313	151
Nashville-Davidson-Murfreesboro-Franklin, TN	34980	460 i	319	142 i
Pueblo, CO	39380	436	14 i	422
Davenport-Moline-Rock Island, IA-IL	19340	428	425	3 e
Memphis, TN-MS-AR	32820	421 i	396	25 i
Winston-Salem, NC	49180	419 i	405 i	14
Oshkosh-Neenah, WI	36780	384	381	3 i
Ogden-Clearfield, UT	36260	378	282	96
Niles, MI	35660	370	363	7

TABLE 14

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and core-based statistical area: 2019**

(Millions of U.S. dollars)

Core-based statistical area (CBSA)	CBSA code	Total	Paid for by the company	Paid for by others
Greenville-Anderson, SC	24860	367	343	25 i
Waterloo-Cedar Falls, IA	47940	361	361	1 e
Portland-South Portland, ME	38860	356 i	315 i	41 i
Oklahoma City, OK	36420	347	286	61 i
Salisbury, MD-DE	41540	337 i	324 i	13 i
All other CBSAs		26,625	22,937	3,688
Locations outside a CBSA		2,620	2,327	293 i
Undistributed <sup>a</sup>		1,034	916	117

e = > 50% of value is modeled—see Technical Notes. i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

<sup>a</sup> Includes data reported that were not allocated to a specific location by multi-establishment companies. For single-establishment companies, data reported were allocated to the location in the address used to mail the survey form.

**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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For a given estimate in this table, if the conditions are satisfied for both the "i" and "e" flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. A CBSA is a U.S. geographic area that consists of one or more counties (or equivalents) anchored by an urban center of at least 10,000 people plus adjacent counties that are socioeconomically tied to the urban center by commuting. CBSAs are defined by the Office of Management and Budget in the Executive Office of the President.

**Source(s):**

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

TABLE 15

**Domestic R&D paid for by the company and others and performed by the company, by industry, company size, and domestic R&D program size: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size					
		All companies	Less than \$1 million	\$1 million–\$9.999 million	\$10 million–\$49.999 million	\$50 million–\$99.999 million	\$100 million or more
All industries	21–23, 31–33, 42–81	492,956	4,980	32,782	40,807	28,222	386,165
Manufacturing industries	31–33	285,674	2,784	15,831	22,018	17,938	227,103
Food	311	4,180	172	613	639	636	2,119 i
Beverage and tobacco products	312	1,082	42	84	60	285	611
Textile, apparel, and leather products	313–16	904	51	221	246	220	166
Wood products	321	186	19	86	81	0	0
Paper	322	1,064	12	133	86	0	832
Printing and related support activities	323	420 i	26	284	110 i	0	0
Petroleum and coal products	324	1,306	13	74	105	50 - 372	740 - 1,066
Chemicals	325	97,063	360	2,952	7,310	7,057	79,384
Basic chemicals	3251	2,360	46	376	665	521	752
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172	0 - 164	162	139	50 - 70	636 - 823
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846	0 - 25	80	84	0	1,658
Pharmaceuticals and medicines	3254	87,619	75	1,933	5,847	6,243	73,521
Soap, cleaning compound, and toilet preparation	3256	2,760	76	179	172	107	2,227
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333	0 - 165	223	403	114 - 138	401 - 592
Plastics and rubber products	326	2,856	165	768	819	277	827
Nonmetallic mineral products	327	1,508 i	36	149	223	86	1,014 i
Primary metals	331	665	33	248	304	80	0
Fabricated metal products	332	2,885	458	1,137	645	457	189
Machinery	333	15,184	416	2,240	2,173	1,448	8,906
Agricultural implement	33311	1,921	46	130	134	193	1,419
Semiconductor machinery	333242	4,459	5	122	218	243	3,870
Engine, turbine, and power transmission equipment	3336	1,301	19 i	137	174	71	900
Other machinery	other 333	7,503	346	1,851	1,648	941	2,717
Computer and electronic products	334	86,729	378	2,787	3,691	2,927	76,946
Communications equipment	3342	12,595	49	385	602	654	10,905
Semiconductor and other electronic components	3344	35,183 i	60	916	1,354	1,116	31,736 i
Navigational, measuring, electromedical, and control instruments	3345	17,562	221	1,233	1,409	472	14,227
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342	36	310	594	154	2,248 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662	32	197	294	55	9,084
Other measuring and controlling device	other 3345	4,558	153	727	520	263	2,895
Other computer and electronic products	other 334	21,388	49	253	325	684	20,078
Electrical equipment, appliances, and components	335	5,263	211	580	919	934	2,619
Transportation equipment	336	45,375	110	1,703	2,402	1,973	39,186

TABLE 15

**Domestic R&D paid for by the company and others and performed by the company, by industry, company size, and domestic R&D program size: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size					
		All companies	Less than \$1 million	\$1 million–\$9.999 million	\$10 million–\$49.999 million	\$50 million–\$99.999 million	\$100 million or more
Motor vehicles, bodies, trailers, and parts	3361–63	24,117	84	761	1,579	1,207	20,485
Aerospace products and parts	3364	18,358	i 3 - 27	709	559	603 - 629	16,459
Aircraft, aircraft engine, and aircraft parts	336411–13	16,891	i 0 - 23	436	362	603 - 629	15,466
Guided missile, space vehicle, and related parts	336414–15, 336419	1,467	4	273	i 197	0	993
Military armored vehicle, tank, and tank component	336992	35	1	34	0	0	0
Other transportation	other 336	2,865	0 - 23	199	264	137 - 162	2,242
Furniture and related products	337	409	31	128	250	0	0
Miscellaneous	339	18,596	251	1,643	1,954	1,191 - 1,513	13,233 - 13,558
Medical equipment and supplies	3391	16,014	119	1,164	1,420	1,142	12,169
Other miscellaneous manufacturing	3399	2,582	132	479	534	50 - 372	1,064 - 1,389
Nonmanufacturing industries	21–23, 42–81	207,283	2,196	16,951	18,790	10,284	159,062
Mining, quarrying, oil and gas extraction, and support activities	21	2,717	26	359	91 - 1,808	0	524 - 2,242
Utilities	22	275	0 - 31	65	131	50 - 81	0
Wholesale trade	42	1,191	420	771	0	0	0
Electronic shopping and electronic auctions	454111–12	3,131 - 15,818	i 14	68	10 - 1,726	50 - 317	1,005 - 15,677
Transportation and warehousing	48–49	9,890	i 19	115	488	101	9,167
Information	51	110,227	402	5,115	6,306	6,529	91,875
Publishing	511	33,019	206	1,660	1,409	1,043	28,701
Newspaper, periodical, book, and directory publishers	5111	61	5	18	38	0	0
Software publishers	5112	32,958	201	1,642	1,372	1,043	28,701
Telecommunications	517	3,733	39	145	504	90	2,954
Data processing, hosting, and related services	518	30,558	121	2,817	3,867	4,921	18,833
Other information	other 51	42,917	36	493	525	475	41,387
Finance and insurance	52	8,917	14	323	1,313	373	6,893
Real estate and rental and leasing	53	1,371	10	17	64	0	1,280
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	4	i 6	35	0	0
Other real estate and rental and leasing	other 53	1,326	6	11	30	0	1,280
Professional, scientific, and technical services	54	53,233	1,176	7,868	8,061	2,697	33,432
Architectural, engineering, and related services	5413	4,207	287	1,522	990	511	897
Computer systems design and related services	5415	21,046	648	2,856	2,488	520	14,535
Scientific research and development services	5417	21,669	115	2,563	3,201	1,281	14,509
Research and development in biotechnology	541711	6,457	26	656	800	307	4,668

TABLE 15

**Domestic R&D paid for by the company and others and performed by the company, by industry, company size, and domestic R&D program size: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size						
		All companies	Less than \$1 million	\$1 million–\$9.999 million	\$10 million–\$49.999 million	\$50 million–\$99.999 million	\$100 million or more	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446 i	87	1,870	2,321	974	9,193 i	
Research and development in the social sciences and humanities	541720	766	1	37	80	0	647	
Other professional, scientific, and technical services	other 54	6,312	126 i	927	1,382	385	3,491	
Health care services	621–23	2,265	43	1,186	602	50 - 317	116 - 386	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,380 - 14,067	37 - 77	1,064	10 - 1,726	170	100 - 12,787	
All companies (number of domestic employees)	–	492,956	4,980	32,782	40,807	28,222	386,165	
Small companies								
10–19 <sup>a</sup>	–	5,501	1,111	3,875	369	146	0	
20–49	–	12,418	1,720	7,822	2,641	235	0	
Medium companies								
50–99	–	14,021	987	5,528	5,857	1,171	478	
100–249	–	19,793	695	7,182	7,478	3,198	1,240	
Large companies								
250–499	–	18,883	295	3,412	6,209	4,127	4,840	
500–999	–	23,969	95	2,133	5,944	5,704	10,094	
1,000–4,999	–	75,671	71	2,335	8,527	9,302	55,436	
5,000–9,999	–	50,811	2	161	2,001	1,935	46,711	
10,000–24,999	–	88,263	2	232	1,190	1,572	85,267	
25,000 or more	–	183,626	1	103	590	832	182,100	

i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. R&D program size classifications are based on R&D performance. 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.

TABLE 16

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2019**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Total	Paid for by the company	Paid for by others
All business activities	21100–81000	492,956	428,968	63,989
Oil and gas extraction	21100	712	687	24
Mining	21200	122	94	28
Support activities for mining, including oil and gas	21300	1,364	1,268	96
Utilities	22100	274	236	38
Construction	23000	886	859	26
Food manufacturing	31100	4,199 - 6,169	4,200	0 - 1,969
Beverage manufacturing	31210	653	551	102
Tobacco manufacturing	31220	189	180	9
Textile, apparel, and leather products manufacturing	31990	831	802	29
Wood products manufacturing	32100	232	225	6
Paper manufacturing	32200	1,478	1,478	*
Printing and related support activities	32300	447	447	0
Petroleum refineries	32401	525 - 2,495	526	0 - 1,969
Asphalt paving, roofing, and saturated materials manufacturing	32402	110	110	0
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	106 - 2,076	107	0 - 1,969
Basic chemicals manufacturing	32510	2,639	2,459	180
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,293	1,203	90
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	2,094	1,736	359
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	56,018	50,038	5,980
In vitro diagnostic substances manufacturing	32542	1,388	1,354	34
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	28,850	26,005	2,845
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,311 - 4,281	2,312	0 - 1,969
Paint, adhesive, and other chemical manufacturing	32592	1,423	1,372	51
Plastics and rubber products manufacturing	32600	2,997	2,909	88
Clay and glass products manufacturing	32710	1,326	1,318	9
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	439	417	23
Primary metal manufacturing	33100	743	720	24
Fabricated metal products manufacturing	33200	2,816 - 4,786	2,817	0 - 1,969
Agricultural machinery and equipment manufacturing	33311	1,550	1,542	8
Construction machinery manufacturing	33312	1,276	1,273	3
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,104	1,060	44
Semiconductor machinery manufacturing	33321	4,396	3,790	606
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,387	1,150	237
Photographic and photocopying equipment manufacturing	33331	162	148	14
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	1,712	1,557	156
Digital cameras manufacturing	33333	415	411	4
Engine, turbine, and power transmission equipment manufacturing	33360	2,551	2,233	318
Metalworking and other general purpose machinery manufacturing	33390	2,396	2,181	215
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	20,122	19,990	132



TABLE 16

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2019**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Total	Paid for by the company	Paid for by others
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	8,495	8,450	46
Radio, television, and wireless communication equipment manufacturing	33422	2,589	1,628	961
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	1,781	1,522	259
Audio and video equipment manufacturing	33430	1,292	1,285	7
Semiconductor and other electronic components manufacturing	33440	35,730	32,537	3,194
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	3,982	3,764	219
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	7,870	2,857	5,013
Measuring and control instruments manufacturing (not listed elsewhere)	33459	3,855	3,670	185
Electrical equipment, appliances, and components manufacturing	33500	5,229	4,819	410
Motor vehicles manufacturing	33610	15,268	13,564	1,704
Motor vehicle body and trailer manufacturing	33620	155	155	0
Motor vehicle parts manufacturing	33630	8,030	6,715	1,315
Aircraft manufacturing	33641	10,720	5,087	5,633
Aircraft engine and engine parts manufacturing	33642	2,104	1,082	1,022
Other aircraft parts and auxiliary equipment manufacturing	33643	1,434	1,079	355
Guided missiles, space vehicles, and related parts manufacturing	33644	3,496	954	2,542
Railroad rolling stock manufacturing	33651	210 - 2,180	211	0 - 1,969
Ship and boat building	33660	182 - 2,152	183	0 - 1,969
Motorcycle, bicycle, and parts manufacturing	33691	367	367	*
Military armored vehicle, tank, and tank components manufacturing	33692	541	298	243
All other transportation equipment manufacturing	33699	465	456	9
Furniture and related products manufacturing	33700	458	450	8
Medical equipment and supplies manufacturing	33910	14,759	14,538	222
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,558	2,516	42
Merchant wholesalers, durable goods	42300	756	659	97
Merchant wholesalers, nondurable goods	42400	945	926	19
Wholesale electronic markets and agents and brokers (business to business)	42500	37	33	4
Retail trade (except electronic shopping and electronic auctions)	44000	280	280	*
Electronic shopping and electronic auctions	45411	0 - 13,286	0 - 11,353	0 - 1,969
Transportation	48000	9,398	9,016	382
Couriers, messengers, and express delivery services	49200	290	290	0
Warehousing and storage	49300	128	124	4
Newspaper, periodical, book, and directory publishers (except Internet)	51110	84	84	*
Software publishers (except Internet)	51120	24,851	24,104	747
Motion picture and sound recording (except Internet)	51200	72	53	19
Broadcasting (except Internet)	51500	0 - 2,469	0 - 501	0 - 1,969
Wired telecommunications carriers	51710	424	416	8
Wireless telecommunications carriers (except satellite)	51720	2,306	2,271	35
Satellite telecommunications	51740	475	470	6
Other telecommunications (not listed elsewhere)	51790	492	459	33
Data processing, hosting, and related services	51800	8,994	8,836	158
Cloud computing applications and Internet-based software services	51801	27,957	27,617	340



TABLE 16

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2019**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Total	Paid for by the company	Paid for by others
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	46,100 - 48,070	46,101	0 - 1,969
Finance: banking and credit intermediation	52200	4,924	4,923	1
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,445	1,418	27
Insurance carriers and related activities	52400	2,202	2,202	0
Real estate	53100	396	396	0
Rental and leasing services	53200	945	945	0
Lessors of nonfinancial intangible assets, including patent licensing	53300	59	58	*
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	1,979	1,979	0
Architectural, engineering, and related services	54130	4,474	2,569	1,905
Specialized design services	54140	163	112	51
Computer systems design and related services	54150	19,667	17,324	2,343
Management, scientific, and technical consulting services	54160	2,842	1,897	945
Research and development services in social sciences and humanities	54172	764	27	736
Research and development services in biotechnology	54173	5,648	953	4,695
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	15,171 i	2,569	12,603 i
Advertising and related services	54180	1,106 i	1,101 i	6
Professional, scientific, and technical services (not listed elsewhere)	54190	1,646	1,142	504
Management of companies and enterprises	55100	0 - 13,286	0 - 11,353	0 - 1,969
Administrative and support services	56100	3,285	3,263	22
Waste management and remediation services	56200	20	17	3
Offices of physicians	62110	508	196	312
Medical and diagnostic laboratories	62150	2,466	1,860	605
Other ambulatory health care services (ambulance, dental, home health care)	62199	148	147	1
Hospitals and nursing care facilities	62200	0 - 11,355	0 - 11,353	1 i
Social assistance services	62400	0 - 11,353	0 - 11,353	0
Arts, entertainment, and recreation	71000	415	415	0
Accommodation and food services	72000	80	80	0
Other services (not listed elsewhere)	81000	660	380	280
Undistributed	-	0	0	0

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

<sup>a</sup> Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

<sup>b</sup> Business codes and descriptions are based on 2012 North American Industry Classification System industry definitions.

**Note(s):**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 17

**Domestic R&D paid for by the company and others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
All industries	21-23, 31-33, 42-81	492,956		4.4	4.6
Manufacturing industries	31-33	285,674		5.0	5.1
Food	311	4,180		0.7	0.7
Beverage and tobacco products	312	1,082		0.6	0.6
Textile, apparel, and leather products	313-16	904		1.4	1.4
Wood products	321	186		0.5	0.5
Paper	322	1,064		1.2	1.2
Printing and related support activities	323	420	i	0.7	0.7
Petroleum and coal products	324	1,306		0.5	0.5
Chemicals	325	97,063		8.4	8.4
Basic chemicals	3251	2,360		0.8	0.8
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172		1.8	1.8
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846		D	D
Pharmaceuticals and medicines	3254	87,619		16.3	16.4
Soap, cleaning compound, and toilet preparation	3256	2,760		2.4	2.4
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333		D	D
Plastics and rubber products	326	2,856		1.4	1.4
Nonmetallic mineral products	327	1,508	i	2.7	3.3
Primary metals	331	665		0.5	0.5
Fabricated metal products	332	2,885		2.2	2.2
Machinery	333	15,184		4.2	4.2
Agricultural implement	33311	1,921		4.1	4.1
Semiconductor machinery	333242	4,459		18.1	18.1
Engine, turbine, and power transmission equipment	3336	1,301		3.6	3.6
Other machinery	other 333	7,503		2.9	3.0
Computer and electronic products	334	86,729		12.8	12.8
Communications equipment	3342	12,595		14.3	14.3
Semiconductor and other electronic components	3344	35,183	i	17.0	17.0
Navigational, measuring, electromedical, and control instruments	3345	17,562		9.6	9.6
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342		11.2	11.2
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662		12.7	12.7
Other measuring and controlling device	other 3345	4,558		5.9	5.9
Other computer and electronic products	other 334	21,388		10.7	10.7
Electrical equipment, appliances, and components	335	5,263		3.7	3.7
Transportation equipment	336	45,375		3.9	4.1
Motor vehicles, bodies, trailers, and parts	3361-63	24,117		3.0	3.2
Aerospace products and parts	3364	18,358	i	6.5	6.5
Aircraft, aircraft engine, and aircraft parts	336411-13	16,891	i	6.2	6.2
Guided missile, space vehicle, and related parts	336414-15, 336419	1,467		17.2	17.2
Military armored vehicle, tank, and tank component	336992	35		3.6	3.6
Other transportation	other 336	2,865		3.7	3.7
Furniture and related products	337	409		1.0	1.0

TABLE 17

**Domestic R&D paid for by the company and others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Miscellaneous	339	18,596		5.3	5.3
Medical equipment and supplies	3391	16,014		6.5	6.5
Other miscellaneous manufacturing	3399	2,582		2.5	2.5
Nonmanufacturing industries	21–23, 42–81	207,283		3.8	4.1
Mining, quarrying, oil and gas extraction, and support activities	21	2,717		1.5	1.5
Utilities	22	275		0.1	0.1
Wholesale trade	42	1,191		0.9	1.0
Electronic shopping and electronic auctions	454111–12	3,131 - 15,818	i	D	D
Transportation and warehousing	48–49	9,890	i	3.5	3.5
Information	51	110,227		7.7	7.8
Publishing	511	33,019		17.6	17.7
Newspaper, periodical, book, and directory publishers	5111	61		5.6	5.9
Software publishers	5112	32,958		17.7	17.8
Telecommunications	517	3,733		0.7	0.7
Data processing, hosting, and related services	518	30,558		6.4	6.4
Other information	other 51	42,917		16.6	17.4
Finance and insurance	52	8,917		0.6	0.7
Real estate and rental and leasing	53	1,371		14.8	14.8
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		4.4	4.4
Other real estate and rental and leasing	other 53	1,326		16.1	16.1
Professional, scientific, and technical services	54	53,233		10.9	11.0
Architectural, engineering, and related services	5413	4,207		4.1	4.2
Computer systems design and related services	5415	21,046		10.7	10.8
Scientific research and development services	5417	21,669		26.7	26.8
Research and development in biotechnology	541711	6,457		20.7	20.7
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446	i	29.7	29.9
Research and development in the social sciences and humanities	541720	766		63.9	65.2
Other professional, scientific, and technical services	other 54	6,312		6.0	6.0
Health care services	621–23	2,265		1.7	1.7
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,380 - 14,067		D	D
All companies (number of domestic employees)	–	492,956		4.4	4.6
Small companies					
10–19 <sup>c</sup>	–	5,501		24.7	25.2
20–49	–	12,418		11.4	11.6
Medium companies					
50–99	–	14,021		11.6	11.9
100–249	–	19,793		7.4	7.5
Large companies					
250–499	–	18,883		6.3	6.4
500–999	–	23,969		6.5	6.5
1,000–4,999	–	75,671		5.1	5.2

TABLE 17

**Domestic R&D paid for by the company and others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
5,000–9,999	–	50,811	4.4	4.6
10,000–24,999	–	88,263	4.2	4.3
25,000 or more	–	183,626	3.5	3.8

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

<sup>b</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 18

**Domestic R&D paid for by the company and others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers only <sup>b</sup>
All industries	21-23, 31-33, 42-81	538,835		4.8	5.1
Manufacturing industries	31-33	326,235		5.7	5.8
Food	311	4,373		0.8	0.8
Beverage and tobacco products	312	1,260		0.8	0.8
Textile, apparel, and leather products	313-16	920		1.4	1.4
Wood products	321	197		0.5	0.5
Paper	322	1,068		1.2	1.2
Printing and related support activities	323	426	i	0.7	0.7
Petroleum and coal products	324	1,553 - 1,656		D	D
Chemicals	325	127,629		11.0	11.0
Basic chemicals	3251	2,424		0.8	0.8
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,196 - 1,245		D	D
Pesticide, fertilizer, and other agricultural chemicals	3253	2,034 - 2,038		D	2.4
Pharmaceuticals and medicines	3254	117,494		21.9	22.0
Soap, cleaning compound, and toilet preparation	3256	3,082		2.7	2.7
Paint, coating, adhesive, and other chemicals	3255, 3259	1,347 - 1,400		D	D
Plastics and rubber products	326	2,937		1.5	1.5
Nonmetallic mineral products	327	1,532	i	2.8	3.3
Primary metals	331	682		0.6	0.6
Fabricated metal products	332	2,941		2.3	2.3
Machinery	333	15,657		4.3	4.3
Agricultural implement	33311	2,120		4.5	4.5
Semiconductor machinery	333242	4,502		18.2	18.2
Engine, turbine, and power transmission equipment	3336	1,334		3.6	3.6
Other machinery	other 333	7,701		3.0	3.0
Computer and electronic products	334	89,340		13.2	13.2
Communications equipment	3342	13,564 - 13,567		D	15.5
Semiconductor and other electronic components	3344	35,601		17.2	17.3
Navigational, measuring, electromedical, and control instruments	3345	18,432		10.1	10.1
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,469		11.6	11.6
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	10,259		13.5	13.5
Other measuring and controlling device	other 3345	4,704		6.1	6.1
Other computer and electronic products	other 334	21,740 - 21,743		D	10.8
Electrical equipment, appliances, and components	335	5,388		3.8	3.8
Transportation equipment	336	50,457		4.3	4.5
Motor vehicles, bodies, trailers, and parts	3361-63	27,653		3.4	3.7
Aerospace products and parts	3364	19,849		7.1	7.1
Aircraft, aircraft engine, and aircraft parts	336411-13	18,264	i	6.7	6.7
Guided missile, space vehicle, and related parts	336414-15, 336419	1,585		18.6	18.6
Military armored vehicle, tank, and tank component	336992	35		3.6	3.6
Other transportation	other 336	2,920		3.7	3.7
Furniture and related products	337	432		1.1	1.1

TABLE 18

**Domestic R&D paid for by the company and others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers only <sup>b</sup>
Miscellaneous	339	19,337 - 19,436		D	D
Medical equipment and supplies	3391	16,755		6.8	6.8
Other miscellaneous manufacturing	3399	2,582 - 2,680		D	D
Nonmanufacturing industries	21-23, 42-81	212,601		3.9	4.2
Mining, quarrying, oil and gas extraction, and support activities	21	2,840		1.6	1.6
Utilities	22	458		0.1	0.2
Wholesale trade	42	1,241		1.0	1.0
Electronic shopping and electronic auctions	454111-12	3,255 - 15,944	i	D	D
Transportation and warehousing	48-49	9,933	i	3.5	3.5
Information	51	112,359		7.8	7.9
Publishing	511	34,064		18.2	18.3
Newspaper, periodical, book, and directory publishers	5111	64		5.9	6.2
Software publishers	5112	34,000		18.3	18.4
Telecommunications	517	4,151		0.8	0.8
Data processing, hosting, and related services	518	30,827		6.4	6.4
Other information	other 51	43,317		16.8	17.5
Finance and insurance	52	9,236		0.6	0.7
Real estate and rental and leasing	53	1,378		14.9	14.9
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		4.4	4.4
Other real estate and rental and leasing	other 53	1,333		16.2	16.2
Professional, scientific, and technical services	54	55,415		11.4	11.5
Architectural, engineering, and related services	5413	4,672		4.6	4.6
Computer systems design and related services	5415	21,221		10.8	10.8
Scientific research and development services	5417	23,065		28.4	28.5
Research and development in biotechnology	541711	6,693		21.4	21.4
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	15,485	i	31.8	32.0
Research and development in the social sciences and humanities	541720	887		74.0	75.6
Other professional, scientific, and technical services	other 54	6,458		6.1	6.1
Health care services	621-23	2,335		1.7	1.7
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,465 - 14,154		D	D
All companies (number of domestic employees)	-	538,835		4.8	5.1
Small companies					
10-19 <sup>c</sup>	-	6,158		27.7	28.1
20-49	-	13,985		12.8	13.0
Medium companies					
50-99	-	16,569		13.7	14.0
100-249	-	22,054		8.3	8.3
Large companies					
250-499	-	21,003		7.0	7.1
500-999	-	26,280		7.1	7.2

TABLE 18

**Domestic R&D paid for by the company and others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers only <sup>b</sup>
1,000–4,999	–	82,404	5.6	5.7
5,000–9,999	–	57,005	5.0	5.2
10,000–24,999	–	99,260	4.7	4.8
25,000 or more	–	194,117	3.7	4.0

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

<sup>b</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 19

**Companies with domestic R&D paid for by the company and others and performed by the company in the software products and embedded software technology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Software products and embedded software R&D									
		Domestic R&D		Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Total		Federally funded	
								Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
All industries	21-23, 31-33, 42-81	28,270	492,956	12,450	200,859	11,640	189,553	1,440	11,306	710	5,089
Manufacturing industries	31-33	15,180	285,674	4,410	41,105	4,230	36,281	500	4,824	140	2,995
Food	311	870	4,180	80	45	80	41	10	4	0	0
Beverage and tobacco products	312	350	1,082	20	1	20	1	0	0	0	0
Textile, apparel, and leather products	313-16	240	904	50	60	50	60	0	0	0	0
Wood products	321	80	186	20	8	20	8	0	0	0	0
Paper	322	90	1,064	20	12	20	12	0	0	0	0
Printing and related support activities	323	200	420	70	78	70	78	0	0	0	0
Petroleum and coal products	324	80	1,306	10	10	10	10	0	0	0	0
Chemicals	325	2,330	97,063	200	1,572	190	1,538	20	34	10	2
Basic chemicals	3251	240	2,360	20	21	20	16	10	5	0	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	1,172	10	8	10	8	0	0	0	0
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,822 - 1,846	20	973	20	955	10	17	0	0
Pharmaceuticals and medicines	3254	1,060	87,619	90	470	90	467	10	4	10	2
Soap, cleaning compound, and toilet preparation	3256	270	2,760	10	17	10	9	10	8	0	0
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,305 - 1,333	70	84	70	84	10	*	10	*
Plastics and rubber products	326	790	2,856	80	75	80	75	0	0	0	0
Nonmetallic mineral products	327	170	1,508	20	31	20	31	0	0	0	0
Primary metals	331	200	665	40	30	40	30	0	0	0	0
Fabricated metal products	332	1,840	2,885	390	311	360	284	30	27	0	0
Machinery	333	2,240	15,184	810	1,631	770	1,552	60	80	10	34
Agricultural implement	33311	190	1,921	60	249	60	249	10	1	10	*
Semiconductor machinery	333242	80	4,459	60	365	40	348	30	17	0	0
Engine, turbine, and power transmission equipment	3336	110	1,301	50	133	50	99	10	34	10	31
Other machinery	other 333	1,880	7,503	650	884	640	856	20	28	10	3
Computer and electronic products	334	2,280	86,729	1,380	29,799	1,320	25,864	190	3,935	40	2,693
Communications equipment	3342	300	12,595	240	8,231	240	8,168	10	63	10	37



TABLE 19

**Companies with domestic R&D paid for by the company and others and performed by the company in the software products and embedded software technology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Software products and embedded software R&D									
		Domestic R&D		Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Total		Federally funded	
								Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
Semiconductor and other electronic components	3344	640	35,183	190	8,407	170	8,088	60	320	10	55
Navigational, measuring, electromedical, and control instruments	3345	1,140	17,562	760	7,037	730	3,544	120	3,493	30	2,583
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	3,342	130	512	130	419	30	94	10	1
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	9,662	140	5,192	130	1,853	30	3,339	30	2,580
Other measuring and controlling device	other 3345	740	4,558	500	1,332	490	1,272	60	60	10	2
Other computer and electronic products	other 334	220	21,388	200	6,124	190	6,065	10	59	10	18
Electrical equipment, appliances, and components	335	900	5,263	550	830	540	735	30	96	10	1
Transportation equipment	336	1,090	45,375	260	3,881	250	3,262	130	619	90	265
Motor vehicles, bodies, trailers, and parts	3361-63	540	24,117	180	2,076	170	1,834	40	242	10	3
Aerospace products and parts	3364	380	18,358	60	1,658	60	1,282	90	376	90	261
Aircraft, aircraft engine, and aircraft parts	336411-13	200	16,891	60	1,550	50	1,268	20	282	10	170
Guided missile, space vehicle, and related parts	336414-15, 336419	190	1,467	10	108	10	14	80	95	80	90
Military armored vehicle, tank, and tank component	336992	30	35	0	0	0	0	0	0	0	0
Other transportation	other 336	150	2,865	30	147	30	146	10	1	10	1
Furniture and related products	337	190	409	50	66	50	66	0	0	0	0
Miscellaneous	339	1,310	18,596	460	2,665	440	2,635	70	30	10	*
Medical equipment and supplies	3391	790	16,014	370	2,004	350	1,974	70	30	10	*
Other miscellaneous manufacturing	3399	520	2,582	90	661	90	661	0	0	0	0
Nonmanufacturing industries	21-23, 42-81	13,100	207,283	8,050	159,754	7,420	153,272	940	6,482	570	2,094
Mining, quarrying, oil and gas extraction, and support activities	21	160	2,717	30	951	30	943	10	8	10	*
Utilities	22	40	275	20	45	20	45	0	0	0	0
Wholesale trade	42	1,560	1,191	290	70	280	7-71	10	0-62	0	0
Electronic shopping and electronic auctions	454111-12	60	3,131 - 15,818	50	1,298 - 15,375	50	1,293 - 15,375	10	0-61	0	0
Transportation and warehousing	48-49	130	9,890	50	8,194	50	8,194	0	0	0	0
Information	51	3,090	110,227	2,830	102,561	2,760	101,780	130	781	10	10-31



TABLE 19

**Companies with domestic R&D paid for by the company and others and performed by the company in the software products and embedded software technology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Software products and embedded software R&D									
		Domestic R&D		Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Total		Federally funded	
								Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
50–99	–	4,960	14,021	2,060	i 3,716	1,960	i 3,107	160	609	80	296
100–249	–	4,580	19,793	1,720	i 5,963	1,640	i 5,127	170	i 835	70	i 425
Large companies											
250–499	–	2,140	18,883	780	6,633	730	5,632	90	1,001	i 30	327
500–999	–	1,230	23,969	510	8,157	500	7,714	40	443	20	i 64
1,000–4,999	–	1,330	75,671	590	31,404	580	30,165	50	1,239	20	504
5,000–9,999	–	240	50,811	120	15,174	i 120	14,470	i 30	704	i 10	140
10,000–24,999	–	220	88,263	120	29,212	110	26,829	i 20	2,383	10	290
25,000 or more	–	130	183,626	80	94,534	i 80	91,455	i 20	3,079	i 10	2,579

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.<sup>b</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&amp;D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. 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&amp;D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&amp;D in one, more than one, or no application area. 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.

TABLE 20

**Companies with domestic R&D paid for by the company and others and performed by the company in the biotechnology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
All industries	21-23, 31-33, 42-81	28,270	492,956	2,470	i 77,792	2,010	i 62,952	780	i 14,841		
Manufacturing industries	31-33	15,180	285,674	1,700	i 65,874	1,530	i 60,655	380	i 5,219		
Food	311	870	4,180	110	i 705	100	i 657	30	i 48		
Beverage and tobacco products	312	350	1,082	30	i 24 - 41	30	i 25	10	i 0 - 16		
Textile, apparel, and leather products	313-16	240	904	10	*	10	*	0	0		
Wood products	321	80	186	10	i 10	10	i 10	0	0		
Paper	322	90	1,064	10	2	10	2	0	0		
Printing and related support activities	323	200	420	i 0	0	0	0	0	0		
Petroleum and coal products	324	80	1,306	10	142 - 159	10	143	10	0 - 16		
Chemicals	325	2,330	97,063	940	60,577	870	55,562	220	5,015		
Basic chemicals	3251	240	2,360	50	i 370	50	i 254	10	116		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	1,172	20	i 94	20	i 94	0	0		
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,822 - 1,846	80	i 154 - 295	80	i 155	10	0 - 139		
Pharmaceuticals and medicines	3254	1,060	87,619	770	59,736	700	54,974	210	4,761		
Soap, cleaning compound, and toilet preparation	3256	270	2,760	40	i 79 - 220	40	i 80	10	0 - 139		
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,305 - 1,333	10	5	10	5	0	0		
Plastics and rubber products	326	790	2,856	50	i 55	50	i 55	0	0		
Nonmetallic mineral products	327	170	1,508	i 10	*	10	*	0	0		
Primary metals	331	200	665	10	2	10	2	0	0		
Fabricated metal products	332	1,840	2,885	10	9	10	9	0	0		
Machinery	333	2,240	15,184	80	i 40	30	24	50	i 16		
Agricultural implement	33311	190	1,921	10	*	10	*	0	0		
Semiconductor machinery	333242	80	4,459	0	0	0	0	0	0		
Engine, turbine, and power transmission equipment	3336	110	1,301	0	0	0	0	0	0		
Other machinery	other 333	1,880	7,503	70	i 39	30	23	50	i 16		
Computer and electronic products	334	2,280	86,729	200	i 2,506	170	i 2,435	70	i 70		
Communications equipment	3342	300	12,595	10	0 - 48	10	0 - 48	0	0		
Semiconductor and other electronic components	3344	640	35,183	i 10	1	10	1	0	0		
Navigational, measuring, electromedical, and control instruments	3345	1,140	17,562	190	i 2,456	160	i 2,388	60	i 68		

TABLE 20

**Companies with domestic R&D paid for by the company and others and performed by the company in the biotechnology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D									
				Total		Paid for by the company				Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	3,342	100	i 1,830	100	i 1,772	30	i 58				
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	9,662	10	i 320	10	i 320	0					
Other measuring and controlling device	other 3345	740	4,558	100	i 307	70	i 297	40	i 10				
Other computer and electronic products	other 334	220	21,388	10	1 - 50	10	0 - 48	10	i 2				
Electrical equipment, appliances, and components	335	900	5,263	10	12	10	12	10					*
Transportation equipment	336	1,090	45,375	10	48	10	48	0					0
Motor vehicles, bodies, trailers, and parts	3361-63	540	24,117	10	24	10	24	0					0
Aerospace products and parts	3364	380	i 18,358	10	24	10	24	0					0
Aircraft, aircraft engine, and aircraft parts	336411-13	200	i 16,891	10	17	10	17	0					0
Guided missile, space vehicle, and related parts	336414-15, 336419	190	i 1,467	10	i 7	10	i 7	0					0
Military armored vehicle, tank, and tank component	336992	30	35	0	0	0	0	0					0
Other transportation	other 336	150	2,865	0	0	0	0	0					0
Furniture and related products	337	190	409	0	0	0	0	0					0
Miscellaneous	339	1,310	18,596	280	i 1,727	270	i 1,670	40	i 57				i
Medical equipment and supplies	3391	790	16,014	270	i 1,621	260	i 1,564	40	i 57				i
Other miscellaneous manufacturing	3399	520	2,582	10	106	10	106	0					0
Nonmanufacturing industries	21-23, 42-81	13,100	207,283	780	i 11,919	490	i 2,297	400	i 9,622				i
Mining, quarrying, oil and gas extraction, and support activities	21	160	2,717	10	i 1 - 16	10	0 - 13	10	i 2				
Utilities	22	40	275	0	0	0	0	0					0
Wholesale trade	42	1,560	1,191	10	i 5	10	i 5	0					0
Electronic shopping and electronic auctions	454111-12	60	3,131 - 15,818	0	0	0	0	0					0
Transportation and warehousing	48-49	130	i 9,890	10	2	10	2	0					0
Information	51	3,090	110,227	40	86	40	80	10					6
Publishing	511	1,080	33,019	30	58	20	54	10	i 5				
Newspaper, periodical, book, and directory publishers	5111	40	61	0	0	0	0	0					0
Software publishers	5112	1,040	32,958	30	58	20	54	10	i 5				

TABLE 20

**Companies with domestic R&D paid for by the company and others and performed by the company in the biotechnology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D					
		Companies <sup>a</sup> (number)	Amount	Total		Paid for by the company		Paid for by others	
				Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
Telecommunications	517	210	3,733	0	0	0	0	0	0
Data processing, hosting, and related services	518	1,480	30,558	20	26	20	25	10	1
Other information	other 51	340	42,917	10	2	10	2	0	0
Finance and insurance	52	220	8,917	0	0	0	0	0	0
Real estate and rental and leasing	53	50	1,371	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	30	1,326	0	0	0	0	0	0
Professional, scientific, and technical services	54	6,500	53,233	700	10,971	410	1,473	390	9,498
Architectural, engineering, and related services	5413	1,450	4,207	120	93	30	39	90	54
Computer systems design and related services	5415	3,020	21,046	20	33	20	33	0	0
Scientific research and development services	5417	1,230	21,669	530	10,747	340	1,311	280	9,436
Research and development in biotechnology	541711	310	6,457	270	4,556	170	861	150	3,695
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446	260	6,061	180	450	130	5,611
Research and development in the social sciences and humanities	541720	30	766	10	130	0	0	10	130
Other professional, scientific, and technical services	other 54	810	6,312	50	98	30	89	20	9
Health care services	621-23	680	2,265	30	838	30	727	10	111
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	680	1,380 - 14,067	10	3 - 18	10	0 - 13	10	4
All companies (number of domestic employees)	-	28,270	492,956	2,470	77,792	2,010	62,952	780	14,841
Small companies									
10-19 <sup>c</sup>	-	5,490	5,501	570	1,224	420	921	220	302
20-49	-	7,980	12,418	660	2,801	530	2,262	240	538
Medium companies									
50-99	-	4,960	14,021	440	5,075	370	4,334	130	741
100-249	-	4,580	19,793	320	4,736	270	3,992	100	743

TABLE 20

**Companies with domestic R&D paid for by the company and others and performed by the company in the biotechnology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Biotechnology R&D									
		Domestic R&D		Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
Large companies											
250–499	–	2,140	18,883	190	4,708	180	4,022	40	686	i	
500–999	–	1,230	23,969	80	5,148	70	4,552	20	596	i	
1,000–4,999	–	1,330	75,671	140	10,329	130	8,035	30	2,294	i	
5,000–9,999	–	240	50,811	30	11,326	30	7,801	10	3,525	i	
10,000–24,999	–	220	88,263	40	22,815	40	18,655	20	4,159	i	
25,000 or more	–	130	183,626	20	9,631	20	8,376	10	1,255	i	

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.<sup>b</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&amp;D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. 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&amp;D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&amp;D in one, more than one, or no application area. 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.

TABLE 21

**Companies with domestic R&D paid for by the company and others and performed by the company in the nanotechnology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Nanotechnology R&D							
		Companies <sup>a</sup> (number)	Amount	Total		Paid for by the company		Paid for by others			
				Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
All industries	21-23, 31-33, 42-81	28,270	492,956	900	i 23,484	i 780	i 21,626	i 170	1,858	i	
Manufacturing industries	31-33	15,180	285,674	620	i 21,008	i 590	i 19,643	i 70	1,365	i	
Food	311	870	4,180	10	2	10	2	0	0		
Beverage and tobacco products	312	350	1,082	10	5	10	5	0	0		
Textile, apparel, and leather products	313-16	240	904	10	*	10	*	0	0		
Wood products	321	80	186	10	*	10	*	0	0		
Paper	322	90	1,064	10	11	i 10	11	i 0	0		
Printing and related support activities	323	200	420	i 0	0	0	0	0	0		
Petroleum and coal products	324	80	1,306	10	0 - 69	i 10	0 - 69	i 0	0		
Chemicals	325	2,330	97,063	180	i 553	i 170	i 500	20	53		
Basic chemicals	3251	240	2,360	50	i 70	40	i 61	10	8		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	1,172	10	12	10	3	i 10	9		
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,822 - 1,846	10	*	10	*	0	0		
Pharmaceuticals and medicines	3254	1,060	87,619	40	379	30	345	10	i 34	i	
Soap, cleaning compound, and toilet preparation	3256	270	2,760	10	*	10	*	0	0		
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,305 - 1,333	100	i 92	100	i 90	10	2		
Plastics and rubber products	326	790	2,856	70	i 63	70	i 60	10	i 4	i	
Nonmetallic mineral products	327	170	1,508	i 20	10	20	i 7	10	3		
Primary metals	331	200	665	10	i 5	i 10	i 5	0	0		
Fabricated metal products	332	1,840	2,885	10	i 20	10	i 20	0	0		
Machinery	333	2,240	15,184	60	1,138	50	i 1,116	i 20	21		
Agricultural implement	33311	190	1,921	0	0	0	0	0	0		
Semiconductor machinery	333242	80	4,459	20	1,105	20	1,083 - 1,106	i 10	0 - 22		
Engine, turbine, and power transmission equipment	3336	110	1,301	10	*	10	*	0	0		
Other machinery	other 333	1,880	7,503	40	i 32	30	i 10 - 33	20	0 - 22		
Computer and electronic products	334	2,280	86,729	200	i 18,707	i 190	i 17,440	i 30	i 1,267	i	
Communications equipment	3342	300	12,595	10	*	10	*	0	0		
Semiconductor and other electronic components	3344	640	35,183	i 120	i 18,317	i 110	i 17,116	i 20	i 1,200	i	
Navigational, measuring, electromedical, and control instruments	3345	1,140	17,562	80	i 287	80	i 221	i 10	66		



TABLE 21

**Companies with domestic R&D paid for by the company and others and performed by the company in the nanotechnology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Nanotechnology R&D							
				Total		Paid for by the company				Paid for by others	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	3,342	10	i 6	10	i 5	10	i 1		
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	9,662	10	i 124	10	i 63	10	i 61		
Other measuring and controlling device	other 3345	740	4,558	70	i 157	70	i 153	10	i 4		
Other computer and electronic products	other 334	220	21,388	10		10		10	i *		
Electrical equipment, appliances, and components	335	900	5,263	20	i 57	20	i 57	0		0	
Transportation equipment	336	1,090	45,375	10	i 101	10	i 85	10	i 15	i	
Motor vehicles, bodies, trailers, and parts	3361-63	540	24,117	10	i 91	10		10	i 15	i	
Aerospace products and parts	3364	380	18,358	10	i 10	10	i 9	10	i 1		
Aircraft, aircraft engine, and aircraft parts	336411-13	200	16,891	10	i 9	10	i 9	0		0	
Guided missile, space vehicle, and related parts	336414-15, 336419	190	1,467	10		0		10		1	
Military armored vehicle, tank, and tank component	336992	30	35	0		0		0		0	
Other transportation	other 336	150	2,865	0		0		0		0	
Furniture and related products	337	190	409	0		0		0		0	
Miscellaneous	339	1,310	18,596	70	i 273-342	70	i 271-341	10	i 2		
Medical equipment and supplies	3391	790	16,014	60	i 274	60	i 272	10	i 2		
Other miscellaneous manufacturing	3399	520	2,582	10	0-69	10	0-69	0		0	
Nonmanufacturing industries	21-23, 42-81	13,100	207,283	280	i 2,476	200	i 1,983	110	i 493	i	
Mining, quarrying, oil and gas extraction, and support activities	21	160	2,717	10	i 41	10		10	i 2	i	
Utilities	22	40	275	0		0		0		0	
Wholesale trade	42	1,560	1,191	60	i 10	60	i 10	0		0	
Electronic shopping and electronic auctions	454111-12	60	3,131-15,818	10	i 12	10	i 12	0		0	
Transportation and warehousing	48-49	130	9,890	0		0		0		0	
Information	51	3,090	110,227	20	1,217	20	1,213	10		4	
Publishing	511	1,080	33,019	20	i 1,216	20	i 1,212	10		4	
Newspaper, periodical, book, and directory publishers	5111	40	61	0		0		0		0	
Software publishers	5112	1,040	32,958	20	i 1,216	20	i 1,212	10		4	



TABLE 21

**Companies with domestic R&D paid for by the company and others and performed by the company in the nanotechnology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Nanotechnology R&D							
				Total		Paid for by the company				Paid for by others	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
250–499	–	2,140	18,883	70	i 745	70	i 439	20		306	i
500–999	–	1,230	23,969	30	i 624	30	i 412	10	i	212	i
1,000–4,999	–	1,330	75,671	60		60		10	i	658	i
5,000–9,999	–	240	50,811	20		20	i 4,526	10		145	
10,000–24,999	–	220	88,263	20	i 5,251	20	i 5,146	10	i	105	i
25,000 or more	–	130	183,626	20	i 6,656	20	i 6,508	10		147	

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.<sup>b</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&amp;D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. 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&amp;D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&amp;D in one, more than one, or no application area. 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.

TABLE 22

**Companies with domestic R&D paid for by the company and others and performed by the company in the artificial intelligence technology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Artificial intelligence R&D							
		Companies <sup>a</sup> (number)	Amount	Total		Paid for by the company		Paid for by others			
				Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount		
All industries	21-23, 31-33, 42-81	28,270	492,956	2,590	i 15,351	i 2,340	i 14,038	i 350	i 1,313		
Manufacturing industries	31-33	15,180	285,674	890	i 4,665	i 850	i 4,484	i 80	181		
Food	311	870	4,180	10	3	10	3	10	1		
Beverage and tobacco products	312	350	1,082	10	1	10	1	0	0		
Textile, apparel, and leather products	313-16	240	904	10	4	10	4	0	0		
Wood products	321	80	186	10	1	10	1	0	0		
Paper	322	90	1,064	10	1	10	1	0	0		
Printing and related support activities	323	200	420	i 0	0	0	0	0	0		
Petroleum and coal products	324	80	1,306	0	0	0	0	0	0		
Chemicals	325	2,330	97,063	40	123	40	119	10	5		
Basic chemicals	3251	240	2,360	10	5	10	i 2	i 10	4		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	1,172	10	5	10	5	0	0		
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,822 - 1,846	20	i 75	20	i 75	10	1		
Pharmaceuticals and medicines	3254	1,060	87,619	20	33	20	33	10	1		
Soap, cleaning compound, and toilet preparation	3256	270	2,760	0	0	0	0	0	0		
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,305 - 1,333	10	4	10	4	0	0		
Plastics and rubber products	326	790	2,856	20	6	20	6	0	0		
Nonmetallic mineral products	327	170	1,508	i 10	5	10	5	0	0		
Primary metals	331	200	665	10	1	10	1	10	*		
Fabricated metal products	332	1,840	2,885	20	16	20	16	0	0		
Machinery	333	2,240	15,184	120	i 209	110	i 200	20	9		
Agricultural implement	33311	190	1,921	20	i 44	20	i 44	10	i *		
Semiconductor machinery	333242	80	4,459	10	6	10	6	0	0		
Engine, turbine, and power transmission equipment	3336	110	1,301	10	4	0	0	10	4		
Other machinery	other 333	1,880	7,503	100	i 155	90	i 150	20	5		
Computer and electronic products	334	2,280	86,729	330	i 2,813	i 310	i 2,733	i 30	i 80		
Communications equipment	3342	300	12,595	60	i 66	i 60	i 66	10	i *		
Semiconductor and other electronic components	3344	640	35,183	i 90	i 1,357	i 90	i 1,323	i 20	i 34		
Navigational, measuring, electromedical, and control instruments	3345	1,140	17,562	150	i 238	i 140	i 193	i 20	i 45		
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	3,342	20	i 5	10	3	10	i 3		

TABLE 22

**Companies with domestic R&D paid for by the company and others and performed by the company in the artificial intelligence technology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Artificial intelligence R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount		
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	9,662	60	i 120	60	i 79	i 10	41		
Other measuring and controlling device	other 3345	740	4,558	70	i 113	i 70	i 111	i 10	2		
Other computer and electronic products	other 334	220	21,388	40	i 1,151	40	i 1,151	10	i *		
Electrical equipment, appliances, and components	335	900	5,263	220	i 331	i 220	i 324	i 10	i 6		
Transportation equipment	336	1,090	45,375	50	857	50	781	10	76		
Motor vehicles, bodies, trailers, and parts	3361-63	540	24,117	40	i 740	40	i 704	10	36		
Aerospace products and parts	3364	380	i 18,358	i 10	i 115	i 10	i 75	i 10	i 40		
Aircraft, aircraft engine, and aircraft parts	336411-13	200	i 16,891	i 10	i 113	i 10	i 74	i 10	i 40		
Guided missile, space vehicle, and related parts	336414-15, 336419	190	i 1,467	10	1	10	1	10	*		
Military armored vehicle, tank, and tank component	336992	30	35	0	0	0	0	0	0		
Other transportation	other 336	150	2,865	10	2	10	2	0	0		
Furniture and related products	337	190	409	10	1	10	1	0	0		
Miscellaneous	339	1,310	18,596	100	i 293	i 100	i 289	i 20	i 4		
Medical equipment and supplies	3391	790	16,014	100	i 279	i 90	i 275	i 20	i 4		
Other miscellaneous manufacturing	3399	520	2,582	10	14	10	14	0	0		
Nonmanufacturing industries	21-23, 42-81	13,100	207,283	1,710	i 10,686	i 1,500	i 9,554	i 280	i 1,132		
Mining, quarrying, oil and gas extraction, and support activities	21	160	2,717	10	i 49	10	i 49	0	0		
Utilities	22	40	275	10	*	10	*	0	0		
Wholesale trade	42	1,560	1,191	10	i 1	i 10	i 0-2	i 10	i 0-2		
Electronic shopping and electronic auctions	454111-12	60	3,131 - 15,818	i 10	i 1 - 2,138	i 10	i 0 - 2,135	i 10	1 - 6		
Transportation and warehousing	48-49	130	i 9,890	i 20	i 331	i 20	i 331	i 0	0		
Information	51	3,090	110,227	520	5,426	520	5,396	10	30		
Publishing	511	1,080	33,019	160	i 2,061	160	i 2,057	10	3		
Newspaper, periodical, book, and directory publishers	5111	40	61	0	0	0	0	0	0		
Software publishers	5112	1,040	32,958	160	i 2,061	160	i 2,057	10	3		
Telecommunications	517	210	3,733	10	13	10	13	0	0		
Data processing, hosting, and related services	518	1,480	30,558	310	1,647	310	1,620	10	26		

TABLE 22

**Companies with domestic R&D paid for by the company and others and performed by the company in the artificial intelligence technology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Artificial intelligence R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount		
Other information	other 51	340	42,917	50	1,705	50	1,705	0	0		
Finance and insurance	52	220	8,917	20	313	20	313	0	0		
Real estate and rental and leasing	53	50	1,371	10	0 - 1,327	10	0 - 1,327	0	0		
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	0	0		
Other real estate and rental and leasing	other 53	30	1,326	10	0 - 1,327	10	0 - 1,327	0	0		
Professional, scientific, and technical services	54	6,500	53,233	1,100	2,356	900	1,258	260	1,098		
Architectural, engineering, and related services	5413	1,450	4,207	110	115	70	41	50	74		
Computer systems design and related services	5415	3,020	21,046	640	1,080	590	742	70	338		
Scientific research and development services	5417	1,230	21,669	250	883	140	216	140	667		
Research and development in biotechnology	541711	310	6,457	30	17	20	11	20	6		
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446	210	852	130	205	120	646		
Research and development in the social sciences and humanities	541720	30	766	10	14	0	0	10	14		
Other professional, scientific, and technical services	other 54	810	6,312	120	279	120	260	10	19		
Health care services	621-23	680	2,265	10	76	10	76	0	0		
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	680	1,380 - 14,067	30	0 - 2,135	30	0 - 2,135	0	0		
All companies (number of domestic employees)	-	28,270	492,956	2,590	15,351	2,340	14,038	350	1,313		
Small companies											
10-19 <sup>b</sup>	-	5,490	5,501	630	215	560	171	100	43		
20-49	-	7,980	12,418	800	589	730	466	110	123		
Medium companies											
50-99	-	4,960	14,021	370	520	340	461	50	59		
100-249	-	4,580	19,793	320	929	290	773	40	157		
Large companies											
250-499	-	2,140	18,883	160	776	140	418	30	358		
500-999	-	1,230	23,969	90	388	80	341	10	47		
1,000-4,999	-	1,330	75,671	150	1,477	140	1,460	10	17		

TABLE 22

**Companies with domestic R&D paid for by the company and others and performed by the company in the artificial intelligence technology focus area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Artificial intelligence R&D							
		Domestic R&D		Total		Paid for by the company		Paid for by others	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount
5,000–9,999	–	240	50,811	40	947 i	40	870 i	20	78 i
10,000–24,999	–	220	88,263	30	2,279 i	30	1,964 i	10	315 i
25,000 or more	–	130	183,626	30	7,231 i	30	7,114 i	10	117 i

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse.

<sup>b</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. 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.

TABLE 23

**Companies with domestic R&D paid for by the company and others and performed by the company in the energy application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Energy R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
All industries	21-23, 31-33, 42-81	28,270	492,956	3,880	i 26,162	i 3,450	i 24,054	i 640	i 2,108	i	
Manufacturing industries	31-33	15,180	285,674	2,840	i 20,925	i 2,670	i 19,780	i 310	i 1,145		
Food	311	870	4,180	70	i 40	i 60	i 39	i 10	1		
Beverage and tobacco products	312	350	1,082	20	5	20	5	0	0		
Textile, apparel, and leather products	313-16	240	904	20	i 99	i 20	i 99	0	0		
Wood products	321	80	186	20	i 4	i 20	i 4	0	0		
Paper	322	90	1,064	20	i 43	i 20	i 43	0	0		
Printing and related support activities	323	200	420	i 10	i 1	i 10	i 1	0	0		
Petroleum and coal products	324	80	1,306	20	405 - 421	20	406	10	i 0 - 14		
Chemicals	325	2,330	97,063	250	i 542	240	i 479	20	64		
Basic chemicals	3251	240	2,360	110	i 319	110	i 308	10	12		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	1,172	40	i 53	40	i 53	0	0		
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,822 - 1,846	10	17	10	*	10	17		
Pharmaceuticals and medicines	3254	1,060	87,619	10	44	10	16	10	i 27	i	
Soap, cleaning compound, and toilet preparation	3256	270	2,760	20	i 42	20	i 42	0	0		
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,305 - 1,333	80	i 68	80	i 59	10	8		
Plastics and rubber products	326	790	2,856	120	i 250	120	i 250	10	i 1	i	
Nonmetallic mineral products	327	170	1,508	i 30	i 169	30	i 169	0	0		
Primary metals	331	200	665	70	i 72	70	i 72	10	*		
Fabricated metal products	332	1,840	2,885	290	i 482	290	i 457	10	25		
Machinery	333	2,240	15,184	620	i 2,529	570	i 2,340	80	i 189		
Agricultural implement	33311	190	1,921	30	i 53	30	i 53	10	*		
Semiconductor machinery	333242	80	4,459	10	13	10	13	0	0		
Engine, turbine, and power transmission equipment	3336	110	1,301	70	i 808	70	i 713	20	95		
Other machinery	other 333	1,880	7,503	530	i 1,655	480	i 1,561	60	i 94		
Computer and electronic products	334	2,280	86,729	610	i 8,580	i 570	i 8,218	i 100	i 362	i	
Communications equipment	3342	300	12,595	70	i 264	70	i 262	10	i 2		
Semiconductor and other electronic components	3344	640	35,183	i 190	i 5,399	i 160	i 5,210	i 50	i 189	i	
Navigational, measuring, electromedical, and control instruments	3345	1,140	17,562	300	i 2,138	280	i 1,979	50	i 159	i	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	3,342	10	1	10	1	0	0		



TABLE 23

**Companies with domestic R&D paid for by the company and others and performed by the company in the energy application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Energy R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	9,662	40	1,144	40	1,000	10	144		
Other measuring and controlling device	other 3345	740	4,558	270	993	250	977	50	16		
Other computer and electronic products	other 334	220	21,388	70	779	70	767	10	12		
Electrical equipment, appliances, and components	335	900	5,263	480	1,729	460	1,656	40	74		
Transportation equipment	336	1,090	45,375	130	5,741	110	5,328	40	413		
Motor vehicles, bodies, trailers, and parts	3361-63	540	24,117	80	5,371	70	4,978	30	393		
Aerospace products and parts	3364	380	18,358	30	288	30	269	10	19		
Aircraft, aircraft engine, and aircraft parts	336411-13	200	16,891	20	284	20	267	10	17		
Guided missile, space vehicle, and related parts	336414-15, 336419	190	1,467	10	4	10	2	10	2		
Military armored vehicle, tank, and tank component	336992	30	35	10	1	0	0	10	1		
Other transportation	other 336	150	2,865	30	81	30	81	10	*		
Furniture and related products	337	190	409	20	10	20	10	0	0		
Miscellaneous	339	1,310	18,596	120	211 - 226	90	205	40	6 - 21		
Medical equipment and supplies	3391	790	16,014	80	76	50	70	40	7		
Other miscellaneous manufacturing	3399	520	2,582	40	135 - 150	40	136	10	0 - 14		
Nonmanufacturing industries	21-23, 42-81	13,100	207,283	1,040	5,236	780	4,274	340	963		
Mining, quarrying, oil and gas extraction, and support activities	21	160	2,717	50	2,146	40	2,073	10	72		
Utilities	22	40	275	40	267	40	231	10	36		
Wholesale trade	42	1,560	1,191	60	31	60	31	0	0		
Electronic shopping and electronic auctions	454111-12	60	3,131 - 15,818	0	0	0	0	0	0		
Transportation and warehousing	48-49	130	9,890	10	165	10	165	0	0		
Information	51	3,090	110,227	140	815	140	684	10	132		
Publishing	511	1,080	33,019	70	579	70	447	10	131		
Newspaper, periodical, book, and directory publishers	5111	40	61	0	0	0	0	0	0		
Software publishers	5112	1,040	32,958	70	579	70	447	10	131		
Telecommunications	517	210	3,733	10	48	10	48	0	0		

TABLE 23

**Companies with domestic R&D paid for by the company and others and performed by the company in the energy application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Energy R&D					
				Total		Paid for by the company		Paid for by others	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
Data processing, hosting, and related services	518	1,480	30,558	60	172	60	172	10	1
Other information	other 51	340	42,917	10	17	10	17	0	0
Finance and insurance	52	220	8,917	0	0	0	0	0	0
Real estate and rental and leasing	53	50	1,371	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	30	1,326	0	0	0	0	0	0
Professional, scientific, and technical services	54	6,500	53,233	710	1,510	460	790	320	720
Architectural, engineering, and related services	5413	1,450	4,207	310	639	240	377	90	263
Computer systems design and related services	5415	3,020	21,046	40	89	40	87	10	2
Scientific research and development services	5417	1,230	21,669	330	698	150	247	220	450
Research and development in biotechnology	541711	310	6,457	30	14	10	2	30	12
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446	310	676	150	246	200	431
Research and development in the social sciences and humanities	541720	30	766	10	7	0	0	10	7
Other professional, scientific, and technical services	other 54	810	6,312	40	84	30	80	20	5
Health care services	621–23	680	2,265	0	0	0	0	0	0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	680	1,380 - 14,067	70	302	70	299	10	2
All companies (number of domestic employees)	–	28,270	492,956	3,880	26,162	3,450	24,054	640	2,108
Small companies									
10–19 <sup>c</sup>	–	5,490	5,501	760	328	610	220	190	107
20–49	–	7,980	12,418	860	689	730	553	180	136
Medium companies									
50–99	–	4,960	14,021	620	808	580	706	60	102
100–249	–	4,580	19,793	700	1,159	640	1,021	100	138
Large companies									
250–499	–	2,140	18,883	290	839	270	746	30	93

TABLE 23

**Companies with domestic R&D paid for by the company and others and performed by the company in the energy application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Energy R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
500–999	–	1,230	23,969	190	1,483	180	1,357	30	i	126	
1,000–4,999	–	1,330	75,671	310	3,391	300	3,140	40		251 i	
5,000–9,999	–	240	50,811	80	2,978	80	2,679	20		299 i	
10,000–24,999	–	220	88,263	60	5,578	i	60	5,128	i	20	450
25,000 or more	–	130	183,626	40	8,908	i	40	8,502	i	20	406 i

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

<sup>b</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.

<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. 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.

TABLE 24

**Companies with domestic R&D paid for by the company and others and performed by the company in the environmental protection application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Environmental protection R&D									
		Domestic R&D		Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
All industries	21-23, 31-33, 42-81	28,270	492,956	3,140	11,795	2,820	10,405	440	1,390		
Manufacturing industries	31-33	15,180	285,674	2,380	10,331	2,260	9,411	190	920		
Food	311	870	4,180	80	105	80	74	10	31		
Beverage and tobacco products	312	350	1,082	10	12	10	6	10	5		
Textile, apparel, and leather products	313-16	240	904	30	21	30	21	0	0		
Wood products	321	80	186	20	5	20	5	0	0		
Paper	322	90	1,064	30	74	30	74	0	0		
Printing and related support activities	323	200	420	10	2	10	2	0	0		
Petroleum and coal products	324	80	1,306	30	179	30	178	10	1		
Chemicals	325	2,330	97,063	430	578	420	530	20	48		
Basic chemicals	3251	240	2,360	100	205	100	191	10	13		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	1,172	40	50	40	50	0	0		
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,822 - 1,846	40	104	40	104	10	*		
Pharmaceuticals and medicines	3254	1,060	87,619	10	91	10	63	10	27		
Soap, cleaning compound, and toilet preparation	3256	270	2,760	60	52	60	52	0	0		
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,305 - 1,333	200	76	190	70	10	7		
Plastics and rubber products	326	790	2,856	140	141	140	141	10	*		
Nonmetallic mineral products	327	170	1,508	50	41	50	41	0	0		
Primary metals	331	200	665	50	35	50	30	10	5		
Fabricated metal products	332	1,840	2,885	150	91	140	83	10	8		
Machinery	333	2,240	15,184	470	1,022	420	925	70	97		
Agricultural implement	33311	190	1,921	30	100	30	100	10	*		
Semiconductor machinery	333242	80	4,459	10	3	10	3	0	0		
Engine, turbine, and power transmission equipment	3336	110	1,301	60	299	60	260	20	39		
Other machinery	other 333	1,880	7,503	380	620	330	563	60	57		
Computer and electronic products	334	2,280	86,729	350	2,557	350	2,041	20	516		
Communications equipment	3342	300	12,595	40	154	40	153	10	*		
Semiconductor and other electronic components	3344	640	35,183	50	630	50	619	10	12		
Navigational, measuring, electromedical, and control instruments	3345	1,140	17,562	250	1,712	250	1,209	10	503		
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	3,342	10	1	10	1	0	0		

TABLE 24

**Companies with domestic R&D paid for by the company and others and performed by the company in the environmental protection application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Environmental protection R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	9,662	30	i 1,398	30	i 897	10	i 501	i	
Other measuring and controlling device	other 3345	740	4,558	220	i 313	220	i 311	10	i 2		
Other computer and electronic products	other 334	220	21,388	30	61	30	60	10	i 1		
Electrical equipment, appliances, and components	335	900	5,263	320	i 772	310	i 678	20	i 95		
Transportation equipment	336	1,090	45,375	190	i 4,526	180	i 4,417	30	i 109	i	
Motor vehicles, bodies, trailers, and parts	3361-63	540	24,117	80	i 4,108	80	i 4,001	30	i 106	i	
Aerospace products and parts	3364	380	i 18,358	i 100	i 408	i 100	i 405	i 10	i 3		
Aircraft, aircraft engine, and aircraft parts	336411-13	200	16,891	i 20	346	i 20	344	i 10	2		
Guided missile, space vehicle, and related parts	336414-15, 336419	190	i 1,467	i 90	i 62	i 90	i 61	i 10	i 1	i	
Military armored vehicle, tank, and tank component	336992	30	35	10	*	0	0	10	*		
Other transportation	other 336	150	2,865	10	i 10	i 10	i 10	i 0	0		
Furniture and related products	337	190	409	20	i 12	i 20	i 12	i 0	0		
Miscellaneous	339	1,310	18,596	90	161	60	154	40	i 7	i	
Medical equipment and supplies	3391	790	16,014	70	i 67	40	60	40	i 7	i	
Other miscellaneous manufacturing	3399	520	2,582	30	94	20	94	10	*		
Nonmanufacturing industries	21-23, 42-81	13,100	207,283	770	i 1,464	560	i 994	260	i 469		
Mining, quarrying, oil and gas extraction, and support activities	21	160	2,717	20	i 172	20	166	10	i 6	i	
Utilities	22	40	275	20	i 112	20	i 78 - 113	10	0 - 34		
Wholesale trade	42	1,560	1,191	50	i 31	i 50	i 31	i 0	0		
Electronic shopping and electronic auctions	454111-12	60	3,131 - 15,818	i 0	0	0	0	0	0		
Transportation and warehousing	48-49	130	9,890	i 10	*	10	*	0	0		
Information	51	3,090	110,227	90	148	90	148	0	0		
Publishing	511	1,080	33,019	20	85	20	85	0	0		
Newspaper, periodical, book, and directory publishers	5111	40	61	0	0	0	0	0	0		
Software publishers	5112	1,040	32,958	20	85	20	85	0	0		
Telecommunications	517	210	3,733	10	0 - 64	10	0 - 64	0	0		

TABLE 24

**Companies with domestic R&D paid for by the company and others and performed by the company in the environmental protection application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Environmental protection R&D					
				Total		Paid for by the company		Paid for by others	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
Data processing, hosting, and related services	518	1,480	30,558	70	0 - 64	70	0 - 64	0	0
Other information	other 51	340	42,917	10	0 - 64	10	0 - 64	0	0
Finance and insurance	52	220	8,917	0	0	0	0	0	0
Real estate and rental and leasing	53	50	1,371	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	30	1,326	0	0	0	0	0	0
Professional, scientific, and technical services	54	6,500	53,233	570	i 933	370	i 503	260	i 431
Architectural, engineering, and related services	5413	1,450	4,207	350	i 611	240	i 316	140	i 295
Computer systems design and related services	5415	3,020	21,046	20	39	20	39	0	0
Scientific research and development services	5417	1,230	21,669	180	i 231	100	i 111	110	i 120
Research and development in biotechnology	541711	310	6,457	40	41	20	i 24	30	17
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446	i 140	i 191	i 90	i 87	80	i 103
Research and development in the social sciences and humanities	541720	30	766	0	0	0	0	0	0
Other professional, scientific, and technical services	other 54	810	6,312	40	i 53	30	i 37	20	16
Health care services	621-23	680	2,265	0	0	0	0	0	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	680	1,380 - 14,067	50	67	50	33 - 68	10	0 - 34
All companies (number of domestic employees)	-	28,270	492,956	3,140	i 11,795	i 2,820	i 10,405	i 440	i 1,390
Small companies									
10-19 <sup>c</sup>	-	5,490	5,501	680	i 225	i 570	i 178	i 140	i 48
20-49	-	7,980	12,418	770	i 424	i 670	i 347	i 140	i 77
Medium companies									
50-99	-	4,960	14,021	470	i 321	i 440	i 286	i 50	i 34
100-249	-	4,580	19,793	490	i 463	i 460	i 369	i 40	i 94
Large companies									
250-499	-	2,140	18,883	240	i 490	i 220	i 402	i 30	i 87

TABLE 24

**Companies with domestic R&D paid for by the company and others and performed by the company in the environmental protection application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Environmental protection R&D								
				Total		Paid for by the company		Paid for by others				
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	
500–999	–	1,230	23,969	150	515	140	470	20	i	45	i	
1,000–4,999	–	1,330	75,671	230	1,376	i	220	1,248	i	30	128	
5,000–9,999	–	240	50,811	70	1,450	i	70	1,260	i	10	189	
10,000–24,999	–	220	88,263	60	1,434	i	60	1,299	i	20	i	134
25,000 or more	–	130	183,626	30	5,098		30	4,543		10	555	i

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.<sup>b</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&amp;D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. 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&amp;D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&amp;D in one, more than one, or no application area. 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.

TABLE 25

**Companies with domestic R&D paid for by the company and others and performed by the company in the defense application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Defense R&D							
		Companies <sup>a</sup> (number)	Amount	Total		Paid for by the company		Paid for by others			
				Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
All industries	21-23, 31-33, 42-81	28,270	492,956	3,680	i 33,331	i 2,770	i 13,290	i 1,170	i 20,041		
Manufacturing industries	31-33	15,180	285,674	2,320	i 25,506	i 2,090	i 11,649	i 380	i 13,858		
Food	311	870	4,180	0	0	0	0	0	0		
Beverage and tobacco products	312	350	1,082	0	0	0	0	0	0		
Textile, apparel, and leather products	313-16	240	904	20	i 22	20	i 17	10	4		
Wood products	321	80	186	0	0	0	0	0	0		
Paper	322	90	1,064	10	1	10	1	0	0		
Printing and related support activities	323	200	420	i 0	0	0	0	0	0		
Petroleum and coal products	324	80	1,306	0	0	0	0	0	0		
Chemicals	325	2,330	97,063	170	i 1,689	150	i 128	20	i 1,561		
Basic chemicals	3251	240	2,360	40	i 34	40	i 34	0	0		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	1,172	10	i 10	i 10	i 10	0	0		
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,822 - 1,846	0	0	0	0	0	0		
Pharmaceuticals and medicines	3254	1,060	87,619	30	1,608	20	57	20	i 1,551		
Soap, cleaning compound, and toilet preparation	3256	270	2,760	10	1	10	1	0	0		
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,305 - 1,333	100	i 36	100	i 25	10	10		
Plastics and rubber products	326	790	2,856	80	i 82	80	i 81	10	1		
Nonmetallic mineral products	327	170	1,508	i 20	i 123	i 20	i 121	i 10	i 2		
Primary metals	331	200	665	50	i 45	50	i 41	10	4		
Fabricated metal products	332	1,840	2,885	380	i 127	i 380	i 127	0	0		
Machinery	333	2,240	15,184	310	i 423	270	i 255	50	169		
Agricultural implement	33311	190	1,921	10	i *	10	i *	0	0		
Semiconductor machinery	333242	80	4,459	30	26	10	15	30	12		
Engine, turbine, and power transmission equipment	3336	110	1,301	30	i 209	20	i 73	10	136		
Other machinery	other 333	1,880	7,503	250	i 188	i 240	i 167	20	21		
Computer and electronic products	334	2,280	86,729	800	i 11,220	740	i 5,780	i 140	i 5,440		
Communications equipment	3342	300	12,595	70	i 343	70	i 264	10	79		
Semiconductor and other electronic components	3344	640	35,183	i 300	i 2,872	i 280	i 2,717	i 50	i 155		
Navigational, measuring, electromedical, and control instruments	3345	1,140	17,562	410	i 7,789	380	i 2,634	90	i 5,154		



TABLE 25

**Companies with domestic R&D paid for by the company and others and performed by the company in the defense application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Defense R&D									
				Total		Paid for by the company		Paid for by others					
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount				
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	3,342	40	i 126	30	i 118	10	i 7				
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	9,662	150	i 7,128	140	i 2,014	40		5,115			
Other measuring and controlling device	other 3345	740	4,558	240	i 534	220	i 502	50	i 32				
Other computer and electronic products	other 334	220	21,388	40		217		30		165		10	52
Electrical equipment, appliances, and components	335	900	5,263	160	i 121	140	i 96	30	i 25				
Transportation equipment	336	1,090	45,375	340	i 11,596	250	i 4,955	130	i 6,641				
Motor vehicles, bodies, trailers, and parts	3361-63	540	24,117	40	i 40 - 1,212	30	i 22	10	i 18 - 1,190				
Aerospace products and parts	3364	380	i 18,358	280	i 9,951	190	i 4,507	120	i 5,444				
Aircraft, aircraft engine, and aircraft parts	336411-13	200	16,891	i 100	9,089	i 90	4,091	i 30	4,998				
Guided missile, space vehicle, and related parts	336414-15, 336419	190	i 1,467	190	i 862	110	i 416	90	i 445				
Military armored vehicle, tank, and tank component	336992	30	35	30	33	20	24	10	9				
Other transportation	other 336	150	2,865	10	401 - 1,571	10	402	10	0 - 1,169				
Furniture and related products	337	190	409	0	0	0	0	0	0				
Miscellaneous	339	1,310	18,596	50	58	30	48	20	i 10				
Medical equipment and supplies	3391	790	16,014	30	i 28	10	22	20	i 5				
Other miscellaneous manufacturing	3399	520	2,582	20	31	20	25	10	5				
Nonmanufacturing industries	21-23, 42-81	13,100	207,283	1,370	i 7,824	690	i 1,641	790	i 6,183				
Mining, quarrying, oil and gas extraction, and support activities	21	160	2,717	10	14	10	14	0	0				
Utilities	22	40	275	10	*	10	*	0	0				
Wholesale trade	42	1,560	1,191	10	1	10	1	0	0				
Electronic shopping and electronic auctions	454111-12	60	3,131 - 15,818	i 0	0	0	0	0	0				
Transportation and warehousing	48-49	130	9,890	i 0	0	0	0	0	0				
Information	51	3,090	110,227	130	1,105	i 120	942	i 20	163				
Publishing	511	1,080	33,019	70	i 841	70	i 825	10	16				

TABLE 25

**Companies with domestic R&D paid for by the company and others and performed by the company in the defense application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Defense R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
Newspaper, periodical, book, and directory publishers	5111	40	61	0	0	0	0	0	0	0	
Software publishers	5112	1,040	32,958	70	841	70	825	10	16		
Telecommunications	517	210	3,733	10	3 - 27	10	0 - 23	10	4		
Data processing, hosting, and related services	518	1,480	30,558	60	239	50	95	10	143		
Other information	other 51	340	42,917	10	0 - 23	10	0 - 23	0	0		
Finance and insurance	52	220	8,917	0	0	0	0	0	0		
Real estate and rental and leasing	53	50	1,371	0	0	0	0	0	0		
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	0	0		
Other real estate and rental and leasing	other 53	30	1,326	0	0	0	0	0	0		
Professional, scientific, and technical services	54	6,500	53,233	1,220	6,676	550	666	780	6,010		
Architectural, engineering, and related services	5413	1,450	4,207	270	1,065	100	76	200	989		
Computer systems design and related services	5415	3,020	21,046	370	1,176	290	394	100	782		
Scientific research and development services	5417	1,230	21,669	470	4,021	160	138	390	3,883		
Research and development in biotechnology	541711	310	6,457	50	58	10	9	40	49		
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446	420	3,734	150	129	340	3,606		
Research and development in the social sciences and humanities	541720	30	766	10	228	0	0	10	228		
Other professional, scientific, and technical services	other 54	810	6,312	120	414	20	59	110	356		
Health care services	621-23	680	2,265	10	3	10	2	10	2		
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	680	1,380 - 14,067	20	25	20	16	10	9		
All companies (number of domestic employees)	-	28,270	492,956	3,680	33,331	2,770	13,290	1,170	20,041		
Small companies											
10-19 <sup>c</sup>	-	5,490	5,501	830	575	520	204	350	371		

TABLE 25

**Companies with domestic R&D paid for by the company and others and performed by the company in the defense application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Defense R&D								
				Total		Paid for by the company		Paid for by others				
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount			
20-49	-	7,980	12,418	1,070	i	1,095	740	i	352	410	i	743
Medium companies												
50-99	-	4,960	14,021	610	i	1,128	510	i	401	130		727
100-249	-	4,580	19,793	660	i	1,711	560	i	764	150	i	947
Large companies												
250-499	-	2,140	18,883	200	i	1,139	170	i	300	60		839
500-999	-	1,230	23,969	110	i	609	100		399	20	i	211
1,000-4,999	-	1,330	75,671	140		4,546	130		1,854	40		2,692
5,000-9,999	-	240	50,811	50		2,038	40		887	20		1,150
10,000-24,999	-	220	88,263	30	i	4,429	30		1,812	20		2,617
25,000 or more	-	130	183,626	20		16,061	20		6,318	20		9,743

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.<sup>b</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&amp;D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. 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&amp;D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&amp;D in one, more than one, or no application area. 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.

TABLE 26

**Companies with domestic R&D paid for by the company and others and performed by the company in the health or medical application areas, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Health or medical R&D							
		Companies <sup>a</sup> (number)	Amount	Total		Paid for by the company		Paid for by others			
				Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
All industries	21-23, 31-33, 42-81	28,270	492,956	7,230	i 133,765	6,440	i 108,075	1,400	i 25,691	i	
Manufacturing industries	31-33	15,180	285,674	4,310	i 108,787	4,080	i 99,047	650	i 9,740	i	
Food	311	870	4,180	90	i 225	90	i 170	i 10		55	
Beverage and tobacco products	312	350	1,082	10		47	i 10		12	i 36	
Textile, apparel, and leather products	313-16	240	904	30	i 21	30	i 21	0		0	
Wood products	321	80	186	10		*	10		*	0	
Paper	322	90	1,064	40	i 95	i 40	i 95	i 0		0	
Printing and related support activities	323	200	420	i 10		1	10		1	0	
Petroleum and coal products	324	80	1,306	0		0	0		0	0	
Chemicals	325	2,330	97,063	1,370	i 84,796	1,310	i 75,949	260	i 8,848	i	
Basic chemicals	3251	240	2,360	90	i 167	90	i 164	10		3	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	1,172	40	i 46	40	i 46	0		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,822 - 1,846	10		*	10		*	0	
Pharmaceuticals and medicines	3254	1,060	87,619	1,010	84,406	960	75,561	260	i 8,845	i	
Soap, cleaning compound, and toilet preparation	3256	270	2,760	80	i 156	80	i 156	0		0	
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,305 - 1,333	170	i 22	170	i 22	10		*	
Plastics and rubber products	326	790	2,856	230	i 621	200	i 584	40	i 36	i	
Nonmetallic mineral products	327	170	1,508	i 20	i 152	20	i 151	10	i 1	i	
Primary metals	331	200	665	30	i 92	30	i 91	10		1	
Fabricated metal products	332	1,840	2,885	360	i 158	i 330	i 130	30		27	
Machinery	333	2,240	15,184	370	i 285	360	i 262	i 20		23	
Agricultural implement	33311	190	1,921	10		1	10		1	0	
Semiconductor machinery	333242	80	4,459	10		*	10		*	0	
Engine, turbine, and power transmission equipment	3336	110	1,301	30	i 59	i 30	i 59	i 0		0	
Other machinery	other 333	1,880	7,503	340	i 225	330	i 202	20		23	
Computer and electronic products	334	2,280	86,729	750	i 7,697	i 670	i 7,296	i 160	i 401		
Communications equipment	3342	300	12,595	50	i 171	40	i 169	10		1	
Semiconductor and other electronic components	3344	640	35,183	i 250	i 2,050	i 200	i 1,904	i 70	i 146		

TABLE 26

**Companies with domestic R&D paid for by the company and others and performed by the company in the health or medical application areas, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Health or medical R&D										
		Companies <sup>a</sup> (number)	Amount	Total		Paid for by the company		Paid for by others						
				Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount					
Navigational, measuring, electromedical, and control instruments	3345	1,140	17,562	430	i	3,953	i	410	i	3,702	i	90	i	251
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	3,342	210	i	2,876	i	200	i	2,660	i	50	i	216
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	9,662	10		40		10		19		10		21
Other measuring and controlling device	other 3345	740	4,558	230	i	1,037	i	210	i	1,023	i	40	i	14
Other computer and electronic products	other 334	220	21,388	30	i	1,523		30	i	1,520		10	i	3
Electrical equipment, appliances, and components	335	900	5,263	190	i	183	i	190	i	182	i	10		1
Transportation equipment	336	1,090	45,375	70	i	531	i	60		400		10	i	131
Motor vehicles, bodies, trailers, and parts	3361-63	540	24,117	50	i	473	i	50		357		10	i	117
Aerospace products and parts	3364	380	18,358	20		58		20		44		10		14
Aircraft, aircraft engine, and aircraft parts	336411-13	200	16,891	20		40		20		26		10		14
Guided missile, space vehicle, and related parts	336414-15, 336419	190	1,467	10	i	18	i	10	i	18		10	i	* <sup>i</sup>
Military armored vehicle, tank, and tank component	336992	30	35	0		0		0		0		0		0
Other transportation	other 336	150	2,865	0		0		0		0		0		0
Furniture and related products	337	190	409	30	i	18	i	30	i	18	i	0		0
Miscellaneous	339	1,310	18,596	790	i	13,864		760	i	13,683		130	i	181
Medical equipment and supplies	3391	790	16,014	760	i	13,659		730	i	13,492		120	i	167
Other miscellaneous manufacturing	3399	520	2,582	30		205		30		191		10		14
Nonmanufacturing industries	21-23, 42-81	13,100	207,283	2,930	i	24,978	i	2,360	i	9,028		760	i	15,950
Mining, quarrying, oil and gas extraction, and support activities	21	160	2,717	0		0		0		0		0		0
Utilities	22	40	275	0		0		0		0		0		0
Wholesale trade	42	1,560	1,191	180	i	85	i	180	i	83	i	10		2
Electronic shopping and electronic auctions	454111-12	60	3,131 - 15,818	10	i	42		10	i	42		0		0
Transportation and warehousing	48-49	130	9,890	10		83	i	10		83	i	0		0

TABLE 26

**Companies with domestic R&D paid for by the company and others and performed by the company in the health or medical application areas, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Health or medical R&D								
		Companies <sup>a</sup> (number)	Amount	Total		Paid for by the company		Paid for by others				
				Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount			
Information	51	3,090	110,227	510	i	2,812	500	i	2,782	10		29
Publishing	511	1,080	33,019	280	i	1,554	280	i	1,527	10		27
Newspaper, periodical, book, and directory publishers	5111	40	61	0		0	0		0	0		0
Software publishers	5112	1,040	32,958	280	i	1,554	280	i	1,527	10		27
Telecommunications	517	210	3,733	10		2	10		2	0		0
Data processing, hosting, and related services	518	1,480	30,558	220		1,186	220		1,184	10		2
Other information	other 51	340	42,917	20		69	20		69	0		0
Finance and insurance	52	220	8,917	30		591	30		591	0		0
Real estate and rental and leasing	53	50	1,371	10		1	10		1	0		0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0		0	0		0	0		0
Other real estate and rental and leasing	other 53	30	1,326	10		1	10		1	0		0
Professional, scientific, and technical services	54	6,500	53,233	1,600	i	19,211	1,110	i	3,609	670	i	15,602
Architectural, engineering, and related services	5413	1,450	4,207	310	i	466	170	i	132	160	i	334
Computer systems design and related services	5415	3,020	21,046	340	i	1,607	330	i	1,546	20	i	61
Scientific research and development services	5417	1,230	21,669	810	i	16,508	510	i	1,653	450	i	14,855
Research and development in biotechnology	541711	310	6,457	260	i	5,879	160	i	658	150		5,221
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446	i	540	i	10,243	i	977	300	i	9,266
Research and development in the social sciences and humanities	541720	30	766	20		386	10		18	10		368
Other professional, scientific, and technical services	other 54	810	6,312	150	i	630	110	i	279	60	i	351
Health care services	621–23	680	2,265	560		2,075	490		1,758	80		317
Other nonmanufacturing	23, 44–45 (excluding 454111– 12), 55–56, 624, 71– 72, 81	680	1,380 - 14,067	60	i	78	60	i	78	0		0

TABLE 26

**Companies with domestic R&D paid for by the company and others and performed by the company in the health or medical application areas, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Health or medical R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
All companies (number of domestic employees)	–	28,270	492,956	7,230	i 133,765	6,440	i 108,075	1,400	i 25,691	i	
Small companies											
10–19 <sup>c</sup>	–	5,490	5,501	1,720	i 2,561	1,500	i 2,100	360	i 461	i	
20–49	–	7,980	12,418	1,860	i 4,206	1,630	i 3,415	390	i 791	i	
Medium companies											
50–99	–	4,960	14,021	1,220	i 6,210	1,120	i 5,216	180	i 994		
100–249	–	4,580	19,793	1,100	i 7,054	990	i 5,819	230	i 1,235		
Large companies											
250–499	–	2,140	18,883	560	6,416	520	5,239	80	1,177		
500–999	–	1,230	23,969	240	7,351	230	6,505	40	846		
1,000–4,999	–	1,330	75,671	400	18,070	320	13,674	100	4,396	i	
5,000–9,999	–	240	50,811	80	18,646	70	14,705	20	3,941		
10,000–24,999	–	220	88,263	60	37,476	60	28,676	20	i 8,799	i	
25,000 or more	–	130	183,626	40	25,775	40	22,725	20	3,050		

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.<sup>b</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&amp;D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. 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&amp;D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&amp;D in one, more than one, or no application area. 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.

TABLE 27

**Companies with domestic R&D paid for by the company and others and performed by the company in the agriculture application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Agriculture R&D						
		Domestic R&D		Total		Paid for by the company		Paid for by others		
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)
All industries	21-23, 31-33, 42-81	28,270	492,956	2,350	i 8,706	2,230	i 8,078	170		627
Manufacturing industries	31-33	15,180	285,674	1,770	i 7,502	1,740	i 7,032	50		470
Food	311	870	4,180	240	i 1,164	240	i 1,116	10		48
Beverage and tobacco products	312	350	1,082	40	i 42	40	i 42	0		0
Textile, apparel, and leather products	313-16	240	904	10	i 24	10	i 24	0		0
Wood products	321	80	186	10	i 14	10	i 14	0		0
Paper	322	90	1,064	20	i 54	20	i 54	0		0
Printing and related support activities	323	200	420	i 0	0	0	0	0		0
Petroleum and coal products	324	80	1,306	10	0 - 30	10	0 - 30	0		0
Chemicals	325	2,330	97,063	400	i 3,969	400	i 3,603	10		366
Basic chemicals	3251	240	2,360	100	i 108	100	i 108	0		0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	180	1,172	30	i 189	30	i 189	0		0
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,822 - 1,846	130	i 1,820	130	i 1,474 - 1,502	10		318 - 345
Pharmaceuticals and medicines	3254	1,060	87,619	60	1,809	60	1,760 - 1,789	10	i	20 - 49
Soap, cleaning compound, and toilet preparation	3256	270	2,760	10	8	10	8	0		0
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,305 - 1,333	100	i 35	100	i 35	0		0
Plastics and rubber products	326	790	2,856	90	i 55	80	i 54	10		1
Nonmetallic mineral products	327	170	1,508	i 10	2	10	2	0		0
Primary metals	331	200	665	10	3	10	3	0		0
Fabricated metal products	332	1,840	2,885	200	i 54	200	i 53	10		1
Machinery	333	2,240	15,184	480	i 1,218	470	i 1,207	20		11
Agricultural implement	33311	190	1,921	180	i 1,066	180	i 1,060	10		6
Semiconductor machinery	333242	80	4,459	0	0	0	0	0		0
Engine, turbine, and power transmission equipment	3336	110	1,301	20	i 43	20	i 43	0		0
Other machinery	other 333	1,880	7,503	290	i 108	280	i 103	20		5
Computer and electronic products	334	2,280	86,729	220	i 353	210	i 316	20		37
Communications equipment	3342	300	12,595	40	i 59	40	i 59	10	i	* i
Semiconductor and other electronic components	3344	640	35,183	i 20	27	20	13	10		13
Navigational, measuring, electromedical, and control instruments	3345	1,140	17,562	170	i 248	170	i 225	10		23
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	230	3,342	10	1	10	1	0		0



TABLE 27

**Companies with domestic R&D paid for by the company and others and performed by the company in the agriculture application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Agriculture R&D							
		Companies <sup>a</sup> (number)	Amount	Total		Paid for by the company		Paid for by others			
				Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	9,662	10	38	10	18	10	i	21	
Other measuring and controlling device	other 3345	740	4,558	160	i 208	i 160	i 206	i 10		3	
Other computer and electronic products	other 334	220	21,388	10	19	10	19	10	i	1	
Electrical equipment, appliances, and components	335	900	5,263	30	23	30	22	10	i	1	i
Transportation equipment	336	1,090	45,375	40	210	i 40	205	i 10		5	
Motor vehicles, bodies, trailers, and parts	3361-63	540	24,117	20	71	i 20	71	i 0		0	
Aerospace products and parts	3364	380	i 18,358	i 20	106	i 20	106	i 10		1	
Aircraft, aircraft engine, and aircraft parts	336411-13	200	16,891	i 20	81	i 20	80	i 10		1	
Guided missile, space vehicle, and related parts	336414-15, 336419	190	i 1,467	10	i 26	i 10	26	i 0		0	
Military armored vehicle, tank, and tank component	336992	30	35	0	0	0	0	0		0	
Other transportation	other 336	150	2,865	10	33	10	29	10		4	
Furniture and related products	337	190	409	10	*	10	*	0		0	
Miscellaneous	339	1,310	18,596	20	294 - 325	i 20	294 - 325	i 10		*	
Medical equipment and supplies	3391	790	16,014	10	i 295	i 10	295	i 0		0	
Other miscellaneous manufacturing	3399	520	2,582	10	0 - 30	10	0 - 30	10		*	
Nonmanufacturing industries	21-23, 42-81	13,100	207,283	590	i 1,203	i 500	1,046	i 120		158	i
Mining, quarrying, oil and gas extraction, and support activities	21	160	2,717	10	*	10	*	0		0	
Utilities	22	40	275	10	3	10	3	0		0	
Wholesale trade	42	1,560	1,191	210	i 50	i 210	46	i 10	i	4	
Electronic shopping and electronic auctions	454111-12	60	3,131 - 15,818	i 0	0	0	0	0		0	
Transportation and warehousing	48-49	130	9,890	i 0	0	0	0	0		0	
Information	51	3,090	110,227	60	711	i 60	710	i 10		1	
Publishing	511	1,080	33,019	30	657	i 30	657	i 0		0	
Newspaper, periodical, book, and directory publishers	5111	40	61	0	0	0	0	0		0	
Software publishers	5112	1,040	32,958	30	657	i 30	657	i 0		0	
Telecommunications	517	210	3,733	10	2	10	2	0		0	
Data processing, hosting, and related services	518	1,480	30,558	30	43	30	41	10		1	

TABLE 27

**Companies with domestic R&D paid for by the company and others and performed by the company in the agriculture application area, by industry and company size: 2019**

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Domestic R&D		Agriculture R&D					
				Total		Paid for by the company		Paid for by others	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
Other information	other 51	340	42,917	10	9	10	9	0	0
Finance and insurance	52	220	8,917	0	0	0	0	0	0
Real estate and rental and leasing	53	50	1,371	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	30	1,326	0	0	0	0	0	0
Professional, scientific, and technical services	54	6,500	53,233	270	i 379	180	i 231	110	148 i
Architectural, engineering, and related services	5413	1,450	4,207	110	i 140 i	80	i 70	50	i 70 i
Computer systems design and related services	5415	3,020	21,046	10	8	10	8	0	0
Scientific research and development services	5417	1,230	21,669	130	i 198	90	i 131	60	66
Research and development in biotechnology	541711	310	6,457	50	124	20	i 93	30	31
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	900	14,446	i 90	i 67	70	i 39	30	28
Research and development in the social sciences and humanities	541720	30	766	10	7	0	0	10	7
Other professional, scientific, and technical services	other 54	810	6,312	30	i 33	20	22	20	11 i
Health care services	621-23	680	2,265	0	0	0	0	0	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	680	1,380 - 14,067	60	i 62 i	60	i 57 i	10	5
All companies (number of domestic employees)	-	28,270	492,956	2,350	i 8,706	2,230	i 8,078	170	627
Small companies									
10-19 <sup>c</sup>	-	5,490	5,501	400	i 108 i	370	i 88 i	40	20
20-49	-	7,980	12,418	570	i 239	530	i 208	50	i 31
Medium companies									
50-99	-	4,960	14,021	410	i 281	380	i 236	30	46
100-249	-	4,580	19,793	430	i 371	410	i 334	30	37
Large companies									
250-499	-	2,140	18,883	220	i 262	210	i 241	20	i 21 i
500-999	-	1,230	23,969	140	455	130	431	10	24
1,000-4,999	-	1,330	75,671	150	1,271	150	928	10	342
5,000-9,999	-	240	50,811	40	1,254	40	1,218	10	36
10,000-24,999	-	220	88,263	30	2,387	30	2,361	i 10	26
25,000 or more	-	130	183,626	20	2,078	i 20	2,034	i 10	44 i

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

<sup>b</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology. These company count estimates also reflect an imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014.

<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. 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.

TABLE 28

**Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
All industries	21-23, 31-33, 42-81	104,464	93,944	10,519	17,066	14,324	2,742	87,398	79,620	7,778
Manufacturing industries	31-33	64,351	63,006	1,345	11,824	11,585	239	52,527	51,421	1,105
Food	311	835	833	2	240	240	*	596	594	2
Beverage and tobacco products	312	674	674	0	192	192	0	482	482	0
Textile, apparel, and leather products	313-16	157	157	0	32	32	0	125	125	0
Wood products	321	7	7	0	2	2	0	5	5	0
Paper	322	101	101	*	5	5	*	96	96	*
Printing and related support activities	323	9	9	0	*	*	0	9	9	0
Petroleum and coal products	324	171 - 176	172	0 - 3	0 - 164	0 - 162	0 - 3	9 - 173	9 - 173	*
Chemicals	325	18,568	18,323	245	4,650	4,595	55	13,918	13,728	190
Basic chemicals	3251	742	740	2	236	234	2	506	506	*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	523	518	5	122	117	5	401	401	*
Pesticide, fertilizer, and other agricultural chemicals	3253	450	431	20	76	60	16	375	371	4
Pharmaceuticals and medicines	3254	15,868	15,654	214	4,033	4,001	31	11,835	11,652	183
Soap, cleaning compound, and toilet preparation	3256	757	757	0	102	102	0	655	655	0
Paint, coating, adhesive, and other chemicals	3255, 3259	227	224	4	82	81	1	146	143	3
Plastics and rubber products	326	503	494	9	79	79	1	424	416	8
Nonmetallic mineral products	327	192	192	0	143	143	0	49	49	0
Primary metals	331	76	73	2	46	46	1	29	27	2
Fabricated metal products	332	278	267	11	82	79	2	196	188	9
Machinery	333	4,251	4,218	34	479	474	6	3,772	3,744	28
Agricultural implement	33311	857	855	2	170	170	*	687	685	2
Semiconductor machinery	333242	915	896	19	58	55	3	857	841	16
Engine, turbine, and power transmission equipment	3336	630	619	11	10	9	1	619	610	10
Other machinery	other 333	1,850	1,848	1	241	240	1	1,609	1,608	1
Computer and electronic products	334	25,452	24,940	512	3,132	3,052	80	22,320	21,888	432
Communications equipment	3342	3,312 - 3,316	3,309	3 - 7	439 - 444	440	0 - 3	2,872	2,869	4
Semiconductor and other electronic components	3344	13,007	12,809	198	1,490	1,446	44	11,517	11,363	154

TABLE 28

**Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Navigational, measuring, electromedical, and control instruments	3345	3,950	3,661	288	837	804	33	3,113	2,858	255
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1,280	1,276	3	62	62	*	1,217	1,214	3
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	878	621	258	144	126	18	735	495	240
Other measuring and controlling device	other 3345	1,792	1,764	28	631	615	16	1,161	1,149	12
Other computer and electronic products	other 334	5,179 - 5,183	5,160	19 - 22	361 - 365	362	0 - 3	4,818	4,798	20
Electrical equipment, appliances, and components	335	1,743	1,713	30	340	337	3	1,404	1,376	27
Transportation equipment	336	7,812	7,363	449	1,853	1,768	86	5,959	5,595	364
Motor vehicles, bodies, trailers, and parts	3361-63	6,993	6,667	326	1,604	1,558	46	5,389	5,108	281
Aerospace products and parts	3364	585	493	93	197	181	16	388	311	77
Aircraft, aircraft engine, and aircraft parts	336411-13	585	492	93	197	181	16	388	311	77
Guided missile, space vehicle, and related parts	336414-15, 336419	*	*	0	0	0	0	*	*	0
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0	0	0	0
Other transportation	other 336	234	204	30	52	28	24	182	176	6
Furniture and related products	337	35	35	0	11	11	0	24	24	0
Miscellaneous	339	3,482 - 3,488	3,434	48 - 54	380 - 544	375 - 537	5 - 9	2,940 - 3,104	2,896 - 3,059	44
Medical equipment and supplies	3391	3,069	3,023	46	381	375	5	2,688	2,647	41
Other miscellaneous manufacturing	3399	413 - 419	411	2 - 8	0 - 164	0 - 162	0 - 4	251 - 415	249 - 412	3
Nonmanufacturing industries	21-23, 42-81	40,113	30,939	9,175	5,242	2,740	2,503	34,871	28,199	6,672
Mining, quarrying, oil and gas extraction, and support activities	21	589	561	28	187	185	2	402	376	26
Utilities	22	9	9	0	*	*	0	9	9	0
Wholesale trade	42	113	113	0	77	77	0	36	36	0
Electronic shopping and electronic auctions	454111-12	69 - 4,198	69 - 4,198	0	*	*	0	69 - 4,198	69 - 4,198	0
Transportation and warehousing	48-49	62	62	0	1	1	0	61	61	0
Information	51	19,051	19,002	48	1,614	1,599	14	17,437	17,403	34

TABLE 28

**Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Publishing	511	6,949	6,901	48	754	740	14	6,195	6,161	34
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0	0	0	0	0	0
Software publishers	5112	6,949	6,901	48	754	740	14	6,195	6,161	34
Telecommunications	517	124	123	*	19	19	0	104	104	*
Data processing, hosting, and related services	518	5,891	5,891	* i	583	583	* i	5,307	5,307	* i
Other information	other 51	6,087	6,087	0	257 i	257 i	0	5,831 i	5,831 i	0
Finance and insurance	52	1,175	1,092	83	91	91	0	1,084	1,002	83 i
Real estate and rental and leasing	53	104	104	0	3 - 69	3 - 69	0	35 - 101	35 - 101	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	4	4	0	4	4	0	0	0	0
Other real estate and rental and leasing	other 53	101	101	0	0 - 65	0 - 65	0	35 - 101	35 - 101	0
Professional, scientific, and technical services	54	14,790	5,778	9,012 i	3,198	711	2,487	11,592 i	5,066 i	6,526 i
Architectural, engineering, and related services	5413	37	35	2	4	4	*	33	31	2
Computer systems design and related services	5415	5,370	5,294	76	697	642	55	4,673 i	4,652 i	21
Scientific research and development services	5417	9,006 i	99	8,908 i	2,449 i	27 i	2,422 i	6,558 i	72	6,486 i
Research and development in biotechnology	541711	2,793	46	2,748	341	*	341	2,452 i	46	2,407 i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	6,205 i	51	6,153 i	2,101 i	27 i	2,074 i	4,104 i	25	4,079 i
Research and development in the social sciences and humanities	541720	8	1	7	7	* i	7	1	1	0
Other professional, scientific, and technical services	other 54	376	349	27	49	39 i	10	327 i	311 i	16
Health care services	621-23	24	23	* i	9	9	0	14	14	* i
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2 - 4,124	0 - 4,121	3	0 - 65	0 - 65	0	2 - 4,124	0 - 4,121	3
All companies (number of domestic employees)	-	104,464	93,944	10,519 i	17,066	14,324	2,742	87,398	79,620	7,778 i

TABLE 28

**Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Small companies										
10–19 <sup>a</sup>	–	138	128	10	29	26	3 i	109	102	7
20–49	–	457	443	14 i	67	65	3 i	389	378	11
Medium companies										
50–99	–	737	674	64	162	154	8 i	575	520	56
100–249	–	2,192	1,979	214	428	403	25	1,765	1,576	189 i
Large companies										
250–499	–	2,709	2,639	70	525	499	26	2,184	2,139	45
500–999	–	2,953	2,807	146	749	727	22 i	2,204	2,080	124
1,000–4,999	–	16,553	16,140	413	3,278	3,199	80	13,275	12,942	333 i
5,000–9,999	–	11,965	9,828	2,137 i	2,311	1,263 i	1,048	9,654 i	8,565 i	1,089 i
10,000–24,999	–	23,612	18,183	5,429 i	3,869 i	2,786	1,084 i	19,743 i	15,398	4,345 i
25,000 or more	–	43,148	41,124	2,024	5,648	5,203	445	37,500	35,921	1,579

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 29

**For companies that performed foreign R&D, domestic and foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	Total	Paid for by		Research (basic and applied)			Development			
			the company	by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	
Total domestic R&D performance											
All industries	21-23, 31-33, 42-81	359,341	325,595	33,746	66,277	58,001	8,276	293,064	267,594	25,470	i
Manufacturing industries	31-33	209,614	191,043	18,572	44,682	41,208	3,474	164,932	149,834	15,098	
Chemicals	325	65,887	63,703	2,184	22,029	21,473	556	43,858	42,230	1,628	
Pharmaceuticals and medicines	3254	59,464	57,637	1,826	19,626	19,419	207	39,838	38,218	1,619	
Other chemicals	other 325	6,423	6,065	358	2,403	2,053	350	4,020	4,012	9	
Computer and electronic products	334	76,515	69,012	7,503	11,361	9,905	i 1,456	65,154	59,107	6,047	
Semiconductor and other electronic components	3344	31,900	i 30,620	i 1,280	3,747	i 3,376	i 371	28,153	i 27,244	i 910	
Other computer and electronic products	other 334	44,615	38,392	6,223	7,614	6,529	1,085	37,001	31,863	5,138	
Nonmanufacturing industries	21-23, 42-81	149,727	134,552	15,174	i 21,594	16,792	4,802	128,132	117,760	10,373	i
Information	51	94,642	94,184	458	7,852	7,715	137	86,791	86,469	321	
Software publishers	5112	30,216	29,778	438	2,539	2,411	128	27,677	27,367	310	
Other information	other 51	64,427	64,406	21	5,313	5,304	9	59,114	59,102	11	
Professional, scientific, and technical services	54	30,932	16,324	14,608	i 7,672	3,070	4,602	23,260	i 13,254	i 10,006	i
Scientific research and development services	5417	14,174	i 456	i 13,718	i 4,237	161	4,076	9,936	i 295	9,641	i
Other professional, scientific, and technical services	other 54	16,759	15,868	891	3,435	2,909	526	13,324	i 12,959	i 365	
Total foreign R&D performance											
All industries	21-23, 31-33, 42-81	104,464	93,944	10,519	i 17,066	14,324	2,742	87,398	79,620	7,778	i
Manufacturing industries	31-33	64,351	63,006	1,345	11,824	11,585	239	52,527	51,421	1,105	
Chemicals	325	18,568	18,323	245	4,650	4,595	55	13,918	13,728	190	
Pharmaceuticals and medicines	3254	15,868	15,654	214	4,033	4,001	31	11,835	11,652	183	
Other chemicals	other 325	2,700	2,669	31	617	594	24	2,083	2,076	7	
Computer and electronic products	334	25,452	i 24,940	i 512	3,132	i 3,052	i 80	22,320	i 21,888	i 432	
Semiconductor and other electronic components	3344	13,007	i 12,809	i 198	1,490	i 1,446	i 44	11,517	i 11,363	i 154	
Other computer and electronic products	other 334	12,445	12,131	314	1,642	1,606	36	10,803	10,525	278	
Nonmanufacturing industries	21-23, 42-81	40,113	30,939	9,175	i 5,242	2,740	2,503	34,871	i 28,199	i 6,672	i
Information	51	19,051	19,002	48	1,614	1,599	14	17,437	17,403	34	
Software publishers	5112	6,949	6,901	48	754	740	14	6,195	6,161	34	



TABLE 29

**For companies that performed foreign R&D, domestic and foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	Total	Paid for by the company	Paid for by others	Research (basic and applied)			Development											
					Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others									
Other information	other 51	12,102	12,101	* i	859	859	* i	11,242	i	11,242	i	*							
Professional, scientific, and technical services	54	14,790	5,778	9,012	i	3,198	711	2,487	i	11,592	i	5,066	i	6,526	i				
Scientific research and development services	5417	9,006	i	99	i	8,908	i	2,449	i	27	i	2,422	i	6,558	i	72	i	6,486	i
Other professional, scientific, and technical services	other 54	5,784	5,679	105		749	684	65		5,034	i	4,994	i	40					

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018.

**Source(s):**

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

TABLE 30

**Foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry, and location: 2019**

(Millions of U.S. dollars)

Industry and location	NAICS code	Total foreign R&D performance	Research (basic and applied)		Development	
All locations						
All industries	21-23, 31-33, 42-81	104,464		17,066		87,398
Manufacturing industries	31-33	64,351		11,824		52,527
Chemicals	325	18,568		4,650		13,918
Pharmaceuticals and medicines	3254	15,868		4,033		11,835
Computer and electronic products	334	25,452	i	3,132	i	22,320
Semiconductor and other electronic components	3344	13,007	i	1,490	i	11,517
Nonmanufacturing industries	21-23, 42-81	40,113		5,242		34,871
Information	51	19,051		1,614		17,437
Software publishers	5112	6,949		754		6,195
Professional, scientific, and technical services	54	14,790		3,198		11,592
Scientific research and development services	5417	9,006	i	2,449	i	6,558
Africa						
All industries	21-23, 31-33, 42-81	372		63	i	309
Manufacturing industries	31-33	187		58	i	130
Chemicals	325	89		23		67
Pharmaceuticals and medicines	3254	64		17		47
Computer and electronic products	334	3		0 - 4		0 - 4
Semiconductor and other electronic components	3344	*		*		0
Nonmanufacturing industries	21-23, 42-81	184	i	5		179
Information	51	47		2		44
Software publishers	5112	13		1		11
Professional, scientific, and technical services	54	98	i	3		95
Scientific research and development services	5417	85	i	2		83
Asia and Pacific						
All industries	21-23, 31-33, 42-81	32,458		4,504		27,954
Manufacturing industries	31-33	20,057		3,437		16,620
Chemicals	325	3,881		934		2,947
Pharmaceuticals and medicines	3254	3,077		785		2,292
Computer and electronic products	334	9,987		1,259	i	8,727
Semiconductor and other electronic components	3344	5,304		660	i	4,644
Nonmanufacturing industries	21-23, 42-81	12,401		1,067		11,334
Information	51	6,289		528		5,762
Software publishers	5112	2,649		256		2,393
Professional, scientific, and technical services	54	3,740	i	455		3,285
Scientific research and development services	5417	1,856	i	193		1,664
Canada						
All industries	21-23, 31-33, 42-81	6,862		1,200		5,661
Manufacturing industries	31-33	3,610		634		2,975
Chemicals	325	789		169		620
Pharmaceuticals and medicines	3254	684		154		530
Computer and electronic products	334	1,764		254		1,510
Semiconductor and other electronic components	3344	665		47		618
Nonmanufacturing industries	21-23, 42-81	3,252		566		2,686
Information	51	1,877		200		1,677
Software publishers	5112	1,015		102		913
Professional, scientific, and technical services	54	1,003		325		678
Scientific research and development services	5417	491		256		235

TABLE 30

**Foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry, and location: 2019**

(Millions of U.S. dollars)

Industry and location	NAICS code	Total foreign R&D performance		Research (basic and applied)		Development	
Europe							
All industries	21-23, 31-33, 42-81	48,764		8,298		40,465	
Manufacturing industries	31-33	29,930		6,126		23,804	
Chemicals	325	12,252		3,093		9,160	
Pharmaceuticals and medicines	3254	10,829		2,725		8,104	
Computer and electronic products	334	7,089		1,001	i	6,088	i
Semiconductor and other electronic components	3344	2,660		317	i	2,343	i
Nonmanufacturing industries	21-23, 42-81	18,834		2,172		16,662	i
Information	51	9,063		724		8,339	
Software publishers	5112	2,718		329		2,389	
Professional, scientific, and technical services	54	6,802		1,178		5,624	i
Scientific research and development services	5417	4,941	i	917		4,024	i
Latin America and OWH							
All industries	21-23, 31-33, 42-81	5,407	i	795		4,613	i
Manufacturing industries	31-33	3,613		717		2,896	i
Chemicals	325	1,051		254		798	
Pharmaceuticals and medicines	3254	839		217		622	
Computer and electronic products	334	1,257	i	128	i	1,129	i
Semiconductor and other electronic components	3344	450		68	i	382	i
Nonmanufacturing industries	21-23, 42-81	1,795	i	78		1,717	i
Information	51	354		27		327	
Software publishers	5112	53		0 - 12		41 - 54	
Professional, scientific, and technical services	54	1,241	i	44	i	1,197	i
Scientific research and development services	5417	355	i	11		345	i
Middle East							
All industries	21-23, 31-33, 42-81	6,342		703	i	5,639	i
Manufacturing industries	31-33	4,120		449	i	3,671	i
Chemicals	325	388		132		256	
Pharmaceuticals and medicines	3254	295		116		179	
Computer and electronic products	334	3,091		257	i	2,835	i
Semiconductor and other electronic components	3344	2,207		202	i	2,005	i
Nonmanufacturing industries	21-23, 42-81	2,223		254		1,968	i
Information	51	1,371		128		1,242	
Software publishers	5112	476		57		419	
Professional, scientific, and technical services	54	566		112		454	i
Scientific research and development services	5417	81	i	5		76	i
Puerto Rico <sup>a</sup>							
All industries	21-23, 31-33, 42-81	539	i	73		466	i
Manufacturing industries	31-33	516	i	68		448	i
Chemicals	325	103		42		61	
Pharmaceuticals and medicines	3254	67		15		52	
Computer and electronic products	334	250 - 413	i	0 - 27	i	224 - 387	i
Semiconductor and other electronic components	3344	3		*	i	2	i
Nonmanufacturing industries	21-23, 42-81	23		5		18	i
Information	51	0 - 18		0 - 6	i	0 - 18	i
Software publishers	5112	0 - 6		0 - 6		*	
Professional, scientific, and technical services	54	5 - 24		0 - 6		0 - 19	i

TABLE 30

**Foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry, and location: 2019**

(Millions of U.S. dollars)

Industry and location	NAICS code	Total foreign R&D performance	Research (basic and applied)	Development
Scientific research and development services	5417	6	0 - 6	0 - 7   i

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System; OWH = Other Western Hemisphere.

<sup>a</sup> Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.

**Note(s):**

Detail within a select location may not add to total because of rounding. Sum of locations do not equal all locations due to the undistributed portion not being published. Industry classification is 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. 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 and also performed foreign R&D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 31

## Domestic R&amp;D paid for and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
All industries	21-23, 31-33, 42-81	428,968	231,648	38,284	19,261	6,738	26,298	7,405	17,058	8,894	12,400	60,981
Manufacturing industries	31-33	248,109	123,559	11,417	9,448	3,267	23,249	3,771	11,368	8,553	9,560	43,918
Food	311	3,937	2,433	67	85	13	455	55	169	1	181	479
Beverage and tobacco products	312	971	500	10	39	2	83	8	43	0	59	227
Textile, apparel, and leather products	313-16	873	547	17	22	10	196	4	14	*	12	52
Wood products	321	180	139	0	4	*	21	9	2	0	2	4 i
Paper	322	1,064	434	*	6 i	1 i	485	7 i	8 i	1 i	11 i	108
Printing and related support activities	323	420 i	285 i	0	4 i	1	64	8 i	5	* i	7	46
Petroleum and coal products	324	1,203	569 - 628	*	11 - 18	7	19 - 42	0 - 5	41	*	283 - 296	166 - 239
Chemicals	325	87,288	34,544	4,222	5,096	585	8,051	1,359	3,475	7,322	4,509	18,125
Basic chemicals	3251	2,198	1,272	4	22 - 44	14	229	42	152	23	142	273 - 295
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092	727	1	46	2	98	12	62	3	53	89
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501	758 - 826	*	152 - 177	0 - 3 i	143	100 - 110	105	27	60 - 65	61 - 157
Pharmaceuticals and medicines	3254	78,652	29,357	4,205	4,773	559	7,331	1,169	3,028	7,269	4,215	16,746
Soap, cleaning compound, and toilet preparation	3256	2,596	1,540	12	68	1	154	18	86	*	19	698
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249	824 - 888	*	13	5 - 11	95	6 - 16	43	*	14 - 19	163 - 234
Plastics and rubber products	326	2,770	1,597	22	48	42	444	20	83	6	97	411
Nonmetallic mineral products	327	1,473 i	827 i	6	9 - 16	20 i	225 i	18 i	59 i	0	35 - 48 i	253 - 266 i
Primary metals	331	649	365	4	5	3	151	0 - 2	27	4	39	48 - 52
Fabricated metal products	332	2,632	1,722	58	86	30	400	14	40	9	32 - 45	225 - 243 i
Machinery	333	13,930	7,944	261	562	123	1,884	177	556	31	287	2,105
Agricultural implement	33311	1,913	1,034	0	136	4	255	6	35	*	41	402
Semiconductor machinery	333242	3,854	1,844	201	26	4	452	118	308	*	145	755
Engine, turbine, and power transmission equipment	3336	1,096	651	5	21	10	99	12	46	11	12 i	230

TABLE 31

## Domestic R&amp;D paid for and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Other machinery	other 333	7,067	4,416	56	379	104	1,079	41	166	20	88	718
Computer and electronic products	334	75,570	38,899	6,186	1,263	1,498	4,575	1,663	5,066	716	2,240	13,465
Communications equipment	3342	11,495	6,636	703	363	182	265	916	556	12	166	1,696
Semiconductor and other electronic components	3344	31,975	15,927	1,714	378	294	2,163	258	2,613	407	408	7,814
Navigational, measuring, electromedical, and control instruments	3345	10,912	6,975	321	340	150	960	116	229	7	314	1,502
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117	1,767	191	117	45	178	71	68	2	175	504
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400	2,316	42	135	26	403	15	68	1	38	355
Other measuring and controlling device	other 3345	4,395	2,892	88	88	78	379	30	93	3	101	643
Other computer and electronic products	other 334	21,188	9,361	3,447	182	873	1,188	374	1,668	290	1,352	2,453
Electrical equipment, appliances, and components	335	4,886	3,129	105	182	58	432	100	118	3	172	585
Transportation equipment	336	31,505	18,890	18	1,187	510	4,271	202	990	337	533	4,566
Motor vehicles, bodies, trailers, and parts	3361-63	20,883	13,529	1 - 4	950	478	2,531 - 2,960	177	861	304 - 334	120	1,501 - 1,897
Aerospace products and parts	3364	8,900	4,192	4	154 - 223	17 - 21	1,275	0 - 19	107	4	382	2,669 - 2,766
Aircraft, aircraft engine, and aircraft parts	336411-13	8,341	3,883	3	154	18	1,185	0 - 14	100	4	366	2,613 - 2,632
Guided missile, space vehicle, and related parts	336414-15, 336419	559	309	1	0 - 69	0 - 3	91	0 - 6	7	1	16	55 - 137
Military armored vehicle, tank, and tank component	336992	25	21	*	*	0 - 1	2	*	0	*	*	0 - 3
Other transportation	other 336	1,697	1,148	9 - 13	12 - 83	9 - 16	35 - 462	4 - 25	23	0 - 29	31	0 - 304
Furniture and related products	337	407	288	3	11	1	49	2	8	3	6	35
Miscellaneous	339	18,352	10,395 - 10,440	438	815	363	1,414 - 1,435	119	664	119	1,027	2,929 - 2,979
Medical equipment and supplies	3391	15,812	8,639	422	727	313	1,171	98	620	69	997	2,756
Other miscellaneous manufacturing	3399	2,540	1,757 - 1,801	15	88	51	242 - 264	21	44	50	30	174 - 223
Nonmanufacturing industries	21-23, 42-81	180,858	108,089	26,867	9,814	3,471	3,049	3,634	5,690	342	2,840	17,063

TABLE 31

## Domestic R&amp;D paid for and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Mining, quarrying, oil and gas extraction, and support activities	21	2,535	1,567	0 - 292	158	17	312	33	86	1	73	0 - 292
Utilities	22	237	103	0 - 1	9	1	7	1	0 - 96	3	21	0 - 96
Wholesale trade	42	1,104	713	3	24	1	65	23	16	*	7	252
Electronic shopping and electronic auctions	454111-12	3,088 - 15,775	0 - 9,404	0 - 2,447	117	0 - 192	57	0 - 228	0 - 793	0	5	0 - 4,141
Transportation and warehousing	48-49	9,504	3,240	4,683	514	34	153	93	71	34	206	475
Information	51	109,062	64,708	18,424	5,745	2,552	776	2,787	3,075	229	1,763	9,003
Publishing	511	32,447	20,646	3,956	1,567	263	415	327	372	91	1,251	3,560
Newspaper, periodical, book, and directory publishers	5111	61	55	0	2	1	*	*	*	0	1	2
Software publishers	5112	32,386	20,590	3,956	1,565	263	415	327	371	91	1,250	3,557
Telecommunications	517	3,700	2,720	39	609	13 - 16	78	30 - 41	33	1	118 - 129	35 - 46
Data processing, hosting, and related services	518	30,154	20,294	3,985 - 4,006	723 - 737	381	210	605	492	120	307	3,000 - 3,021
Other information	other 51	42,761	21,049	10,422 - 10,444	2,831 - 2,845	1,892 - 1,895	72	1,813 - 1,824	2,179	16	75 - 89	2,377 - 2,401
Finance and insurance	52	8,890	5,625	357	1,778	114	41	43	534	11	72	315
Real estate and rental and leasing	53	1,371	887	102	53	49	3	2	2 - 258	0	0	19 - 275
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	17	2	1	1	1	*	3	0	0	20
Other real estate and rental and leasing	other 53	1,326	870	100	53	48	2	2	0 - 255	0	0	0 - 255
Professional, scientific, and technical services	54	29,131	20,745	799 - 826	945	485	1,258	395	1,081	57	629	2,705 - 2,737
Architectural, engineering, and related services	5413	2,288	1,936	4	27	6	133	12	11	4	90	66
Computer systems design and related services	5415	18,395	13,125	611	689	340	448	161	707	19	297	1,997
Scientific research and development services	5417	3,265	1,826	81	144	46	345	121	161	25	107	410
Research and development in biotechnology	541711	1,083	578	36	39	8	149	53	60	17	49	95

TABLE 31

## Domestic R&amp;D paid for and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155	1,229	45	105	38	196	67	101	8	58	308
Research and development in the social sciences and humanities	541720	27	19	0	0	0	*	1	*	0	0	6
Other professional, scientific, and technical services	other 54	5,182	3,859	102 - 129	85	93	331	100	203	10	135	234 - 266
Health care services	621-23	1,928	1,102	55	213	30	272	34	34	1	32	155
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,322 - 14,012	0 - 9,404	0 - 2,447	257 i	0 - 192	108	0 - 228	0 - 793	5	32	0 - 4,141 i
All companies (number of domestic employees)	-	428,968	231,648	38,284	19,261	6,738	26,298	7,405	17,058	8,894	12,400	60,981
Small companies												
10-19 <sup>a</sup>	-	4,432	2,521	57 i	297	42	623	74	102	5 - 43	288	382 - 426 i
20-49	-	10,040	6,420	163	366	76	998	257	187	55	352	1,167
Medium companies												
50-99	-	11,492	6,676	401	397	112	1,137	264	221	315	677	1,293
100-249	-	16,520	10,338	640	591	183	1,588	296	397	116	750	1,621
Large companies												
250-499	-	15,356	9,168	859	616	348	1,309	297	336	105	501	1,817
500-999	-	21,549	12,025	1,156	1,011	215	1,480	426	662	1,289	548	2,738
1,000-4,999	-	64,475	36,976	6,934	2,098	878	3,336	894	2,191	687	2,165	8,316
5,000-9,999	-	44,728	22,633	2,749	1,958	394	2,490	704	1,969	4,291	679	6,860
10,000-24,999	-	74,385	37,886	7,121	3,500	812	5,704	698	3,673	692	2,626 i	11,674
25,000 or more	-	165,991	87,006	18,204	8,427	3,679	7,634	3,495	7,320	1,297 - 1,335	3,816	25,072 - 25,116



\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 32

## Domestic R&amp;D paid for and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more
All industries	21-23, 31-33, 42-81	428,968	4,432	10,040	11,492	16,520	15,356	21,549	64,475	44,728	74,385	165,991
Manufacturing industries	31-33	248,109	2,007	4,606	7,013	9,921	8,834	13,163	36,818	33,246	53,071	79,430
Food	311	3,937	0 - 26	29	91	163	191	184	506	194 - 234	1,687 - 1,697	856
Beverage and tobacco products	312	971	15	18	16	10	12 - 20	26	21	204	101	541 - 547
Textile, apparel, and leather products	313-16	873	0 - 23	68	0 - 10	22 - 41	22	14	190	282	86	166
Wood products	321	180	0	4	5	22	5	7	45	85	7	0
Paper	322	1,064	2	12	6	29	24	10	76	119	341	446
Printing and related support activities	323	420	i 123	4	18	22	52	i 11	29	i 72	i 89	0
Petroleum and coal products	324	1,203	1	4	0 - 140	16 - 35	39	25 - 65	44	0 - 279	0 - 193	455 - 1,050
Chemicals	325	87,288	905	2,072	4,186	4,549	3,949	5,178	10,289	12,926	27,034	16,201
Basic chemicals	3251	2,198	0 - 45	97	43	142	103	149	1,033	259 - 312	308	15
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092	0 - 45	14	13 - 27	96	22	64	99 - 133	0	704 - 772	0
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501	21	22	20 - 34	39	25	25	166 - 237	695 - 751	362 - 476	0
Pharmaceuticals and medicines	3254	78,652	820	1,880	3,951	4,077	3,663	4,856	8,155	11,538	23,828	15,884
Soap, cleaning compound, and toilet preparation	3256	2,596	21	10	48	116	50	33	348	379	i 1,410	181
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249	0 - 45	49	82 - 99	78	85	51	419 - 489	0	239 - 366	121
Plastics and rubber products	326	2,770	6	50	134	208	233	316	684	633	333	174
Nonmetallic mineral products	327	1,473	i *	10	26	11 - 30	0 - 15	190	150	37 - 57	1,014	i 0
Primary metals	331	649	0 - 4	12 - 18	16	101	24	46	228	98	105 - 111	9
Fabricated metal products	332	2,632	110	155	290	520	350	417	547	154	i 88	0
Machinery	333	13,930	134	554	460	929	535	710	2,384	3,839	1,387	2,997
Agricultural implement	33311	1,913	4	48	13	44	20	81	270	141	0	1,293
Semiconductor machinery	333242	3,854	0 - 125	15	0 - 48	87	45	154	709 - 762	2,666 - 2,799	0	0
Engine, turbine, and power transmission equipment	3336	1,096	7	i 42	1	34	48	64	89	462	350	0
Other machinery	other 333	7,067	0 - 125	449	397 - 448	764	423	412	1,263 - 1,317	436 - 570	1,037	1,704

TABLE 32

**Domestic R&D paid for and performed by the company, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)														
		All companies	10–19 <sup>a</sup>	20–49	50–99	100–249	250–499	500–999	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more				
Computer and electronic products	334	75,570	247	942	912	1,465	1,613	3,137	13,281	9,175	i	12,764	32,034			
Communications equipment	3342	11,495	0 - 102	227	0 - 264	194	220 - 367	904	2,554	1,537 - 1,644		0 - 1,131	4,218 - 5,850			
Semiconductor and other electronic components	3344	31,975	i	0 - 102	187	224	752	859	1,048	4,348	5,520 - 5,547	i	9,716	9,192 - 9,320		
Navigational, measuring, electromedical, and control instruments	3345	10,912		146	i	492	426	393	282 - 389	679 - 778	3,474	339 - 421	1,919	i	2,586	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117		70	i	113	198	81	131	453	1,155	0	914	i	0	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400		8		65	29 - 104	67	95	20	648	77 - 157	388	i	1,927	
Other measuring and controlling device	other 3345	4,395		67		313	124 - 199	244	57 - 163	205 - 304	1,670	263	617		659	
Other computer and electronic products	other 334	21,188		0 - 102	i	36	0 - 264	127	32 - 144	406 - 506	2,905	1,670	i	0 - 1,131	i	14,302 - 15,913
Electrical equipment, appliances, and components	335	4,886		132		162	190	291	221	872	1,329	482	578		630	
Transportation equipment	336	31,505		143	i	129	165	737	765	1,157	2,973	3,000	3,059		19,375	
Motor vehicles, bodies, trailers, and parts	3361–63	20,883		7		14	0 - 84	393	604	762	1,966	2,088	i	1,968	12,993 - 13,085	
Aerospace products and parts	3364	8,900		135	i	75	58 - 87	308	108	201 - 231	795	336	1,083		5,774	
Aircraft, aircraft engine, and aircraft parts	336411–13	8,341		13		61	11 - 40	223	106	201 - 231	506	336	1,083		5,774	
Guided missile, space vehicle, and related parts	336414–15, 336419	559		122	i	14	46	86	2	0	289	0	0		0	
Military armored vehicle, tank, and tank component	336992	25		1		*	23	1	1	0	0	0	0		0	
Other transportation	other 336	1,697		0		41	0 - 84	35	52	164 - 194	213	575	8		515 - 609	
Furniture and related products	337	407		0		1 - 5	27	30 - 34	19 - 23	35	116	157	15		0	
Miscellaneous	339	18,352		159		366 - 372	337 - 477	733 - 752	751 - 785	793 - 831	3,924	1,505 - 1,785	4,190 - 4,384		4,953 - 5,535	
Medical equipment and supplies	3391	15,812		145		271	338	564	597	466	2,781	1,506	4,191		4,954	
Other miscellaneous manufacturing	3399	2,540		14		95 - 101	0 - 140	170 - 189	155 - 189	327 - 365	1,144	0 - 279	i	0 - 193	0 - 581	

TABLE 32

**Domestic R&D paid for and performed by the company, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)													
		All companies	10–19 <sup>a</sup>	20–49	50–99	100–249	250–499	500–999	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more			
Nonmanufacturing industries	21–23, 42–81	180,858	2,425	5,435	4,478	6,599	6,522	8,386	27,657	11,482	21,314	i	86,561		
Mining, quarrying, oil and gas extraction, and support activities	21	2,535	3	8	322	4	56	43	66	256	1,776		0		
Utilities	22	237	*	4 - 10	0 - 2	5	0	0 - 161	65	3	0 - 161		0 - 161		
Wholesale trade	42	1,104	88 - 100	531	118	196	106 - 121	i	23	19	i	0	11	i	0
Electronic shopping and electronic auctions	454111–12	3,088 - 15,775	i	0	0 - 170	7	0 - 510	0 - 303	0 - 1,264	0 - 559	0 - 946	i	0	0 - 13,832	i
Transportation and warehousing	48–49	9,504	i	2	0 - 170	0 - 186	0 - 510	62	i	0 - 676	793	0 - 676	7,974	i	0 - 676
Information	51	109,062		518	1,848	1,367	2,788	3,348	5,603	19,456	7,376	6,396		60,362	
Publishing	511	32,447		173 - 207	809	361	682 - 807	642	592 - 696	7,852	2,606 - 2,689	2,246		16,308	
Newspaper, periodical, book, and directory publishers	5111	61		4	1	6	4	44	2	0	0	0		0	
Software publishers	5112	32,386		169 - 203	808	355	679 - 803	598	590 - 694	7,852	2,606 - 2,689	2,246		16,308	
Telecommunications	517	3,700		29	33	135	114	169	87	67	59	23		2,982	
Data processing, hosting, and related services	518	30,154		0 - 316	769	810	1,622 - 1,643	2,102	3,791	8,524	4,097	2,447 - 2,772		5,668	
Other information	other 51	42,761		0 - 316	237	61	225 - 350	435	1,028 - 1,132	3,011	531 - 614	1,354 - 1,679		35,405	
Finance and insurance	52	8,890		78	0 - 170	0 - 186	197	598	264	1,572	902	1,960		2,960 - 3,323	
Real estate and rental and leasing	53	1,371		*	10	3	7	35	24	1,293	0	0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		*	7	2	i	1	35	0	0	0		0	
Other real estate and rental and leasing	other 53	1,326		0	2	1	6	0	24	1,293	0	0		0	
Professional, scientific, and technical services	54	29,131		1,016	2,867	2,332	2,763	1,494	1,169	3,674	2,002	2,407	i	9,408	
Architectural, engineering, and related services	5413	2,288		207	237	313	430	199	121	381	274	i	125	1	
Computer systems design and related services	5415	18,395		409	1,568	993	1,006	758	709	2,639	i	288	2,192	i	7,833
Scientific research and development services	5417	3,265		353	817	643	890	260	211	27	*	2	i	62	
Research and development in biotechnology	541711	1,083		127	256	247	91	i	169	132	0	0		62	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155		224	551	388	800	83	79	27	*	2	i	0	

TABLE 32

**Domestic R&D paid for and performed by the company, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19 <sup>a</sup>	20–49	50–99	100–249	250–499	500–999	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more
Research and development in the social sciences and humanities	541720	27	2	10	7	*	8	0	0	0	0	0
Other professional, scientific, and technical services	other 54	5,182	47	244	383	436	277	127	627	1,441	88	1,512
Health care services	621–23	1,928	695	0 - 170	147	134	523	0 - 267	165	1	0 - 267	0 - 267
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,322 - 14,012	12 - 24	0 - 170	0 - 186	0 - 510	0 - 303	0 - 1,264 i	0 - 559	0 - 946 i	359 - 793	0 - 13,640

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 33

**Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
All industries	21-23, 31-33, 42-81	428,968	25,916	59,697	343,355
Manufacturing industries	31-33	248,109	18,732	38,686	190,691
Food	311	3,937	209	731	2,997
Beverage and tobacco products	312	971	85	205	681
Textile, apparel, and leather products	313-16	873	74	106	694
Wood products	321	180	26	22	132
Paper	322	1,064	132	272	659
Printing and related support activities	323	420	24	70	325
Petroleum and coal products	324	1,203	208 - 238	395 - 426	545 - 590
Chemicals	325	87,288	11,990	17,547	57,751
Basic chemicals	3251	2,198	236	683	1,279
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092	187	272	633
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501	399	380 - 452	650 - 722
Pharmaceuticals and medicines	3254	78,652	11,000	15,527	52,125
Soap, cleaning compound, and toilet preparation	3256	2,596	92	434	2,071
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249	76	182 - 254	919 - 992
Plastics and rubber products	326	2,770	155	431	2,185
Nonmetallic mineral products	327	1,473	171	242	1,060
Primary metals	331	649	46	115	487
Fabricated metal products	332	2,632	165	499	1,968
Machinery	333	13,930	672	1,524	11,734
Agricultural implement	33311	1,913	124	240	1,549
Semiconductor machinery	333242	3,854	80 - 107	284 - 388	3,386 - 3,464
Engine, turbine, and power transmission equipment	3336	1,096	40	129	927
Other machinery	other 333	7,067	400 - 427	768 - 873	5,792 - 5,872
Computer and electronic products	334	75,570	1,718	9,729	64,123
Communications equipment	3342	11,495	349	1,237	9,909
Semiconductor and other electronic components	3344	31,975	482	3,118	28,374
Navigational, measuring, electromedical, and control instruments	3345	10,912	525	2,056	8,331
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117	119	948	2,050
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400	74	501	2,825
Other measuring and controlling device	other 3345	4,395	332	607	3,455
Other computer and electronic products	other 334	21,188	362	3,317	17,509
Electrical equipment, appliances, and components	335	4,886	353	690	3,842
Transportation equipment	336	31,505	1,981	4,179	25,345
Motor vehicles, bodies, trailers, and parts	3361-63	20,883	1,315	2,814	16,754
Aerospace products and parts	3364	8,900	607	1,201	7,092
Aircraft, aircraft engine, and aircraft parts	336411-13	8,341	603	1,179	6,559
Guided missile, space vehicle, and related parts	336414-15, 336419	559	4	23	532
Military armored vehicle, tank, and tank component	336992	25	*	0	25
Other transportation	other 336	1,697	59	164	1,475

TABLE 33

**Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Furniture and related products	337	407	39	72	296
Miscellaneous	339	18,352	647 - 686	1,818 - 1,858	15,827 - 15,860
Medical equipment and supplies	3391	15,812	474	1,527	13,811
Other miscellaneous manufacturing	3399	2,540	173 - 212	291 - 330	2,016 - 2,048
Nonmanufacturing industries	21-23, 42-81	180,858	7,183	21,011	152,664
Mining, quarrying, oil and gas extraction, and support activities	21	2,535	233	591	1,712
Utilities	22	237	33	74	130
Wholesale trade	42	1,104	85	135	884
Electronic shopping and electronic auctions	454111-12	3,088 - 15,775	i 23	i 2,777 - 3,677	i 0 - 12,975
Transportation and warehousing	48-49	9,504	i 218	i 899	i 8,388
Information	51	109,062	3,615	8,464	96,983
Publishing	511	32,447	1,065	1,719	29,663
Newspaper, periodical, book, and directory publishers	5111	61	1	2	58
Software publishers	5112	32,386	1,065	1,716	29,605
Telecommunications	517	3,700	236 - 267	i 1,536 - 1,568	1,872 - 1,897
Data processing, hosting, and related services	518	30,154	1,644	2,772	25,738
Other information	other 51	42,761	638 - 671	2,404 - 2,437	39,684 - 39,708
Finance and insurance	52	8,890	289	1,196	7,404
Real estate and rental and leasing	53	1,371	270	415	686
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	3	39	3
Other real estate and rental and leasing	other 53	1,326	267	377	683
Professional, scientific, and technical services	54	29,131	2,050	5,111	21,970
Architectural, engineering, and related services	5413	2,288	186	519	1,582
Computer systems design and related services	5415	18,395	1,049	2,606	14,740
Scientific research and development services	5417	3,265	332	816	2,117
Research and development in biotechnology	541711	1,083	129	283	672
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155	204	521	1,430
Research and development in the social sciences and humanities	541720	27	* i	11	16
Other professional, scientific, and technical services	other 54	5,182	482	i 1,170	i 3,531
Health care services	621-23	1,928	179	454	1,295
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,322 - 14,012	188	0 - 900	234 - 13,217
All companies (number of domestic employees)	-	428,968	25,916	59,697	343,355
Small companies					
10-19 <sup>a</sup>	-	4,432	314	774	3,344
20-49	-	10,040	822	2,362	6,856
Medium companies					
50-99	-	11,492	1,046	2,376	8,070
100-249	-	16,520	1,424	2,736	12,359
Large companies					
250-499	-	15,356	994	2,697	11,665

TABLE 33

**Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
500–999	–	21,549	1,620	3,729	16,200
1,000–4,999	–	64,475	5,280	10,184	49,011
5,000–9,999	–	44,728	2,464	5,916 <sup>i</sup>	36,348
10,000–24,999	–	74,385	4,491	9,590	60,304
25,000 or more	–	165,991	7,460	19,334	139,197

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.



TABLE 34-A

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (A-M): 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	
All industries	21-23, 31-33, 42-81	26,270	428,968	1,191	41	4,570	397	158,850	5,208	6,171	1,436	277	5,611	3,924	86	2,608	13,383	6,895	2,285	1,857	939	534	373	4,248	25,955	18,918	7,547	276	4,150	176	
Manufacturing industries	31-33	14,410	248,109	764	16	3,699	306	77,700	2,971	5,452	1,239	54	3,045	2,125	27	2,466	10,753	6,561	1,934	1,297	692	201	246	3,192	20,040	17,517	5,976	221	3,290	99	
Food	311	860	3,937	9	2 e	4	40	170	35	25	322-436	i *	e 25	38	1 e	104	807	i 34	497	i 20	26	5	2	50	35	136	354	4	42	3	
Beverage and tobacco products	312	350	971	* i	* e	3	* e	59	9	1	* e	* e	14	87	* e	* e	96	1 e	* e	3	36	* e	* e	1 e	4	3	1 e	* e	1 e	* e	
Textile, apparel, and leather products	313-16	210	873	4	* e	1 e	3	322	9	1 e	* e	0	16	i 101	*	* e	10	2	i *	e 2	2	i *	e 1	1 e	36	16	7	1 e	1 e	* e	
Wood products	321	80	180	1	* e	*	1	29	* e	* e	* e	0	3	9	* e	* e	* i	1	28	* e	* e	1	*	* e	* e	1	i 14	1	* e	* e	
Paper	322	90	1,064	13	0	1	34	11	*	4	*	0	19	36	* e	* e	18	2	i 1	4	12	6	14	1	11	10	4	* e	1 e	* e	
Printing and related support activities	323	200	420	i 1 e	* e	3 e	1 e	27	19	i 4	* e	* e	7 e	6 e	* e	* e	16 e	5 e	3 e	3 e	6	i 1 e	1 e	3 e	15	i 9	37	i *	e 17	i 10	i
Petroleum and coal products	324	70	1,203	* e	* e	* e	3	13	3	* e	* e	0	6	2	0	* e	34	27	0	5	0-31	1 e	* e	9	* e	* e	* e	2	3	0	
Chemicals	325	2,260	87,288	83	i 9	246	40	20,912	227	4,490	662	27	760	274	8	25	5,043	3,887	112	178	235	69	13	1,843	12,912	963	384	15	2,229	8	
Basic chemicals	3251	240	2,198	4	0	18	6	87	2	72	91	0	4	80	* e	* e	63	16	52	5	15	26	* e	70	97	20	2	6	18	* e	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	170	1,092	10	0	* e	*	19	* e	1 e	0-149	0	2 e	18	* e	* e	18	5	4	2	19	0-35	3	* e	11	125-292	8	* e	1	0	
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,501	1	9	44	10	55	5	* e	0-149	0	6	19	3	2	33	10	5	5	*	2 e	* e	4	0-146	20	2	2	29	1	
Pharmaceuticals and medicines	3254	1,000	78,652	61	i *	e 177	20	20,507	209	4,200	424	27	733	136	4	14	4,734	3,836	38	99	27	8	10	1,768	12,590	633	176	4 e	2,142	7	
Soap, cleaning compound, and toilet preparation	3256	260	2,596	1 e	0	2	2	170	2 e	100	* e	0	12	13	* e	9	124	4 e	5	i 63	i *	e *	e *	1 e	71	1 e	135	* e	12	* e	
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,249	5	0	5	* e	75	9	117	* e	0	3	8	i 0	* e	71	i 16	8	4	174	0-35	e *	e *	0-146	0-161	61	3	26	1	i
Plastics and rubber products	326	770	2,770	14	* e	375	7	155	60	61	16	0	59	51	* e	2	134	75	13	9	41	34	1 e	116	88	197	87	9	18	* e	
Nonmetallic mineral products	327	160	1,473	i 4	* e	* e	* e	122	45	* e	* e	* e	3	3	i *	* e	35	22	* e	4	2	* e	* e	4	6	8	12	40	3	* e	
Primary metals	331	200	649	8	0	11	13	21	8	3	4	* e	1 e	7	0	1	20	55	23	1 e	5	1 e	* e	12	6	85	23	16	3	* e	

TABLE 34-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A-M): 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
Fabricated metal products	332	1,690	2,632	34 i * e	48	14 i	262	33	93	1 e	* e	17 e	26 i	* e	5	171	101	15 i	56	27	9 e	1 e	11	40	112	75	8	66	2 i	
Machinery	333	2,080	13,930	31	0	122	34	3,368	51	82	4	0	189	159	1	32 i	1,599	323	877	132	85	36	16 i	182 i	556	534	569	17 i	124	52 i
Agricultural implement	33311	180	1,913	3	0	16	4 e	88	3	* e	0	0	1 e	42	0	1 e	393	5	841	62	1 e	13	* e	* e	0	9	116	1 e	1 e	* e
Semiconductor machinery	333242	60	3,854	0	0	68	0	2,622	* i	* e	0	0	10	0	0	22 i	0	2	0	0	0	0	0	1 i	248 i	0	0-439	0	0	0-53 i
Engine, turbine, and power transmission equipment	3336	100	1,096	* e	0	*	* e	14	1 e	*	0	0	47	11	0	* e	25	24	* e	* e	* e	11	12 i	8	19	49 i	16	* e	13	* e
Other machinery	other 333	1,760	7,067	29	0	38	30	645	46	81	4	0	131	106	1	9	1,181	292	35	69	84	13 e	4 e	173 i	289	475	0-439	16 i	110	0-53 e
Computer and electronic products	334	2,160	75,570	151	1	2,517	51 i	41,446	1,784	240	100	27	1,116	624	13	2,271	1,132	156	292 i	548	35 i	20	48	261	3,566	301	903	13	61	12
Communications equipment	3342	290	11,495	92	1	76	8	5,086	205	32	14-47	0-27	445	389	12	46	651	61	7	48 i	11	6	4	167	422	96	115	6	31	3
Semiconductor and other electronic components	3344	550	31,975 i	32	0	1,681	8 i	16,342 i	706 i	22	1	1	100	17	*	2,119	73	35	51 i	0-102 e	9 i	* e	28	34	1,465 i	78	131	3	6	3
Navigational, measuring, electromedical, and control instruments	3345	1,120	10,912	15	* e	732	34 i	3,372	376	182	53	1 i	201	152	1	7 i	299	47	226 i	400	12 i	7	16	54	977	108	298	4	17 i	5
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	220	3,117	* e	0	41 i	18 i	1,465	56 i	66 i	3	0	53	31 i	0	*	97 i	9 i	6 i	* e	7 i	* e	1 e	14 i	413	20 i	36	0	* e	* e
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	3,400	13	0	646	0	385	64	9	* e	0	92 i	39	* i	* e	140	9	195 i	394	0	2	11	9	245	7	142	2	5	1
Other measuring and controlling device	other 3345	720	4,395	1 e	* e	45 i	16	1,522	256	107	51	1 i	57	82	1	7 i	62	29	26 i	6	5	5 e	4	31	319	81	120	2 e	12 i	4
Other computer and electronic products	other 334	220	21,188	13	0	29	1	16,647	497	3	0-33	0-27	369	67 i	*	98 i	109	13	7	0-102	3	7	*	5	702	20	360	1 e	6 i	1
Electrical equipment, appliances, and components	335	880	4,886	15	* i	35	16	1,098	26	100	0-36 e	* i	42	107	0-6 i	2 e	306	39	27	12	12	5	2 i	25	490	485	79	16	49	3

TABLE 34-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A-M): 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	
Transportation equipment	336	970	31,505	354	3	147	43	4,115	i 390	220	3	* i	516	i 420	0-6	13	716	1,311	19	307	134	7	10	468	i 231	14,209	460	65	i 628	3	
Motor vehicles, bodies, trailers, and parts	3361-63	530	20,883	158	* e	28	21	2,340	i 0-27	10	3	0	14	0-346	* e	4	580	1,143	11 e	9	133	1 e	0-5 e	0-131	59	13,953	180	42	i 30	3	
Aerospace products and parts	3364	290	8,900	138	3	104	21	1,692	364	195	* e	* i	433	i 75	0-6	9	97	157	7	293	1 e	0-7	6	338	i 168	71	0-70	13	587	* e	
Aircraft, aircraft engine, and aircraft parts	336411-13	180	8,341	98	2	68	21	1,587	212	181	* e	* i	307	i 75	0-6	9	96	157	7	293	* e	0-7	1	338	i 168	70	0-70	7	584	* e	
Guided missile, space vehicle, and related parts	336414-15, 336419	110	i 559	40	1	36	*	106	151	13	0	*	125	i 1	0	0	1	*	0	*	1 e	0	5	*	*	*	*	6	i 2	0	
Military armored vehicle, tank, and tank component	336992	30	25	2 e	0	0-8	i 0	0-8	i 0	0	0	0	4 e	0	0	0	0	0	0	0	0	0	0	0-8	0	7 e	0	0	1 e	0	
Other transportation	other 336	140	1,697	57	* e	5-17	* e	73-84	0-27	15	* e	0	66	0-346	0-6 e	* e	40	11	* e	5	* e	0-7	0-5	0-131	i 4	178	209-281	9	11	* e	
Furniture and related products	337	190	407	3	0	3	* e	28	30	* e	* e	* e	* e	20	* e	* e	7	24	6	* e	3	* e	* e	* e	9	82	19	12	1	* e	
Miscellaneous	339	1,280	18,352	38	* e	183	9	5,542	241	129	17-83	*	251	155	1 e	9	607	497	23	14	8-39	7	i 135	i 204	2,036	366	i 2,946	2 e	45	6	
Medical equipment and supplies	3391	770	15,812	34	* e	145	3 e	5,035	200	76	18	*	220	145	1 e	2 e	525	482	3 e	4 e	9	3	i 134	i 198	1,936	264	i 2,886	1 e	32	1 e	
Other miscellaneous manufacturing	3399	520	2,540	4 e	* e	38	6	507	42	53	i 0-65	i 0	31	10	*	7	81	15	19	9	0-31	4 e	1 e	7	100	102	60	1 e	12	5	
Nonmanufacturing industries	21-23, 42-81	11,880	180,858	426	25	871	91	81,150	2,237	719	197	223	2,565	1,799	59	143	2,630	334	351	560	247	334	i 127	1,056	5,915	1,402	1,571	54	860	76	
Mining, quarrying, oil and gas extraction, and support activities	21	150	2,535	3 e	3 e	5	0-10 e	172	i 35	7	* e	0	1 e	11	* e	2 e	5 e	3 e	1 e	3 e	6 e	27 e	* e	* e	37	2 e	2 e	4	i 0-25 e	0-10 e	
Utilities	22	40	237	0-42	0	0	0-10	27	0	0	0-11	0-13	0	25	1	0	13	0-50	0	*	0-50	7	0	9	5	0	0	0-8	2	* i	
Wholesale trade	42	1,500	1,104	9 e	0-15 e	16	6 e	154 e	17 e	9 e	0-11 e	0-13 e	36 e	34 e	2 e	6	44 e	23	18	21	i 33	i 11	e 3	e 20	24 e	30 e	46	i 4 e	26	2 e	
Electronic shopping and electronic auctions	454111-12	60	3,088-15,775	i 0-42	i *	e 0-123	i *	2,980	i 0-175	i 4	i 0-11	i 0-13	i 25	i 0-109	i *	i 1	i 24	i 0-53	i *	i 1	i 0-50	i *	e *	3	i 0-660	i 0-461	i 0-95	i *	e 2	i 0-10	i
Transportation and warehousing	48-49	130	9,504	i 2 e	0-15 e	3 e	9	6,346	i 25	2 e	0-11 e	0-13	46	10	19	1 e	140	6 e	2 e	10	2 e	3 e	1 e	2 e	73	14	122	0-8 e	14	* e	

TABLE 34-A

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (A-M): 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	
Information	51	3,000	109,062	226	3 e	385	21 e	57,930	1,360	440	38 e	161	1,433	1,010	13	31 e	844	132	217	136	120	155 i	35	401	3,440	523	605	9 e	137	39	
Publishing	511	1,040	32,447	99	1	144	4	8,296	333	85 - 99	9 e	17	341	173	4-7	20	196	84	33	51	8	5 e	15	163	1,559	291	345	2	40	5	
Newspaper, periodical, book, and directory publishers	5111	40	61	*	* e	2	* e	12	*	0 - 13	* e	3	4	1	0-3	*	2	1	* e	*	* e	* e	*	*	13	1 i	* e	* e	* e	* e	
Software publishers	5112	1,000	32,386	98	1	142	4	8,284	333	86	9 e	14	337	172	5	20	194	83	33	51	8	5 e	14	163	1,545	291	345	2	39	5	
Telecommunications	517	210	3,700	4	0-3 e	25	0-4 e	244	67	1	1	0-27 e	555	94	0-3	0-5 e	23	3	1 e	18	65	5	1 e	13	91	4	2 e	0-3 e	2 e	1 e	
Data processing, hosting, and related services	518	1,440	30,154	74	1 e	190	15 e	17,953	583	63 - 197	27 e	71	492	571	7 i	8 e	471	41 e	91	65 e	42	142 i	17	217	1,236	187	243	6 e	88	33	
Other information	other 51	330	42,761	49	0-3 e	26	0-4 e	31,438	377	142 - 291	* e	44 - 75 i	45	172	0-3 e	0-5 e	154	5 e	91	2 e	4	2 e	1	8 e	555	40	15	0-3 e	7	1 e	
Finance and insurance	52	220	8,890	0-42 i	* e	125 i	0-10 i	3,342	35	32	130	0-13	370 i	91	* e	* e	786	0-53	28	0-29	0-50	1 e	52	85	214	73 i	191	* e	0-46	1	
Real estate and rental and leasing	53	50	1,371	* e	* e	*	*	1,011	6	* e	* e	*	2	6	* e	* e	1	* e	2	*	1 i	* i	* e	* e	*	1	1 i	* e	* e	* e	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	0	0	0	0	40	0	0	0	0	1 i	0	0	0	0	0	0	0	1 i	0	0	0	0	0	* i	0	0	0	0
Other real estate and rental and leasing	other 53	30	1,326	* e	* e	*	*	971	6	* e	* e	*	1	6	* e	* e	1	* e	2	*	* e	* i	* e	* e	*	1	1 i	* e	* e	* e	
Professional, scientific, and technical services	54	5,540	29,131	134	6 e	184	39	7,737	562	159	20	51	531	489	17	89	603	108	51	350	31	86	30	469	1,375	272	500	25	625	27	
Architectural, engineering, and related services	5413	1,160	2,288	37	3	20	2 e	268	52	51	2	6	104	55	7	33	78	24	10	17	9	57	25	98	62	61	29	9	17	13	
Computer systems design and related services	5415	2,880	18,395	80	2 e	133	34	3,879	354	74	7 e	26 e	273	337	7	44	277	50	34	303	15 e	17	3 e	193 e	739	110	344	9	591	4 i	
Scientific research and development services	5417	850	3,265	10	0	23	1 e	1,280	104	6	6	1 i	59	16	2	2 i	44	25	3	13	4	6	* e	131	415	27	46 i	6	6	8	
Research and development in biotechnology	541711	210	1,083	* e	0	2	* e	535	4	* i	2	* e	12	4	0	* e	10	11	2	10	3	*	*	16	129 i	*	37 i	*	1	0	

TABLE 34-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A-M): 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	630	2,155	9	0	21	1 e	736	100	6	5	* e	47	12	2	2 i	33	15	1 e	2	1	5	* e	110	286	27	9	6	6	8	
Research and development in the social sciences and humanities	541720	20	27	0	0	0	0	8	0	0	0	1 i	*	0	0	0	* i	0	0	0	0	0	0	5	*	0	0	0	0	0	
Other professional, scientific, and technical services	other 54	670	5,182	9	* e	9	2	2,310	52	28	4 i	18	95	82	1	10	204	9	4	17	3 e	7 i	2	47	159	73	81	1 e	11	2	
Health care services	621-23	560	1,928	13 e	0-15 e	34	9 e	943	27 i	11 e	0-11 e	0-13 e	56 e	19 e	0-10 e	3 e	34 e	13 e	6 e	14	8 e	11 e	0-9 e	17 e	92	30 e	14 e	5 e	12 e	0-10 e	
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	670	1,322-14,012	0-42 e	0-15	0-123 i	0-10 e	509	0-175 i	54	0-11	0-13 e	65 e	0-109	0-10 e	9	135	0-53	26	0-29	0-50	32	0-9	50	0-660	0-461 i	0-95	3 e	0-46	0-10	
All companies (number of domestic employees)	-	26,270	428,968	1,191	41	4,570	397	158,850	5,208	6,171	1,436	277	5,611	3,924	86	2,608	13,383	6,895	2,285	1,857	939	534	373	4,248	25,955	18,918	7,547	276	4,150	176	
Small companies																															
10-19 <sup>b</sup>	-	4,990	4,432	35 e	3 e	56 e	14 e	932	82 e	43 e	8 e	13 e	275 i	86 e	9 e	13 e	140 e	70 e	34 e	28 e	27 e	30 e	7 e	102 e	394	111 e	103 e	11 e	42 e	6 e	
20-49	-	7,220	10,040	71 e	3 e	96 e	29 e	2,804	163	91 e	46	33 e	240 e	185 e	13	27 e	299 e	138	74	45 e	42 e	36 e	23 i	276	1,073	258 e	212	14 e	82 e	13	
Medium companies																															
50-99	-	4,720	11,492	48 e	4 e	108	17 e	3,279	118	452	15	10 e	256	121	4 e	20	339	130	63	46	117	52 e	14	162	1,810	293	130	23	72	11 i	
100-249	-	4,350	16,520	126	7	131	55	5,208	313	199	24	16	333	237	4 e	64	425	182	74	164	69	74	11 e	328	1,797	417	368	20	155	20	
Large companies																															
250-499	-	2,050	15,356	42	3	206	28	6,330	277	130	3	21	307	215	2 e	21	370	124	99	90	56	46	5 e	246	1,115	430	283	9	111	25	
500-999	-	1,180	21,549	52	0-8 e	191	16	5,744	526	133	21	13 e	385	281	17	50	661	245	112	106	72	19 e	7	648	3,762	1,028 i	289	49	91	10	
1,000-4,999	-	1,230	64,475	486	6	530	71	24,723	1,358	1,038	657	51	1,101	746	5	157	1,256	568	249	540	320	91	92	886	7,095	2,163	1,448	38	361	24	
5,000-9,999	-	230	44,728	66	11	756 i	52	21,921	405	527	41	2	359	293	19	2,037	1,079	492	26	175	77	7	125 i	236	921 i	1,579 i	461	53 i	179	5-63 i	

TABLE 34-A

**Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
10,000–24,999	–	220	74,385	65	*	406	36 i	25,897 i	937 i	292	511 i	7	531	507	2	138 i	5,158	3,810	681 i	547	116	28	17	845	3,552	1,799	1,053	35	1,519	0-49
25,000 or more	–	130	165,991	200	0-8	2,091	79	62,010	1,029	3,266	111	110	1,822	1,254	9	80	3,656	1,137	873	115	42	151 i	72	519 i	4,435	10,839	3,200	23	1,538	8

\* = amount < \$500,000. e = estimated; > 50% of the estimate is modeled—see Technical Notes. i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

<sup>b</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For a given estimate in this table, if the conditions are satisfied for both the "i" and "e" flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. 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.

TABLE 34-B

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (N-Z): 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed <sup>c</sup>	
All industries	21-23, 31-33, 42-81	26,270	428,968	735	829	1,036	16,648	391	17,968	9,188	340	7,087	956	7,606	13,353	664	1,527	170	1,381	20,916	2,463	218	4,276	35,823	219	i	5,679	670	916
Manufacturing industries	31-33	14,410	248,109	243	513	734	12,680	220	7,690	6,239	155	5,824	573	5,973	10,177	612	1,088	134	981	9,015	1,037	128	1,480	5,709	169	i	3,829	641	379
Food	311	860	3,937	54	2 e	* e	241	* e	38	56	4	163	14	16	64	1 e	4	4	27	27	6	4	133	45	* e	92	0-175 e	0-175	
Beverage and tobacco products	312	350	971	* e	* e	* e	1 e	* e	260	86	* e	2	1 i	2 e	2 e	* e	* e	* e	1 e	148	* e	1 i	90	49	* e	1 i	0-22 e	0-22	
Textile, apparel, and leather products	313-16	210	873	* e	1	13	2 e	* e	32	50	* e	82	2	21	6	1 e	64	* e	3 e	5 e	5	* e	9	19	* e	12	0-29	0-29	
Wood products	321	80	180	* e	* e	* e	* e	*	* e	10	13	3	0-22	3	3 i	3	* e	* e	6	4 i	1 i	* i	11	10	* e	14	* e	0-22	
Paper	322	90	1,064	1	* e	2	8	* e	7	38	0	20	* e	1	24	4	274	* e	29	16	*	2	93	15	* e	324	0	3	
Printing and related support activities	323	200	420 i	1 e	1 e	1 e	5 e	1 i	13	49 i	* e	28 i	1 e	4	21 i	1	3 i	* e	32 i	13	1 e	1 e	3 e	7 i	* e	32 i	* e	8	
Petroleum and coal products	324	70	1,203	* e	* e	* e	341	* e	1 e	2	0	6	0-62	2	11	* e	9	* e	* e	599-682	2	0	1	* e	* e	2	* e	0-130	
Chemicals	325	2,260	87,288	49	115	92	9,825	16	3,793	2,892	4	2,421	150	89	7,327	63	96	37	285	1,639	251	50 i	221	1,439	128 i	591	5	55	
Basic chemicals	3251	240	2,198	9	0-40	2	167	* e	24	75	* e	263	11	13	187	2	27	35	238	173	2	0	130	18	13	35	* e	0-40	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	170	1,092	* e	* e	* e	6	0	26	6	0	237	*	3	116	2	16	0	1 e	240	* e	* e	4	15	10	9	0	0-45	
Pesticide, fertilizer, and other agricultural chemicals	3253	150	1,501	11	61-105	51	207	* e	1	176-327	*	2	95	1	97	15	* e	*	1	99	3	* e	4	3	* e	1 e	0	0-45	
Pharmaceuticals and medicines	3254	1,000	78,652	27	11	35	9,146	15	3,502	2,460	4	532	39	59	6,792	37	40 e	1	34	1,036	237	43 i	78	1,398	105 i	424	5	5	
Soap, cleaning compound, and toilet preparation	3256	260	2,596	2	* e	* e	232 i	* e	211 i	27	0	1,206	* e	1 e	7 i	* e	3	* e	4	38	7 i	6	1 e	1 e	1 e	113	0	7	
Paint, coating, adhesive, and other chemicals	3255, 3259	460	1,249	* e	* e	4	66	* e	29	0-150	0	181	4	12	128	6	11	*	8	52	2	* e	4	2 i	* e	9	* e	0-45	
Plastics and rubber products	326	770	2,770	2 e	3 e	12	37	* e	106	73	1 e	332	44	6	114	8	51	2	38	99	4 i	* e	25	17	8	100 i	0-89 e	0-89	
Nonmetallic mineral products	327	160	1,473 i	* e	1	* e	23	* e	1,030 i	15	* e	17	0-25 e	3	30	* e	8	* e	4	3	1	* i	2	4	* e	9	* e	0-25	
Primary metals	331	200	649	* e	* e	8	2	* e	6	13	* e	38	3	17	146	3	14	*	4	22	2 i	1 i	2	2 i	2	25	0-32 e	0-32	
Fabricated metal products	332	1,690	2,632	12	7	16	235	1 e	78	42	1 e	224	13 e	24	65	4	68	1 e	40	186	18	1 e	19	126	2 e	170	1	49	
Machinery	333	2,080	13,930	48	15	51	193 i	3 i	593	325	126	415	172	439	282	37	180	14 i	60	773	45	18	66	120	5 e	721	10	43	
Agricultural implement	33311	180	1,913	41	*	0	* e	* e	1 e	49	49	91	24	3	2 e	0	2	3	4	7	2 i	0	1 e	3	1 i	26	* e	4	
Semiconductor machinery	333242	60	3,854	0	0	* i	29	0	58 i	2 e	0	1 e	0	0-437	22	0	0	0	* i	275 i	2	1	0	* e	0	0	0	1	
Engine, turbine, and power transmission equipment	3336	100	1,096	* e	4	2	2	* e	350	13	* e	14	4 i	1	8	* e	159	* e	* e	6	1 i	0	35	14	* e	232	* e	*	

TABLE 34-B

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (N-Z): 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed <sup>c</sup>	
Other machinery	other 333	1,760	7,067	7 e	11	50	163 i	3 i	184	262	76	309	144	0-437	251	37	19	11 i	56	485	40	17	30	103	4 e	463	10	39	
Computer and electronic products	334	2,160	75,570	43	40	446	813	186	982	1,842	1 e	652	57	4,634	972	77	111	62	118	4,217	259	34	323	1,172	6	195	403-623	13-211	
Communications equipment	3342	290	11,495	8	14	119	360	24 i	297	745	* e	113	13	38	319 i	6	17	1	47	772	81	1	195	207	2	26	0	4	
Semiconductor and other electronic components	3344	550	31,975 i	6	3 e	150	166 i	152	204	646 i	0	91	2 e	4,207	255	37	33	40	11	2,129	74	16	16	123	2	45	299-623	0-198	
Navigational, measuring, electromedical, and control instruments	3345	1,120	10,912	27	14 i	152	270	8	274	270	1 e	400	39	246	310	28	60	22	55	461	75	15	97	373	1 e	109	1 e	10	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	220	3,117	* e	8 i	36	38 i	0	119 i	30 i	0	92 i	2	18 i	118	* e	17 i	* e	41	62 i	27 i	5 i	25 i	84	0	56 i	0	1	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	190	3,400	7	3	93	122	3	92	125 i	0	59	25	94 i	62	24	1	* e	1	153	14	*	37	70	0	5	* e	1	
Other measuring and controlling device	other 3345	720	4,395	20	2 e	22	110	4	63	114	1 e	249 i	12	133	130	3 e	42	21	13	247 i	35	10	35	219	1 e	48	* e	8	
Other computer and electronic products	other 334	220	21,188	1 i	9	26	16	2	207	182	* e	49 i	3	143	88	7	2	* i	5	855	29	2	15	469	1 e	15 i	0-125	0-125	
Electrical equipment, appliances, and components	335	880	4,886	1 e	2 e	10	141	1 i	107	238	* i	95	23	73	327	11	54	3	36	136	4	3 e	36	49	4	528	1 i	0-36	
Transportation equipment	336	970	31,505	30	34	38	89	9	332	270	5	923	34	399	254	1 e	137	7	142	808	154	5	362	2,257	12 i	398	4	0-34	
Motor vehicles, bodies, trailers, and parts	3361-63	530	20,883	11	3	19	25	2	128	211	4	0-379	24	368	92	* e	101	0-8	117	156	44	* e	0-261	136	1 e	196	4	0-34	
Aerospace products and parts	3364	290	8,900	19 i	31	19	59	7	180	44	* i	545	10	30	114	* i	9	*	17	631	109 i	5	102 i	2,119	11 i	15	* e	0-34	
Aircraft, aircraft engine, and aircraft parts	336411-13	180	8,341	19 i	31	19	59	7	180	43	* i	539	10	30	112	* i	9	*	16	584	109 i	5	95 i	2,115	11 i	15	* e	0-34	
Guided missile, space vehicle, and related parts	336414-15, 336419	110 i	559	*	*	*	*	*	1	1	0	6	0	0	1	0	*	0	2	47	*	0	7	4	0	* e	0	*	
Military armored vehicle, tank, and tank component	336992	30	25	0	0	0	0	0	0	1	0	* i	0	0	0	0	5 e	0	0	0	0	0	0	0	0	0	0	0	0-8
Other transportation	other 336	140	1,697	1	* e	1	6	0	23	14	*	0-379	* e	1 e	49 i	* e	21	0-8	8	20	* e	0	0-261	2 e	* e	187	0	0-34	
Furniture and related products	337	190	407	* e	* e	* i	3	* e	2	29	* e	4 i	* e	14	21	2	* e	* i	12	5	22	* e	12	2	1	15	* e	14	
Miscellaneous	339	1,280	18,352	1 e	293	45	721 i	2 e	310	207	1 e	399	3-66	226	506	397 i	14	2 e	141 i	240-306	260	7 i	73	376	1 e	601	0-72 i	0-72	
Medical equipment and supplies	3391	770	15,812	1 e	4 e	31	661 i	1 e	164	185	* e	367	4	69	446	24	10	1	133 i	241	223	* e	63	267	* e	555	0-25 i	0-25	



TABLE 34-B

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (N-Z): 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed <sup>c</sup>	
Other miscellaneous manufacturing	3399	520	2,540	1 e	290	14	59	1 e	147	22	* e	32	0-62 e	158	61	373 i	4 e	1 e	8	0-65	36	7 i	10	109	1 e	46	0-65 e	0-65	
Nonmanufacturing industries	21-23, 42-81	11,880	180,858	492	316 i	302	3,968	171	10,278	2,949	185	1,263	383	1,633	3,177	51	439	36	400	11,901 i	1,427	90	2,796	30,114	50	1,850	29 e	537	
Mining, quarrying, oil and gas extraction, and support activities	21	150	2,535	* e	63	* e	0-25 e	8 e	7	0-25 e	19	4 e	141	0-25 e	19	* e	1 e	0-6 e	10	1,867	10 i	* e	3 e	0-25 e	5 e	8	13 e	21	
Utilities	22	40	237	0	0	0	0-50	0	11	0-50	9	23	*	0-50	7	0	0	*	0	44	5	0	0	0-50	7	0-50	1	0-50	
Wholesale trade	42	1,500	1,104	4 e	5 e	4 e	57	2 e	73 e	22 e	3 e	30 e	6 e	13 e	29 e	0-19 e	16	5	14 e	93 e	8 e	1 e	15 e	0-106 e	2 e	25 e	1 e	0-105	
Electronic shopping and electronic auctions	454111-12	60	3,088-15,775	0-35 i	0-127 i	0-20 i	0-271 i	1 i	0-402 i	0-116	1 i	0-109 i	1 i	0-308 i	0-138 i	0-19 i	0-46 i	0-6 i	4 i	0-713 i	47 i	0-14 e	0-819 i	0-8,532 i	1 i	0-96 i	0-6 e	0-105 i	
Transportation and warehousing	48-49	130	9,504	13	0-26 e	0-20 e	17	1 e	787 i	14	6 i	38	2 e	19	824 i	* e	2 e	* e	86	56	4	* e	6	748	* e	9	* e	15	
Information	51	3,000	109,062	395	64 e	177	2,137	79	6,262	1,793	103	489	106	854	1,249	13 i	287	12	96 e	2,089	1,003	27	893	20,080	9	954	8	39	
Publishing	511	1,040	32,447	34	18	100	196	16	820	1,059	96	291	13 e	401	327	6	15	4	20	697	338	12	232	14,710	3	689	3	20	
Newspaper, periodical, book, and directory publishers	5111	40	61	* e	* e	*	*	* e	6	1	* e	1	* e	2	3	* e	*	* e	*	2	* e	* e	1 i	1	* e	*	* e	*	
Software publishers	5112	1,000	32,386	34	18	100	195	16	814	1,058	96	290	13 e	399	323	6	15	4	19	696	338	12	232	14,709	3	689	3	20	
Telecommunications	517	210	3,700	1 e	1 e	6	1,486	1 e	463	43	1 e	6	2 e	15	7	0-3	4	1 e	3	56	8	1 e	59	292	0-3 e	18	0-4 e	0-20	
Data processing, hosting, and related services	518	1,440	30,154	304	43 e	68	278	0-64	1,442	591	6 e	147	30	309	364	6 i	203	5 e	54 e	1,044	423	14	401	1,147	5	224	3 e	0-20	
Other information	other 51	330	42,761	56	2 e	3	178	0-64	3,537	100	1 e	44	61	130	551	0-3 e	65	1	19	292	234	1 e	200	3,931	0-3 e	22	0-4	0-20	
Finance and insurance	52	220	8,890	0-35	26	0-20	396	* e	789	146	* e	188	1 e	0-233	339	0-19	0-46	1	0-78	410	125	0-14	169	0-233	* e	523 i	* e	3	
Real estate and rental and leasing	53	50	1,371	8	*	* e	*	* e	24	* e	* e	7	* e	0-303	1	* e	* e	* e	* e	2 i	1	*	1	0-303	* e	* e	* i	0-105	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	20	45	1 i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1 i	0	0	0	0	0	0	0	*	i
Other real estate and rental and leasing	other 53	30	1,326	7	*	* e	*	* e	24	* e	* e	7	* e	0-303	1	* e	* e	* e	* e	1	1	*	1	0-303	* e	* e	* i	0-105	
Professional, scientific, and technical services	54	5,540	29,131	35	30	102	1,041	31	1,868	840	41	347	105	425 i	521	18	68	15	88	6,555 i	194	50	868	756	19	182	3 e	357	
Architectural, engineering, and related services	5413	1,160	2,288	8	7	6	35	8	117	30	16	51	9	83	76	4 i	7 e	7	26	367 i	24	4	87	70	1 e	30	1	63	
Computer systems design and related services	5415	2,880	18,395	9 e	17	43	216 e	16	1,468	597	20	202	12 e	312 i	191	6 e	35	4	25 e	5,755 i	79	45	553	464 i	6 e	111	1 e	268	

TABLE 34-B

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (N-Z): 2019

(Millions of U.S. dollars and number)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed <sup>c</sup>	
Scientific research and development services	5417	850	3,265	9	1	50	101	4 e	111	144	4	42	4 e	11	149	8 i	7	3	4 e	80	45	1 i	63	151	10	9 e	1 i	10	
Research and development in biotechnology	541711	210	1,083	8	* e	24	4	* e	38	68	0	2	* e	5	56	0	*	2	*	9	20 i	1 i	21	46	*	* e	0	2	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	630	2,155	2 e	1	25	96	4 e	73	77	4	37	4 e	6	93	7 i	7	2	3 e	64	24	* i	42	105	10	9 e	1 i	7	
Research and development in the social sciences and humanities	541720	20	27	0	0	*	1	0	0	0	0	2	0	0	0	* i	0	0	0	7	0	0	*	*	0	0	0	1	
Other professional, scientific, and technical services	other 54	670	5,182	9	5	3	688	3 i	172	69	1	52	79	19	105	1 e	18	* e	33	353	46	1	165	70	1	31	* e	15	
Health care services	621-23	560	1,928	6 e	5 e	2 e	53	6 e	60 e	22 e	0-7 e	33 e	7 e	17 e	55 e	3 e	23	0-6 e	28 e	77 e	10 e	0-14 e	27 e	0-86	0-11 e	57	0-6 e	0-86	
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	670	1,322 - 14,012	0-35	0-127 e	0-20 e	0-271	43	0-402	0-116	0-7	0-109	15	0-308	0-138	0-19	0-46 e	0-6 e	0-78	0-713	22	0-14 i	0-819	0-8,532	0-11	0-96	0-6 e	0-105	
All companies (number of domestic employees)	-	26,270	428,968	735	829	1,036	16,648	391	17,968	9,188	340	7,087	956	7,606	13,353	664	1,527	170	1,381	20,916	2,463	218	4,276	35,823	219 i	5,679	670	916	
Small companies																													
10-19 <sup>b</sup>	-	4,990	4,432	15 e	26 e	47	288	13 e	212 e	94 e	4 e	111 e	29 e	36 e	142 e	24 i	27 e	5 e	41 e	231 e	33 e	6 e	138 e	133	7 e	65 e	3 e	27	
20-49	-	7,220	10,040	32 e	51	35 e	368	18 e	412 e	213 e	19	266 e	40 e	114	403	22 e	54 e	8 e	70 e	458 e	138	14 e	270 e	409	18	148 e	4 e	68	
Medium companies																													
50-99	-	4,720	11,492	28	29 e	49	351	23 e	370	329	20	235	48 e	116	492	18	52 e	12	49 e	638	112	20	188	292	14 e	162	14 e	112	
100-249	-	4,350	16,520	45	43	75	471	47 i	525	310	19	367	65	180	602	36	80	13	85	974	254	13	204	672	9 e	446	5	158	
Large companies																													
250-499	-	2,050	15,356	50	24	41	677	43	840	265	2 e	280	31	135	455	9	54	11	70	584	129	28	185	570	5	170	0-129 e	0-129	
500-999	-	1,180	21,549	95	226	136	578	20	1,038	1,132	22	352	33	117	307	26	88	6 e	119	1,160	213	12	349	578	11	321	4 e	45-104	
1,000-4,999	-	1,230	64,475	159	120	341	1,046	19	1,259	1,965	101	1,281	222	1,117	1,656	216	327	97	161	2,104	724	14	596	3,681	20	820	16	350	
5,000-9,999	-	230	44,728	51	102	80	1,684 i	7	3,022	1,430	13	533	143	440	666	220 i	148	2	100	1,485	142	26	332	437 i	3	1,701	* i	0-82 i	
10,000-24,999	-	220	74,385	58	79	93	4,500 i	15	4,338	1,737	1	2,003	209	694	3,307 i	43	288	5	320	4,911	415	39 i	229	1,261	116 i	1,208	3	0-49	
25,000 or more	-	130	165,991	203	127 i	139	6,686	186	5,952	1,712	140	1,658	138	4,657	5,323	49	408	11	366	8,369 i	304	45	1,784 i	27,790	15 i	637	487-625	0-159	

\* = amount < \$500,000. e = estimated; > 50% of the estimate is modeled—see Technical Notes. i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

<sup>b</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

<sup>c</sup> 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):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For a given estimate in this table, if the conditions are satisfied for both the "i" and "e" flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. 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.

TABLE 35

**Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size					
		All companies	Less than \$1 million	\$1 million–\$9.999 million	\$10 million–\$49.999 million	\$50 million–\$99.999 million	\$100 million or more
All industries	21–23, 31–33, 42–81	428,968	4,608	28,126	35,140	24,458	336,636
Manufacturing industries	31–33	248,109	2,637	14,197	19,863	15,920	195,491
Food	311	3,937	159 - 173	600	566	477 - 591	2,019 - 2,120
Beverage and tobacco products	312	971	42	84	60	173 - 274	511 - 612
Textile, apparel, and leather products	313–16	873	28	213	246	220	166
Wood products	321	180	19	80	81	0	0
Paper	322	1,064	12	133	86	0	832
Printing and related support activities	323	420	26	284	110	0	0
Petroleum and coal products	324	1,203	13	24 - 75	77 - 106	0 - 372	645 - 1,066
Chemicals	325	87,288	336	2,683	6,769	6,411	71,088
Basic chemicals	3251	2,198	39	364	633	521	640
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092	0 - 164	151	118 - 140	0	636 - 823
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501	0 - 25	80	84	0	1,313 - 1,339
Pharmaceuticals and medicines	3254	78,652	59 - 76	1,707	5,373	5,647 - 5,667	65,848
Soap, cleaning compound, and toilet preparation	3256	2,596	74	174	172	107	2,069
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249	0 - 164	207	366 - 391	114 - 137	368 - 562
Plastics and rubber products	326	2,770	159	706	806	275	825
Nonmetallic mineral products	327	1,473	23 - 37	125 - 140	210	86	1,014
Primary metals	331	649	32	233 - 249	302	65 - 81	0
Fabricated metal products	332	2,632	447	1,013	627	356	189
Machinery	333	13,930	393	1,958	1,919	1,353	8,307
Agricultural implement	33311	1,913	46	122	134	193	1,418
Semiconductor machinery	333242	3,854	5	18 - 96	151	243	3,359 - 3,436
Engine, turbine, and power transmission equipment	3336	1,096	16	106	163	0 - 72	738 - 813
Other machinery	other 333	7,067	326	1,635 - 1,712	1,471	844 - 918	2,715
Computer and electronic products	334	75,570	363	2,393	2,948	2,457	67,409
Communications equipment	3342	11,495	49	312 - 379	531	537 - 604	10,000
Semiconductor and other electronic components	3344	31,975	56	686	1,037	819	29,378
Navigational, measuring, electromedical, and control instruments	3345	10,912	212	1,140	1,111	415	8,034
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117	35	280	468	154	2,179

TABLE 35

**Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size					
		All companies	Less than \$1 million	\$1 million–\$9.999 million	\$10 million–\$49.999 million	\$50 million–\$99.999 million	\$100 million or more
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400	32	150	169	55	2,994
Other measuring and controlling device	other 3345	4,395	145	710	474	205	2,861
Other computer and electronic products	other 334	21,188	47	189 - 254	269	620 - 685	19,996
Electrical equipment, appliances, and components	335	4,886	192	548	855	933	2,358
Transportation equipment	336	31,505	110	1,403	2,016	1,568	26,409
Motor vehicles, bodies, trailers, and parts	3361–63	20,883	84	700	1,280	1,042	17,778
Aerospace products and parts	3364	8,900	3 - 27	478 - 650	493	363 - 388	7,366 - 7,540
Aircraft, aircraft engine, and aircraft parts	336411–13	8,341	0 - 23	376	331	363 - 388	7,248
Guided missile, space vehicle, and related parts	336414–15, 336419	559	4	102 - 274	162	0	118 - 292
Military armored vehicle, tank, and tank component	336992	25	1	24	0	0	0
Other transportation	other 336	1,697	0 - 23	28 - 200	244	137 - 162	1,092 - 1,266
Furniture and related products	337	407	30	127	250	0	0
Miscellaneous	339	18,352	221 - 234	1,514 - 1,556	1,901 - 1,929	1,163 - 1,486	13,187 - 13,513
Medical equipment and supplies	3391	15,812	101	1,079	1,394	1,114	12,123
Other miscellaneous manufacturing	3399	2,540	119 - 133	436 - 477	507 - 535	50 - 372	1,064 - 1,389
Nonmanufacturing industries	21–23, 42–81	180,858	1,970	13,929	15,276	8,538	141,145
Mining, quarrying, oil and gas extraction, and support activities	21	2,535	26	346	0 - 1,716	0	446 - 2,164
Utilities	22	237	0 - 31	29 - 66	127	14 - 81	0
Wholesale trade	42	1,104	400	704	0	0	0
Electronic shopping and electronic auctions	454111–12	3,088 - 15,775	i 14	68	0 - 1,720	0 - 293	1,005 - 15,677
Transportation and warehousing	48–49	9,504	i 19	111	488	101	8,785
Information	51	109,062	393	4,882	6,057	6,354	91,376
Publishing	511	32,447	204	1,567	1,292 - 1,410	1,043	28,221 - 28,341
Newspaper, periodical, book, and directory publishers	5111	61	5	18	38	0	0
Software publishers	5112	32,386	199	1,549	1,255 - 1,372	1,043	28,221 - 28,341
Telecommunications	517	3,700	35	134	487	90	2,954
Data processing, hosting, and related services	518	30,154	119	2,707	3,751	4,746	18,831
Other information	other 51	42,761	35	474	408 - 526	475	41,250 - 41,370
Finance and insurance	52	8,890	14	322	1,287	373	6,893
Real estate and rental and leasing	53	1,371	10	17	64	0	1,280
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	4	i 6	35	0	0

TABLE 35

**Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2019**

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size					
		All companies	Less than \$1 million	\$1 million–\$9.999 million	\$10 million–\$49.999 million	\$50 million–\$99.999 million	\$100 million or more
Other real estate and rental and leasing	other 53	1,326	6	11	30	0	1,280
Professional, scientific, and technical services	54	29,131	993 - 1,022	5,497	4,957	1,181 - 1,214	16,472
Architectural, engineering, and related services	5413	2,288	222	1,048	580	250	187 i
Computer systems design and related services	5415	18,395	600	2,505	2,098	520	12,673
Scientific research and development services	5417	3,265	72	1,193	1,350	287	363
Research and development in biotechnology	541711	1,083	20	359	377	157	171
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155	50	808	974	130	193
Research and development in the social sciences and humanities	541720	27	1	26	0	0	0
Other professional, scientific, and technical services	other 54	5,182	97 - 127 i	751	929	125 - 158	3,249
Health care services	621–23	1,928	26	889	579	50 - 317	116 - 386
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,322 - 14,012	11 - 77	1,024 - 1,065	0 - 1,720	170	100 - 12,787
All companies (number of domestic employees)	–	428,968	4,608	28,126	35,140	24,458	336,636
Small companies							
10–19 <sup>a</sup>	–	4,432	977	2,974	334	146	0
20–49	–	10,040	1,567	6,158	2,079 - 2,126	191 - 236	0
Medium companies							
50–99	–	11,492	951	4,808	4,113	1,141	478
100–249	–	16,520	661	6,514	5,809	2,467	1,069
Large companies							
250–499	–	15,356	286	3,165	5,639	2,834	3,432
500–999	–	21,549	91	2,046	5,497	5,043	8,872
1,000–4,999	–	64,475	69	1,966	8,012	8,657	45,770
5,000–9,999	–	44,728	1	161	1,909	1,745	40,911
10,000–24,999	–	74,385	2	232	1,173	1,399	71,579
25,000 or more	–	165,991	1	102	529 - 577	788 - 833	164,525

i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. R&D program size classifications are based on R&D performance. 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.

TABLE 36

**Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
All industries	21–23, 31–33, 42–81	428,968		3.8	4.0
Manufacturing industries	31–33	248,109		4.4	4.4
Food	311	3,937		0.7	0.7
Beverage and tobacco products	312	971		0.6	0.6
Textile, apparel, and leather products	313–16	873		1.3	1.4
Wood products	321	180		0.5	0.5
Paper	322	1,064		1.2	1.2
Printing and related support activities	323	420	i	0.7	0.7
Petroleum and coal products	324	1,203		0.4	0.4
Chemicals	325	87,288		7.5	7.5
Basic chemicals	3251	2,198		0.7	0.7
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092		1.7	1.7
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501		1.8	1.8
Pharmaceuticals and medicines	3254	78,652		14.7	14.7
Soap, cleaning compound, and toilet preparation	3256	2,596		2.3	2.3
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249		2.0	2.0
Plastics and rubber products	326	2,770		1.4	1.4
Nonmetallic mineral products	327	1,473	i	2.7	3.2
Primary metals	331	649		0.5	0.5
Fabricated metal products	332	2,632		2.0	2.0
Machinery	333	13,930		3.8	3.8
Agricultural implement	33311	1,913		4.0	4.1
Semiconductor machinery	333242	3,854		15.6	15.6
Engine, turbine, and power transmission equipment	3336	1,096		3.0	3.0
Other machinery	other 333	7,067		2.8	2.8
Computer and electronic products	334	75,570		11.1	11.2
Communications equipment	3342	11,495		13.1	13.1
Semiconductor and other electronic components	3344	31,975	i	15.5	15.5
Navigational, measuring, electromedical, and control instruments	3345	10,912		6.0	6.0
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117		10.4	10.4
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400		4.5	4.5
Other measuring and controlling device	other 3345	4,395		5.7	5.7
Other computer and electronic products	other 334	21,188		10.6	10.6
Electrical equipment, appliances, and components	335	4,886		3.4	3.4
Transportation equipment	336	31,505		2.7	2.9
Motor vehicles, bodies, trailers, and parts	3361–63	20,883		2.6	2.8
Aerospace products and parts	3364	8,900		3.2	3.2
Aircraft, aircraft engine, and aircraft parts	336411–13	8,341		3.1	3.1
Guided missile, space vehicle, and related parts	336414–15, 336419	559		6.6	6.6
Military armored vehicle, tank, and tank component	336992	25		2.6	2.6
Other transportation	other 336	1,697		2.2	2.2
Furniture and related products	337	407		1.0	1.0
Miscellaneous	339	18,352		5.3	5.3
Medical equipment and supplies	3391	15,812		6.4	6.5



TABLE 36

**Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Other miscellaneous manufacturing	3399	2,540		2.5	2.5
Nonmanufacturing industries	21-23, 42-81	180,858		3.3	3.6
Mining, quarrying, oil and gas extraction, and support activities	21	2,535		1.4	1.4
Utilities	22	237		0.1	0.1
Wholesale trade	42	1,104		0.9	0.9
Electronic shopping and electronic auctions	454111-12	3,088 - 15,775	i	D	D
Transportation and warehousing	48-49	9,504	i	3.4	3.4
Information	51	109,062		7.6	7.7
Publishing	511	32,447		17.3	17.4
Newspaper, periodical, book, and directory publishers	5111	61		5.6	5.9
Software publishers	5112	32,386		17.4	17.5
Telecommunications	517	3,700		0.7	0.7
Data processing, hosting, and related services	518	30,154		6.3	6.3
Other information	other 51	42,761		16.5	17.4
Finance and insurance	52	8,890		0.6	0.7
Real estate and rental and leasing	53	1,371		14.8	14.8
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		4.4	4.4
Other real estate and rental and leasing	other 53	1,326		16.1	16.1
Professional, scientific, and technical services	54	29,131		6.0	6.0
Architectural, engineering, and related services	5413	2,288		2.2	2.3
Computer systems design and related services	5415	18,395		9.3	9.4
Scientific research and development services	5417	3,265		4.0	4.0
Research and development in biotechnology	541711	1,083		3.5	3.5
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155		4.4	4.5
Research and development in the social sciences and humanities	541720	27		2.3	2.3
Other professional, scientific, and technical services	other 54	5,182		4.9	4.9
Health care services	621-23	1,928		1.4	1.4
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,322 - 14,012		D	D
All companies (number of domestic employees)	-	428,968		3.8	4.0
Small companies					
10-19 <sup>c</sup>	-	4,432		19.9	20.3
20-49	-	10,040		9.2	9.4
Medium companies					
50-99	-	11,492		9.5	9.7
100-249	-	16,520		6.2	6.3
Large companies					
250-499	-	15,356		5.1	5.2
500-999	-	21,549		5.8	5.9
1,000-4,999	-	64,475		4.4	4.4
5,000-9,999	-	44,728		3.9	4.1
10,000-24,999	-	74,385		3.5	3.6
25,000 or more	-	165,991		3.2	3.4

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

<sup>b</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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, unless indicated otherwise. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 37

**Domestic R&D paid for by the company and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
All industries	21-23, 31-33, 42-81	466,504		4.2	4.4
Manufacturing industries	31-33	281,995		5.0	5.0
Food	311	4,127		0.7	0.7
Beverage and tobacco products	312	1,146		0.7	0.7
Textile, apparel, and leather products	313-16	890		1.4	1.4
Wood products	321	191		0.5	0.5
Paper	322	1,068		1.2	1.2
Printing and related support activities	323	426	i	0.7	0.7
Petroleum and coal products	324	1,450 - 1,550		D	D
Chemicals	325	112,954		9.7	9.7
Basic chemicals	3251	2,261		0.8	0.8
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,117		1.7	1.7
Pesticide, fertilizer, and other agricultural chemicals	3253	1,693		2.0	D
Pharmaceuticals and medicines	3254	103,704		19.3	19.4
Soap, cleaning compound, and toilet preparation	3256	2,887		2.6	2.6
Paint, coating, adhesive, and other chemicals	3255, 3259	1,292		2.0	D
Plastics and rubber products	326	2,823		1.4	1.4
Nonmetallic mineral products	327	1,496	i	2.7	3.2
Primary metals	331	663		0.5	0.5
Fabricated metal products	332	2,666		2.0	2.1
Machinery	333	14,345		3.9	4.0
Agricultural implement	33311	2,111		4.5	4.5
Semiconductor machinery	333242	3,859		15.6	15.6
Engine, turbine, and power transmission equipment	3336	1,114		3.0	3.0
Other machinery	other 333	7,260		2.9	2.9
Computer and electronic products	334	77,590		11.4	11.4
Communications equipment	3342	12,431		14.1	D
Semiconductor and other electronic components	3344	32,338		15.7	15.7
Navigational, measuring, electromedical, and control instruments	3345	11,292		6.2	6.2
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,235		10.8	10.8
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,558		4.7	4.7
Other measuring and controlling device	other 3345	4,499		5.8	5.8
Other computer and electronic products	other 334	21,530		10.7	D
Electrical equipment, appliances, and components	335	5,010		3.5	3.5
Transportation equipment	336	35,560		3.1	3.2
Motor vehicles, bodies, trailers, and parts	3361-63	24,254		3.0	3.2
Aerospace products and parts	3364	9,532		3.4	3.4
Aircraft, aircraft engine, and aircraft parts	336411-13	8,855		3.3	3.3
Guided missile, space vehicle, and related parts	336414-15, 336419	677		8.0	8.0
Military armored vehicle, tank, and tank component	336992	25		2.6	2.6
Other transportation	other 336	1,749		2.2	2.2
Furniture and related products	337	430		1.1	1.1
Miscellaneous	339	19,059 - 19,153		D	D

TABLE 37

**Domestic R&D paid for by the company and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Medical equipment and supplies	3391	16,520		6.7	6.7
Other miscellaneous manufacturing	3399	2,539 - 2,632		D	D
Nonmanufacturing industries	21-23, 42-81	184,509		3.4	3.7
Mining, quarrying, oil and gas extraction, and support activities	21	2,657		1.5	1.5
Utilities	22	408		0.1	0.2
Wholesale trade	42	1,151		0.9	0.9
Electronic shopping and electronic auctions	454111-12	3,212 - 15,901	i	D	D
Transportation and warehousing	48-49	9,547	i	3.4	3.4
Information	51	111,123		7.7	7.8
Publishing	511	33,448		17.9	18.0
Newspaper, periodical, book, and directory publishers	5111	64		5.9	6.2
Software publishers	5112	33,384		17.9	18.0
Telecommunications	517	4,116		0.8	0.8
Data processing, hosting, and related services	518	30,403		6.3	6.3
Other information	other 51	43,156		16.7	17.4
Finance and insurance	52	9,208		0.6	0.7
Real estate and rental and leasing	53	1,378		14.9	14.9
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45		4.4	4.4
Other real estate and rental and leasing	other 53	1,333		16.2	16.2
Professional, scientific, and technical services	54	29,734		6.1	6.2
Architectural, engineering, and related services	5413	2,382		2.3	2.3
Computer systems design and related services	5415	18,524		9.4	9.5
Scientific research and development services	5417	3,581		4.4	4.4
Research and development in biotechnology	541711	1,201		3.8	3.8
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,353		4.8	4.9
Research and development in the social sciences and humanities	541720	27		2.3	2.3
Other professional, scientific, and technical services	other 54	5,247		5.0	5.0
Health care services	621-23	1,994		1.5	1.5
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,407 - 14,098		D	D
All companies (number of domestic employees)	-	466,504		4.2	4.4
Small companies					
10-19 <sup>c</sup>	-	4,946		22.2	22.6
20-49	-	11,254		10.3	10.5
Medium companies					
50-99	-	13,668		11.3	11.6
100-249	-	18,432		6.9	7.0
Large companies					
250-499	-	17,075		5.7	5.8
500-999	-	23,667		6.4	6.5
1,000-4,999	-	68,986		4.7	4.7
5,000-9,999	-	50,362		4.4	4.5

TABLE 37

**Domestic R&D paid for by the company and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
10,000–24,999	–	83,235	3.9	4.0
25,000 or more	–	174,879	3.3	3.6

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

<sup>b</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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, unless indicated otherwise. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 38

## Domestic R&amp;D paid for by others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
All industries	21-23, 31-33, 42-81	63,989	36,350	760	2,090	453	8,127	831	1,803	343	4,479	8,751
Manufacturing industries	31-33	37,564	22,248	430	1,193	301	6,351	432	1,051	325	899	4,335
Food	311	243	149	2	7	1	15	17	12	0	5	36
Beverage and tobacco products	312	111	63	0	5	1	8	4	9	0	13	10
Textile, apparel, and leather products	313-16	31	22	*	1	*	2	1	*	0	*	5
Wood products	321	6	4	0	0	*	*	*	*	0	*	1
Paper	322	*	*	*	*	*	*	*	0	*	*	*
Printing and related support activities	323	0	0	0	0	0	0	0	0	0	0	0
Petroleum and coal products	324	103	39 - 96	0	0 - 6	0	0 - 21	0 - 5	0 - 7	0	0 - 11	0 - 60
Chemicals	325	9,775	5,921	360	461	134	547	193	486	88	395	1,189
Basic chemicals	3251	162	108	0	0 - 21	4	13	*	15	0	4	0 - 21
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80	62	0	*	0	1	1	11	0	0	4
Pesticide, fertilizer, and other agricultural chemicals	3253	320 - 345	125 - 192	*	80 - 105	0 - 3	19	0 - 9	0 - 28	*	0 - 3	0 - 69
Pharmaceuticals and medicines	3254	8,966	5,456	360	351	127	503	177	423	88	386	1,097
Soap, cleaning compound, and toilet preparation	3256	164	105	*	7	*	7	8	12	*	4	20
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 84	0 - 63	0	*	0 - 5	5	0 - 9	0 - 28	0	0 - 3	0 - 63
Plastics and rubber products	326	85	58	0	*	3	13	*	1	*	1	9
Nonmetallic mineral products	327	35	20	0	0 - 6	*	2	2	2	0	0 - 11	0 - 12
Primary metals	331	16	5	0	0	0	10	0 - 2	*	0	0	0 - 2
Fabricated metal products	332	254	169	0	20	14	21	2	7	0	0 - 11	6 - 24
Machinery	333	1,254	828	*	18	11	244	6	49	4	45	49
Agricultural implement	33311	9	3	0	0	0	1	*	0	3	0	1
Semiconductor machinery	333242	604	493	0	1	1	57	1	43	*	3	7
Engine, turbine, and power transmission equipment	3336	205	127	*	0	10	43	2	3	0	2	18
Other machinery	other 333	436	205	0	18	1	143	3	3	1	40	23
Computer and electronic products	334	11,159	7,099	67	366	68	1,536	103	301	61	185	1,375
Communications equipment	3342	1,100	832	1	38	5	42	15	18	5	20	124
Semiconductor and other electronic components	3344	3,208	1,854	40	81	7	465	61	172	53	96	379

TABLE 38

## Domestic R&amp;D paid for by others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Navigational, measuring, electromedical, and control instruments	3345	6,650	4,265	26	235	54	1,022	25	104	3	57	860
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225	132	0	21	1	15	5	5	*	5	42
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262	4,030	24	210	49	997	19	94	3	35	800
Other measuring and controlling device	other 3345	163	103	1	4	4	11	1	6	*	17	17
Other computer and electronic products	other 334	201	148	*	i 12	1	7	1	7	*	i 11	12
Electrical equipment, appliances, and components	335	377	202	*	48	7	51	2	16	6	4	40
Transportation equipment	336	13,870	i 7,489	i 1	261	i 61	3,849	i 101	i 163	i 166	i 236	i 1,542
Motor vehicles, bodies, trailers, and parts	3361-63	3,233	i 1,674	i 0-1	173	i 36	328-757	i 84	i 106	i 137-167	62	i 206-603
Aerospace products and parts	3364	9,458	i 5,140	i 0-1	21-89	14-18	3,053	i 0-18	i 32-58	*	139	i 940-1,059
Aircraft, aircraft engine, and aircraft parts	336411-13	8,550	i 4,645	i 0	22	i 15	2,867	i 0-14	i 33	0	134	i 817-836
Guided missile, space vehicle, and related parts	336414-15, 336419	908	495	0-1	0-68	0-3	187	0-6	0-26	*	5	i 118-223
Military armored vehicle, tank, and tank component	336992	10	0-8	0	0-8	0-1	3	0-8	*	0	0	0-8
Other transportation	other 336	1,168	666-677	i 0-1	i 0-68	i 5-12	i 37-464	i 0-18	i 0-26	i 0-29	i 34	i 0-304
Furniture and related products	337	2	2	*	i *	i *	i *	i *	i *	i *	i *	i *
Miscellaneous	339	244	127-171	0	5	2	36-58	1	2-10	*	9	18-62
Medical equipment and supplies	3391	202	128	0	4	2	37	1	3	*	8	19
Other miscellaneous manufacturing	3399	42	0-43	0	*	*	0-21	*	0-7	*	*	0-43
Nonmanufacturing industries	21-23, 42-81	26,425	14,102	330	898	152	1,777	400	752	i 18	3,579	i 4,416
Mining, quarrying, oil and gas extraction, and support activities	21	183	69	i 0	0	*	21	i 3	6	1	i 5	i 78
Utilities	22	38	11	0-1	*	*	1	*	0-4	0	2	17-26
Wholesale trade	42	87	64	0	2	i 1	3	i 3	1	*	i *	12
Electronic shopping and electronic auctions	454111-12	43-61	16-61	0-26	*	0	0	0	0	0	0	* i

TABLE 38

## Domestic R&amp;D paid for by others and performed by the company, by type of cost, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Transportation and warehousing	48-49	386	70 i	0	6 i	17 i	3 i	1 i	*	0	84 i	204 i
Information	51	1,165	887	76	21	19	21	19	23	*	42	58
Publishing	511	572	401	46	9	18	17	7	10	*	28	36
Newspaper, periodical, book, and directory publishers	5111	*	0	* i	* i	* i	* i	* i	0	0	* i	* i
Software publishers	5112	572	401	46	9	18	17	7	10	*	28	36
Telecommunications	517	33	23	0	*	0-2	1	0-10	1	*	0-10	0-10
Data processing, hosting, and related services	518	404	378	0-20	0-13	1	2	4	1	* i	2	0-20
Other information	other 51	155	85	10-31	0-13	0-2	*	0-10	12	0	1-13	0-23
Finance and insurance	52	28	19	0	0	0	*	0	0	0	0	9 i
Real estate and rental and leasing	53	0	0	0	0	0	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0	0	0	0	0	0	0	0
Professional, scientific, and technical services	54	24,103	12,710	229-255	848	115	1,693	369	719 i	16	3,445 i	3,928-3,960
Architectural, engineering, and related services	5413	1,919	1,185	1	61	10	257	23	11	1	97	275
Computer systems design and related services	5415	2,651	1,796	110	28	6	45	30	15	4	40	578
Scientific research and development services	5417	18,403	9,074	119	542	89	1,320	306	677 i	12	3,300 i	2,963 i
Research and development in biotechnology	541711	5,374	2,473	34	138	8	304	66	122	2	1,249 i	977
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291 i	6,020	70	386	75	1,003	219 i	540 i	9	2,025 i	1,944 i
Research and development in the social sciences and humanities	541720	738	580 i	16	19	6	12	21	15	0	27 i	42
Other professional, scientific, and technical services	other 54	1,129	656	0-26	217	10	72	10	17	* i	8	111-143
Health care services	621-23	337	207	*	20	*	32	4	1	0	1	74
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	34-58	0-53	0	*	*	2	1	0-4	0	1	0-39



TABLE 38

**Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other						
All companies (number of domestic employees)	-	63,989	36,350	760	2,090	453	8,127	i	831	1,803	343	4,479	i	8,751				
Small companies																		
10-19 <sup>a</sup>	-	1,070	689	1	i	17	19	100	25	11	0 - 37	30		138 - 182				
20-49	-	2,378	1,509	12		70	12	224	44	35	3	64		406				
Medium companies																		
50-99	-	2,529	1,349	14		98	21	334	59	50	6	160		438				
100-249	-	3,274	1,894	78		122	i	20	357	67	70	34		500				
Large companies																		
250-499	-	3,527	1,876	74		210	28	551	69	78	14	125		503				
500-999	-	2,420	1,489	11		96	24	286	36	77	8	79		314				
1,000-4,999	-	11,196	6,469	257		491	86	1,117	205	553	55	630	i	1,333				
5,000-9,999	-	6,083	3,497	84		222	45	500	91	i	299	50	i	665	i	630		
10,000-24,999	-	13,878	i	7,957	208	428	124	i	752	149	i	385	i	141	2,158	i	1,576	i
25,000 or more	-	17,635	9,620	21		337	73	3,907	i	87	247	0 - 37	i	437	2,865 - 2,910			

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 39

## Domestic R&amp;D paid for by others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)												
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-599	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more		
All industries	21-23, 31-33, 42-81	63,989	1,070	2,378	2,529	3,274	3,527	2,420	11,196	6,083	13,878	i	17,635	
Manufacturing industries	31-33	37,564	294	i	850	912	1,216	1,644	1,645	8,759	2,490	6,203	13,551	i
Food	311	243	0-25	i	1	7	80	6	24	86	3-42	0-9	0	
Beverage and tobacco products	312	111	i	0	0	0	0	97-103	i	0	9	0	0-4	i
Textile, apparel, and leather products	313-16	31	0-23	0	0-10	0-18	4	0	0	0	0	0	0	
Wood products	321	6	0	0	0	0	0	6	0	0	0	0	0	
Paper	322	*	0	0	0	*	0	0	0	0	0	0	0	
Printing and related support activities	323	0	0	0	0	0	0	0	0	0	0	0	0	
Petroleum and coal products	324	103	0	0	0	0-18	0	64-104	0	0-39	i	0-9	0-4	
Chemicals	325	9,775	42	i	179	391	388	333	272	3,795	596	3,578	200	
Basic chemicals	3251	162	0-3	7	0-13	0-19	0	0	113	2-37	0	0-5		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80	0-3	*	i	0-13	i	1	10	0	38-70	0	0-14	0
Pesticide, fertilizer, and other agricultural chemicals	3253	320-345	0	0	0-13	0	*	0	275-345	0-35	0	0	0	
Pharmaceuticals and medicines	3254	8,966	40	i	168	379	369	317	272	3,256	560	3,408	196	
Soap, cleaning compound, and toilet preparation	3256	164	0	4	1	1	i	0	0	*	i	0	158	0
Paint, coating, adhesive, and other chemicals	3255, 3259	56-84	0-3	*	0-13	0-19	5	0	9-79	0	0-14	0-5		
Plastics and rubber products	326	85	3	3	25	19	7	7	17	0	4	i	0	
Nonmetallic mineral products	327	35	0	0	1	0-18	0-15	0	17	0-18	0	0	0	
Primary metals	331	16	0-4	0-5	0	7	*	*	i	6	*	0-5	i	0
Fabricated metal products	332	254	27	i	76	3	24	2	3	119	0	0	0	
Machinery	333	1,254	24	103	179	108	20	69	583	164	0	0	3	
Agricultural implement	33311	9	0	*	0	6	*	1	1	0	0	*		
Semiconductor machinery	333242	604	1	47	0-48	1	0	0	506-557	0	0	0	0	
Engine, turbine, and power transmission equipment	3336	205	12	9	i	2	1	9	11	2	160	0	0	
Other machinery	other 333	436	11	47	128-178	101	11	57	22-76	5	0	2		
Computer and electronic products	334	11,159	28	420	200	394	868	644	1,790	869	i	1,210	i	4,736

TABLE 39

## Domestic R&amp;D paid for by others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)																
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-599	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more						
Communications equipment	3342	1,100	i	0-18	*	37	24	5-150	7	14	i	493-599	i	280-394	i	0		
Semiconductor and other electronic components	3344	3,208		0-18	351	50	264	677	460	1,295		88-113		1		0		
Navigational, measuring, electromedical, and control instruments	3345	6,650		11	65	111	102	41-147	80-179	398		182-262		817	i	4,736		
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225		6	18	38	47	0	81	31		0		4		0		
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262		0	40	0-74	42	42	0	332		181-261		813	i	4,736		
Other measuring and controlling device	other 3345	163		5	7	0-74	13	0-105	0-98	35		1		0		0		
Other computer and electronic products	other 334	201		0-18	3	3	i	4	0-110	0-98	i	83		0	0-110	0		
Electrical equipment, appliances, and components	335	377		22	i	11	11	7	7	16		48		0	254	0		
Transportation equipment	336	13,870	i	109	i	10	85	152	i	238	493	2,250	i	804	i	1,146	8,584	i
Motor vehicles, bodies, trailers, and parts	3361-63	3,233	i	5	0	0-28	0-120	i	233	295	1,424	i	565	i	0-482	87-714		
Aerospace products and parts	3364	9,458	i	99	i	10	56-85	33	i	1	171-199	i	816	236	665	7,340	i	
Aircraft, aircraft engine, and aircraft parts	336411-13	8,550	i	1	2	33-62	32	i	*	171-199	i	65	208	665	7,340	i		
Guided missile, space vehicle, and related parts	336414-15, 336419	908		98	i	8	23	1	*	0	750	27	0	0	0	0		
Military armored vehicle, tank, and tank component	336992	10		5	0	1	0	4	0	0	0	0	0	0	0	0		
Other transportation	other 336	1,168		0	0	1	0-120	0	0-28	10	3	0-482	529-1,156					
Furniture and related products	337	2		0	0-3	*	0-3	0-3	*	0	0	0	0	0	0	0		
Miscellaneous	339	244		18	45-50	1-14	23-41	34-67	3-41	48	0	6	27					
Medical equipment and supplies	3391	202		18	46	2	24	35	4	41	0	6	27					
Other miscellaneous manufacturing	3399	42		*	i	0-5	0-13	0-18	i	0-33	0-36	7	0	0	0			
Nonmanufacturing industries	21-23, 42-81	26,425		775	1,528	1,617	2,058	1,883	775	2,437	3,592	7,675	i	4,084				
Mining, quarrying, oil and gas extraction, and support activities	21	183		5	0	99	0	0	2	0	0	76	i	0				
Utilities	22	38		0	1-6	0-2	0	0	0	1	0	0	0	33				

TABLE 39

## Domestic R&amp;D paid for by others and performed by the company, by industry and company size: 2019

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)														
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-599	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more				
Wholesale trade	42	87	0-10	12	17	i	35	11-25	i	0	0	0	0			
Electronic shopping and electronic auctions	454111-12	43-61	0	0	0	*	i	43-61	0	0	0	0	0			
Transportation and warehousing	48-49	386	0	0	0	0	0	0	4	382	0	0	0			
Information	51	1,165	37	184	53	123	44	137	218	81	104	183				
Publishing	511	572	0-32	46	39	0-124	14	0-102	127	0-82	0	182				
Newspaper, periodical, book, and directory publishers	5111	*	0	0	*	0	0	0	0	0	0	0				
Software publishers	5112	572	0-32	46	39	0-124	14	0-102	127	0-82	0	182				
Telecommunications	517	33	6	27	0	0	0	0	1	i	0	0				
Data processing, hosting, and related services	518	404	0-20	111	14	0-20	30	36	91	0	104	2				
Other information	other 51	155	0-32	0	0	0-124	0	0-102	0	0-82	0	0				
Finance and insurance	52	28	0	0	0	28	0	0	0	0	0	0				
Real estate and rental and leasing	53	0	0	0	0	0	0	0	0	0	0	0				
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0	0				
Other real estate and rental and leasing	other 53	0	0	0	0	0	0	0	0	0	0	0				
Professional, scientific, and technical services	54	24,103	724	1,324	1,408	1,847	1,759	627	1,552	3,499	i	7,495	i	3,867		
Architectural, engineering, and related services	5413	1,919	83	199	141	345	320	29	60	133	32	577				
Computer systems design and related services	5415	2,651	43	276	209	142	53	55	0	0	1,480	393				
Scientific research and development services	5417	18,403	562	721	854	1,163	1,121	489	1,490	3,366	i	5,983	i	2,655		
Research and development in biotechnology	541711	5,374	166	183	214	228	61	2	0	0	1,866	2,655				
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291	i	392	530	594	902	1,061	487	1,213	i	2,996	i	4,117	i	0
Research and development in the social sciences and humanities	541720	738	4	8	46	34	0	0	277	370	0	0				
Other professional, scientific, and technical services	other 54	1,129	36	128	205	198	264	54	2	0	0	243				
Health care services	621-23	337	0	1	34	16	9	4	273	*	0	1				
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	34-58	0-10	0-9	2-9	9	1	*	11	12	0	0				

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 40

**Domestic R&D paid for by others and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
All industries	21-23, 31-33, 42-81	63,989	6,324	14,333	43,332
Manufacturing industries	31-33	37,564	3,969 i	7,083	26,513
Food	311	243	17	70	155
Beverage and tobacco products	312	111 i	11 i	23 i	77 i
Textile, apparel, and leather products	313-16	31	0	22	9
Wood products	321	6	0	0	6
Paper	322	*	0 - 1	0 - 1	0
Printing and related support activities	323	0	0	0	0
Petroleum and coal products	324	103	0 - 29 i	0 - 29 i	54 - 99 i
Chemicals	325	9,775	1,878	1,572	6,324
Basic chemicals	3251	162	25	53	83
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80	3 i	21 i	55 i
Pesticide, fertilizer, and other agricultural chemicals	3253	320 - 345	70	205 - 276	0 - 46
Pharmaceuticals and medicines	3254	8,966	1,766	1,186	6,014
Soap, cleaning compound, and toilet preparation	3256	164	12	27	125
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 84	2	8 - 79	3 - 50
Plastics and rubber products	326	85	1	15	69
Nonmetallic mineral products	327	35	2	8	26
Primary metals	331	16	5	2	9
Fabricated metal products	332	254	14	109	131
Machinery	333	1,254	32	172	1,050
Agricultural implement	33311	9	1	3	5
Semiconductor machinery	333242	604	0 - 26	8 - 111	493 - 571
Engine, turbine, and power transmission equipment	3336	205	7	13 i	185
Other machinery	other 333	436	0 - 26	43 - 148	288 - 368
Computer and electronic products	334	11,159	457	1,858	8,844
Communications equipment	3342	1,100 i	7	172 i	921 i
Semiconductor and other electronic components	3344	3,208	294	757	2,157
Navigational, measuring, electromedical, and control instruments	3345	6,650	136	894	5,621
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225	6	27	192
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262	113	839	5,310
Other measuring and controlling device	other 3345	163	17	27	119
Other computer and electronic products	other 334	201	21	35	144 i
Electrical equipment, appliances, and components	335	377	17	23	337
Transportation equipment	336	13,870 i	1,505 i	3,153 i	9,211 i
Motor vehicles, bodies, trailers, and parts	3361-63	3,233 i	9 - 72	1,684 - 1,749 i	1,476
Aerospace products and parts	3364	9,458 i	1,434 i	1,342 i	6,683 i
Aircraft, aircraft engine, and aircraft parts	336411-13	8,550 i	1,431 i	1,339 i	5,780 i
Guided missile, space vehicle, and related parts	336414-15, 336419	908	3	3	903
Military armored vehicle, tank, and tank component	336992	10	0	0 - 11	0 - 11
Other transportation	other 336	1,168	0 - 63	51 - 128	1,041 - 1,054
Furniture and related products	337	2	1	1	*
Miscellaneous	339	244	6 - 35	32 - 62	172 - 204
Medical equipment and supplies	3391	202	7	33	162

TABLE 40

**Domestic R&D paid for by others and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Other miscellaneous manufacturing	3399	42	0 - 29	0 - 29	10 - 41
Nonmanufacturing industries	21-23, 42-81	26,425	2,355	7,250	16,819
Mining, quarrying, oil and gas extraction, and support activities	21	183	15	42	125
Utilities	22	38	5	6	27
Wholesale trade	42	87	14	6	68
Electronic shopping and electronic auctions	454111-12	43 - 61	* i	* i	42 - 61
Transportation and warehousing	48-49	386	0	0	386
Information	51	1,165	201	226	738
Publishing	511	572	46	102	424
Newspaper, periodical, book, and directory publishers	5111	*	*	0	0
Software publishers	5112	572	46	102	424
Telecommunications	517	33	0 - 30	0 - 30	3 - 27
Data processing, hosting, and related services	518	404	84	34	286
Other information	other 51	155	40 - 72	58 - 91	2 - 27
Finance and insurance	52	28	0	27	1
Real estate and rental and leasing	53	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0
Professional, scientific, and technical services	54	24,103	2,112	6,620	15,372
Architectural, engineering, and related services	5413	1,919	117	854	949
Computer systems design and related services	5415	2,651	449	914	1,288
Scientific research and development services	5417	18,403	1,515	4,720	12,168
Research and development in biotechnology	541711	5,374	717	212	4,445
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291	i 378	4,288	7,626
Research and development in the social sciences and humanities	541720	738	421	221	i 97
Other professional, scientific, and technical services	other 54	1,129	31	132	966
Health care services	621-23	337	5	316	16
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	34 - 58	3	7	23 - 48
All companies (number of domestic employees)	-	63,989	6,324	14,333	43,332
Small companies					
10-19 <sup>a</sup>	-	1,070	63	342	664
20-49	-	2,378	109	525	1,744
Medium companies					
50-99	-	2,529	185	638	1,707
100-249	-	3,274	408	781	2,085
Large companies					
250-499	-	3,527	267	786	i 2,474
500-999	-	2,420	168	311	1,941
1,000-4,999	-	11,196	1,764	3,296	6,137
5,000-9,999	-	6,083	436	1,929	3,718
10,000-24,999	-	13,878	i 580	i 2,817	i 10,481
25,000 or more	-	17,635	i 2,344	2,908	12,382

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.



TABLE 41

## Domestic R&amp;D paid for by others and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies outside the United States				U.S. federal government agencies	U.S. state government agencies	Foreign government agencies	U.S. universities, colleges, and academic researchers	Foreign universities, colleges, and academic researchers	All other	
			Companies in the United States		In the United States	Outside the United States							
			Company's parent	Unaffiliated companies									
All industries	21-23, 31-33, 42-81	63,989	21,461	17,563	1,991	21,941	100 - 192	123	47	3 - 16	627 - 719	32 - 44	
Manufacturing industries	31-33	37,564	5,470	14,290	1,459	16,023	14 - 107	119	8	0 - 11	72 - 164	11 - 23	
Food	311	243	5	234	2	*	0	0	*	0	1	0	
Beverage and tobacco products	312	111	*	111	0	0	0	0	0	0	0	0	
Textile, apparel, and leather products	313-16	31	6	*	5	7	0	0	*	0	12	0	
Wood products	321	6	0	6	0	0	0	0	0	0	0	0	
Paper	322	*	*	0	*	*	0	0	0	0	*	*	
Printing and related support activities	323	0	0	0	0	0	0	0	0	0	0	0	
Petroleum and coal products	324	103	0 - 21	72 - 104	0 - 9	*	0	0	0	0	0	0	
Chemicals	325	9,775	1,967	6,643	816	289	1	*	6	0 - 10	45	0 - 10	
Basic chemicals	3251	162	19	141	*	2	0	0	0	0	0	0	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80	0 - 7	61 - 77	1	*	*	0	0 - 1	0	0 - 10	*	
Pesticide, fertilizer, and other agricultural chemicals	3253	320 - 345	0 - 7	287 - 345	0 - 15	0 - 8	0	0	0	0	0 - 10	0 - 10	
Pharmaceuticals and medicines	3254	8,966	1,938	5,906	801	269	0 - 2	*	6	0 - 9	35 - 43	0 - 9	
Soap, cleaning compound, and toilet preparation	3256	164	5	158	1	*	0	0	0	0	*	*	
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 84	0 - 7	14 - 72	0 - 15	11 - 20	0 - 2	0	0 - 1	0 - 10	0 - 10	0 - 10	
Plastics and rubber products	326	85	75	10	*	*	0	0	0	0	0	1	
Nonmetallic mineral products	327	35	2	31	*	2	0	*	*	0	*	*	
Primary metals	331	16	0 - 10	0 - 10	5	2	0	*	*	0	0	0	
Fabricated metal products	332	254	190	60	*	4	0	0	*	0	*	*	
Machinery	333	1,254	371	632	57	193	1	*	0	0	*	*	
Agricultural implement	33311	9	1	6	*	1	*	0	0	0	0	0	
Semiconductor machinery	333242	604	48	497 - 557	0 - 58	*	0	0	0	0	0	*	

TABLE 41

## Domestic R&amp;D paid for by others and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States	Companies outside the United States		U.S. federal government agencies	U.S. state government agencies	Foreign government agencies	U.S. universities, colleges, and academic researchers	Foreign universities, colleges, and academic researchers	All other										
				Company's parent	Unaffiliated companies						In the United States	Outside the United States									
Engine, turbine, and power transmission equipment	3336	205	40	11	0	155	*	i	0	0	0	*	0								
Other machinery	other 333	436	282	57 - 117	0 - 58	37	1	i	*	0	0	*	i	0							
Computer and electronic products	334	11,159	1,679	3,283	321	5,802	0 - 23		36	1	0 - 2	i	14 - 37	2 - 6							
Communications equipment	3342	1,100	i	298 - 471	i	124 - 297	0 - 53		320 - 453	i	*	i	*	i	3	i	*	i			
Semiconductor and other electronic components	3344	3,208		213		2,379	142		468		*		0	1	0 - 2	i	5	0 - 2	i		
Navigational, measuring, electromedical, and control instruments	3345	6,650		997		609	128	i	4,852		0 - 22		36	*			0	6 - 28	3		
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225		15	i	192	*	i	11	i	*	i	0	0			0	7	i	0	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262		944		332	119	i	4,813		0 - 21		33	*			0	0 - 21	3		
Other measuring and controlling device	other 3345	163		38		85	9		28		0		3	*	i		0	0	0		
Other computer and electronic products	other 334	201		0 - 170		0 - 170	0 - 53		31 - 161		*		*	i			0	1	0		
Electrical equipment, appliances, and components	335	377		30	i	315	2		27		1		0	1			0	*	0		
Transportation equipment	336	13,870	i	1,031		2,778	242		9,652	i	0 - 79		82	i	*		0	0 - 79	9	i	
Motor vehicles, bodies, trailers, and parts	3361-63	3,233	i	0 - 374	i	2,564	190		38 - 481		0 - 79		*	i	0		0	0 - 79	*	i	
Aerospace products and parts	3364	9,458	i	658		124 - 205	i	52	8,454	i	1		82	i	*		0	0 - 79	9	i	
Aircraft, aircraft engine, and aircraft parts	336411-13	8,550	i	646		124 - 205	i	52	7,558	i	1		82	i	*		0	0 - 79	9	i	
Guided missile, space vehicle, and related parts	336414-15, 336419	908		12		0	0		896		0		0	*			0	0	0		
Military armored vehicle, tank, and tank component	336992	10		0 - 11		0	0		0 - 11		0 - 11		0	0			0	0	0		
Other transportation	other 336	1,168		0 - 374		8 - 91	0		706 - 1,160		0		0	0			0	0	0		
Furniture and related products	337	2		0 - 2	i	0	*	i	0 - 3	i	*	i	*	i	0		0	*	i	*	i

TABLE 41

## Domestic R&amp;D paid for by others and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies outside the United States			U.S. federal government agencies	U.S. state government agencies	Foreign government agencies	U.S. universities, colleges, and academic researchers	Foreign universities, colleges, and academic researchers	All other	
			Companies in the United States	Company's parent	Unaffiliated companies						In the United States	Outside the United States
Miscellaneous	339	244	98 - 120	72 - 104	4 - 14	36 - 48	*	0	0	0	2	* i
Medical equipment and supplies	3391	202	99	73	5	25	*	0	0	0	* i	* i
Other miscellaneous manufacturing	3399	42	0 - 21	0 - 30	0 - 9	11 - 24	0	0	0	0	2	0
Nonmanufacturing industries	21-23, 42-81	26,425	15,991 i	3,273	532	5,918	85	5	39	4	556	21
Mining, quarrying, oil and gas extraction, and support activities	21	183	72	92	17	1	0	0	0	0	0	* i
Utilities	22	38	0	0 - 8	0	27 - 34	3	0	0	0	0	0
Wholesale trade	42	87	12 i	76 i	* i	0	0	0	0	0	0	0
Electronic shopping and electronic auctions	454111-12	43 - 61	0	35 - 61	0	0 - 8 i	0	0	0	0	0	0
Transportation and warehousing	48-49	386	384	0	0	2	0	0	0	0	0	0
Information	51	1,165	81	674	186	185	* i	* i	*	0	38	*
Publishing	511	572	4	345	131	57	* i	* i	0	0	35	* i
Newspaper, periodical, book, and directory publishers	5111	*	0	0	* i	* i	0	0	0	0	* i	0
Software publishers	5112	572	4	345	131	57	* i	* i	0	0	35	* i
Telecommunications	517	33	2 i	12 - 28	0 - 14 i	4 i	0	0	0	0	1 i	0
Data processing, hosting, and related services	518	404	66	178	43	116	*	0	*	0	0	*
Other information	other 51	155	9	122 - 138	0 - 14 i	8 i	0	0	0	0	2 i	0
Finance and insurance	52	28	28	0	0	0	0	0	0	0	0	0
Real estate and rental and leasing	53	0	0	0	0	0	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0	0	0	0	0	0	0	0
Professional, scientific, and technical services	54	24,103	15,076 i	2,362	312	5,685	81	5	39	4	518	21
Architectural, engineering, and related services	5413	1,919	509	44	14	1,214	49	3	12	3	63	8
Computer systems design and related services	5415	2,651	489	1,491	12	454	5	* i	*	* i	201	0
Scientific research and development services	5417	18,403	13,741 i	760 i	242	3,343	24	2	25	1 i	252	13 i
Research and development in biotechnology	541711	5,374	4,851	231 i	38	108	9	1	2 i	0	129 i	6 i

TABLE 41

## Domestic R&amp;D paid for by others and performed by the company, by source of funds, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States		Companies outside the United States		U.S. federal government agencies	U.S. state government agencies	Foreign government agencies	U.S. universities, colleges, and academic researchers	Foreign universities, colleges, and academic researchers	All other	
			Company's parent	Unaffiliated companies	In the United States	Outside the United States							
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291	8,861	530	204	2,571	6	1	21	1	90	7	
Research and development in the social sciences and humanities	541720	738	30	0	0	664	9	0	2	0	33	0	
Other professional, scientific, and technical services	other 54	1,129	337	67	44	674	4	0	1	*	2	*	
Health care services	621-23	337	331	0	4	2	0	0	0	0	*	0	
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	34 - 58	8	0 - 29	12	9 - 19	1	*	0	0	*	0	
All companies (number of domestic employees)	-	63,989	21,461	17,563	1,991	21,941	100 - 192	123	47	3 - 16	627 - 719	32 - 44	
Small companies													
10-19 <sup>a</sup>	-	1,070	315	99	42	502	16	1	7	3	80	6	
20-49	-	2,378	766	595	65	811	6	4	20	0 - 6	107	0 - 6	
Medium companies													
50-99	-	2,529	796	573	211	697	10	*	7	0 - 5	232	0 - 5	
100-249	-	3,274	1,029	1,060	87	988	0 - 92	*	10	0 - 11	0 - 93	0 - 11	
Large companies													
250-499	-	3,527	623	1,216	189	1,393	10	*	1	0	87	8	
500-999	-	2,420	566	1,439	153	248	7	*	1	0	6	1	
1,000-4,999	-	11,196	1,924	6,993	507	1,710	28	3	*	*	31	*	
5,000-9,999	-	6,083	3,908	795	346	977	0 - 56	*	2	0	0 - 56	2	
10,000-24,999	-	13,878	7,183	4,623	295	1,717	18	36	0	0	5	0	
25,000 or more	-	17,635	4,352	171	97	12,897	9	79	0	0 - 13	20	0 - 13	

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 42

**Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
All industries	21-23, 31-33, 42-81	63,989		0.6	0.6
Manufacturing industries	31-33	37,564		0.7	0.7
Food	311	243		*	*
Beverage and tobacco products	312	111	i	0.1	0.1
Textile, apparel, and leather products	313-16	31		*	*
Wood products	321	6		*	*
Paper	322	*		*	*
Printing and related support activities	323	0		0.0	0.0
Petroleum and coal products	324	103		*	*
Chemicals	325	9,775		0.8	0.8
Basic chemicals	3251	162		0.1	0.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80		0.1	0.1
Pesticide, fertilizer, and other agricultural chemicals	3253	320 - 345		D	D
Pharmaceuticals and medicines	3254	8,966		1.7	1.7
Soap, cleaning compound, and toilet preparation	3256	164		0.1	0.1
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 84		D	D
Plastics and rubber products	326	85		*	*
Nonmetallic mineral products	327	35		0.1	0.1
Primary metals	331	16		*	*
Fabricated metal products	332	254		0.2	0.2
Machinery	333	1,254		0.3	0.3
Agricultural implement	33311	9		*	*
Semiconductor machinery	333242	604		2.4	2.4
Engine, turbine, and power transmission equipment	3336	205		0.6	0.6
Other machinery	other 333	436		0.2	0.2
Computer and electronic products	334	11,159		1.6	1.6
Communications equipment	3342	1,100	i	1.2	1.3
Semiconductor and other electronic components	3344	3,208		1.6	1.6
Navigational, measuring, electromedical, and control instruments	3345	6,650		3.6	3.6
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225		0.8	0.8
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262		8.2	8.2
Other measuring and controlling device	other 3345	163		0.2	0.2
Other computer and electronic products	other 334	201		0.1	0.1
Electrical equipment, appliances, and components	335	377		0.3	0.3
Transportation equipment	336	13,870	i	1.2	1.3
Motor vehicles, bodies, trailers, and parts	3361-63	3,233	i	0.4	0.4
Aerospace products and parts	3364	9,458	i	3.4	3.4
Aircraft, aircraft engine, and aircraft parts	336411-13	8,550	i	3.1	3.1
Guided missile, space vehicle, and related parts	336414-15, 336419	908		10.7	10.7
Military armored vehicle, tank, and tank component	336992	10		1.1	1.1
Other transportation	other 336	1,168		1.5	1.5
Furniture and related products	337	2		*	*
Miscellaneous	339	244		0.1	0.1

TABLE 42

**Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Medical equipment and supplies	3391	202	0.1	0.1
Other miscellaneous manufacturing	3399	42	*	*
Nonmanufacturing industries	21-23, 42-81	26,425	0.5	0.5
Mining, quarrying, oil and gas extraction, and support activities	21	183	0.1	0.1
Utilities	22	38	*	*
Wholesale trade	42	87	0.1	0.1
Electronic shopping and electronic auctions	454111-12	43 - 61	D	D
Transportation and warehousing	48-49	386	0.1	0.1
Information	51	1,165	0.1	0.1
Publishing	511	572	0.3	0.3
Newspaper, periodical, book, and directory publishers	5111	*	*	*
Software publishers	5112	572	0.3	0.3
Telecommunications	517	33	*	*
Data processing, hosting, and related services	518	404	0.1	0.1
Other information	other 51	155	0.1	0.1
Finance and insurance	52	28	*	*
Real estate and rental and leasing	53	0	0.0	0.0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0.0	0.0
Other real estate and rental and leasing	other 53	0	0.0	0.0
Professional, scientific, and technical services	54	24,103	5.0	5.0
Architectural, engineering, and related services	5413	1,919	1.9	1.9
Computer systems design and related services	5415	2,651	1.3	1.4
Scientific research and development services	5417	18,403	22.7	22.8
Research and development in biotechnology	541711	5,374	17.2	17.2
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291	i 25.3	25.4
Research and development in the social sciences and humanities	541720	738	61.6	62.9
Other professional, scientific, and technical services	other 54	1,129	1.1	1.1
Health care services	621-23	337	0.3	0.3
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	34 - 58	D	D
All companies (number of domestic employees)	-	63,989	0.6	0.6
Small companies				
10-19 <sup>c</sup>	-	1,070	4.8	4.9
20-49	-	2,378	2.2	2.2
Medium companies				
50-99	-	2,529	2.1	2.1
100-249	-	3,274	1.2	1.2
Large companies				
250-499	-	3,527	1.2	1.2
500-999	-	2,420	0.7	0.7
1,000-4,999	-	11,196	0.8	0.8
5,000-9,999	-	6,083	0.5	0.6
10,000-24,999	-	13,878	i 0.7	0.7

TABLE 42

**Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
25,000 or more	-	17,635	0.3	0.4

\* = amount < \$500,000 or less than 0.05%; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

<sup>b</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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, unless indicated otherwise. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.



TABLE 43

**Domestic R&D paid for by others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
All industries	21-23, 31-33, 42-81	72,331		0.6	0.7
Manufacturing industries	31-33	44,239		0.8	0.8
Food	311	246		*	*
Beverage and tobacco products	312	114	i	0.1	0.1
Textile, apparel, and leather products	313-16	31		*	*
Wood products	321	6		*	*
Paper	322	*		*	*
Printing and related support activities	323	0		0.0	0.0
Petroleum and coal products	324	102 - 106		D	D
Chemicals	325	14,675		1.3	1.3
Basic chemicals	3251	163		0.1	0.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	79 - 128		D	D
Pesticide, fertilizer, and other agricultural chemicals	3253	341 - 345		D	D
Pharmaceuticals and medicines	3254	13,789		2.6	2.6
Soap, cleaning compound, and toilet preparation	3256	195		0.2	0.2
Paint, coating, adhesive, and other chemicals	3255, 3259	56 - 109		D	D
Plastics and rubber products	326	114		0.1	0.1
Nonmetallic mineral products	327	35		0.1	0.1
Primary metals	331	19		*	*
Fabricated metal products	332	274		0.2	0.2
Machinery	333	1,312		0.4	0.4
Agricultural implement	33311	9		*	*
Semiconductor machinery	333242	643		2.6	2.6
Engine, turbine, and power transmission equipment	3336	219		0.6	0.6
Other machinery	other 333	441		0.2	0.2
Computer and electronic products	334	11,749		1.7	1.7
Communications equipment	3342	1,133 - 1,136	i	D	D
Semiconductor and other electronic components	3344	3,263		1.6	1.6
Navigational, measuring, electromedical, and control instruments	3345	7,141		3.9	3.9
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	234		0.8	0.8
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,701		8.8	8.8
Other measuring and controlling device	other 3345	205		0.3	0.3
Other computer and electronic products	other 334	210 - 213		D	D
Electrical equipment, appliances, and components	335	378		0.3	0.3
Transportation equipment	336	14,897	i	1.3	1.4
Motor vehicles, bodies, trailers, and parts	3361-63	3,398	i	0.4	0.5
Aerospace products and parts	3364	10,317	i	3.7	3.7
Aircraft, aircraft engine, and aircraft parts	336411-13	9,409	i	3.5	3.5
Guided missile, space vehicle, and related parts	336414-15, 336419	908		10.7	10.7
Military armored vehicle, tank, and tank component	336992	10		1.1	1.1
Other transportation	other 336	1,171		1.5	1.5
Furniture and related products	337	2		*	*
Miscellaneous	339	277 - 284		D	D

TABLE 43

**Domestic R&D paid for by others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Medical equipment and supplies	3391	235	0.1	0.1
Other miscellaneous manufacturing	3399	42 - 48	D	D
Nonmanufacturing industries	21-23, 42-81	28,092	0.5	0.6
Mining, quarrying, oil and gas extraction, and support activities	21	183	0.1	0.1
Utilities	22	49	*	*
Wholesale trade	42	90	0.1	0.1
Electronic shopping and electronic auctions	454111-12	43 - 61	D	D
Transportation and warehousing	48-49	386	0.1	0.1
Information	51	1,236	0.1	0.1
Publishing	511	616	0.3	0.3
Newspaper, periodical, book, and directory publishers	5111	*	*	*
Software publishers	5112	616	0.3	0.3
Telecommunications	517	34	*	*
Data processing, hosting, and related services	518	424	0.1	0.1
Other information	other 51	161	0.1	0.1
Finance and insurance	52	28	*	*
Real estate and rental and leasing	53	0	0.0	0.0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0.0	0.0
Other real estate and rental and leasing	other 53	0	0.0	0.0
Professional, scientific, and technical services	54	25,681	5.3	5.3
Architectural, engineering, and related services	5413	2,289	2.2	2.3
Computer systems design and related services	5415	2,697	1.4	1.4
Scientific research and development services	5417	19,484	24.0	24.1
Research and development in biotechnology	541711	5,491	17.6	17.6
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	13,132	i 27.0	27.1
Research and development in the social sciences and humanities	541720	860	71.8	73.3
Other professional, scientific, and technical services	other 54	1,211	1.1	1.2
Health care services	621-23	341	0.3	0.3
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	34 - 58	D	D
All companies (number of domestic employees)	-	72,331	0.6	0.7
Small companies				
10-19 <sup>c</sup>	-	1,212	5.4	5.5
20-49	-	2,731	2.5	2.5
Medium companies				
50-99	-	2,901	2.4	2.4
100-249	-	3,621	1.4	1.4
Large companies				
250-499	-	3,929	1.3	1.3
500-999	-	2,613	0.7	0.7
1,000-4,999	-	13,418	0.9	0.9
5,000-9,999	-	6,642	0.6	0.6
10,000-24,999	-	16,025	0.8	0.8

TABLE 43

**Domestic R&D paid for by others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2019**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
25,000 or more	-	19,239	0.4	0.4

\* = amount < \$500,000 or less than 0.05%; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.

<sup>b</sup> Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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, unless indicated otherwise. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 44

**Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2019**

(Millions of U.S. dollars)

Funders' business activity <sup>a</sup>	Business code <sup>b</sup>	Amount
All business activities	21100–81000	41,016
Oil and gas extraction	21100	46
Mining	21200	46
Support activities for mining, including oil and gas	21300	78
Utilities	22100	1
Construction	23000	12
Food manufacturing	31100	216
Beverage manufacturing	31210	107
Tobacco manufacturing	31220	9
Textile, apparel, and leather products manufacturing	31990	* i
Wood products manufacturing	32100	6
Paper manufacturing	32200	91
Printing and related support activities	32300	0
Petroleum refineries	32401	18
Asphalt paving, roofing, and saturated materials manufacturing	32402	0
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	*
Basic chemicals manufacturing	32510	94
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	74
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	0 - 1,155
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	14,149
In vitro diagnostic substances manufacturing	32542	5
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	7,109
Soap, cleaning compound, and toilet preparations manufacturing	32591	187
Paint, adhesive, and other chemical manufacturing	32592	19
Plastics and rubber products manufacturing	32600	31 i
Clay and glass products manufacturing	32710	1
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	9
Primary metal manufacturing	33100	5
Fabricated metal products manufacturing	33200	181
Agricultural machinery and equipment manufacturing	33311	8
Construction machinery manufacturing	33312	6
Mining, oil, and gas field machinery and equipment manufacturing	33319	71 i
Semiconductor machinery manufacturing	33321	0 - 1,155
Industrial machinery manufacturing (except semiconductor machinery)	33322	75
Photographic and photocopying equipment manufacturing	33331	0
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	7
Digital cameras manufacturing	33333	0
Engine, turbine, and power transmission equipment manufacturing	33360	185
Metalworking and other general purpose machinery manufacturing	33390	43
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	51
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	0 - 1,155
Radio, television, and wireless communication equipment manufacturing	33422	604 i
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	83
Audio and video equipment manufacturing	33430	4
Semiconductor and other electronic components manufacturing	33440	2,881
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	49
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	972

TABLE 44

**Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2019**

(Millions of U.S. dollars)

Funders' business activity <sup>a</sup>	Business code <sup>b</sup>	Amount
Measuring and control instruments manufacturing (not listed elsewhere)	33459	90
Electrical equipment, appliances, and components manufacturing	33500	759
Motor vehicles manufacturing	33610	2,455 i
Motor vehicle body and trailer manufacturing	33620	0
Motor vehicle parts manufacturing	33630	962 i
Aircraft manufacturing	33641	618
Aircraft engine and engine parts manufacturing	33642	321
Other aircraft parts and auxiliary equipment manufacturing	33643	78
Guided missiles, space vehicles, and related parts manufacturing	33644	355
Railroad rolling stock manufacturing	33651	0 - 1,155
Ship and boat building	33660	38
Motorcycle, bicycle, and parts manufacturing	33691	14
Military armored vehicle, tank, and tank components manufacturing	33692	0 - 1,155
All other transportation equipment manufacturing	33699	6
Furniture and related products manufacturing	33700	1
Medical equipment and supplies manufacturing	33910	552
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	63
Merchant wholesalers, durable goods	42300	44 i
Merchant wholesalers, nondurable goods	42400	8 i
Wholesale electronic markets and agents and brokers (business to business)	42500	0
Retail trade (except electronic shopping and electronic auctions)	44000	41
Electronic shopping and electronic auctions	45411	0 - 1,155
Transportation	48000	386
Couriers, messengers, and express delivery services	49200	0
Warehousing and storage	49300	*
Newspaper, periodical, book, and directory publishers (except Internet)	51110	0
Software publishers (except Internet)	51120	305
Motion picture and sound recording (except Internet)	51200	0
Broadcasting (except Internet)	51500	0
Wired telecommunications carriers	51710	6
Wireless telecommunications carriers (except satellite)	51720	6
Satellite telecommunications	51740	2
Other telecommunications (not listed elsewhere)	51790	17
Data processing, hosting, and related services	51800	26
Cloud computing applications and Internet-based software services	51801	150
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	0 - 1,155
Finance: banking and credit intermediation	52200	*
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	35
Insurance carriers and related activities	52400	0
Real estate	53100	0
Rental and leasing services	53200	2
Lessors of nonfinancial intangible assets, including patent licensing	53300	0
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	0
Architectural, engineering, and related services	54130	269
Specialized design services	54140	7
Computer systems design and related services	54150	1,608
Management, scientific, and technical consulting services	54160	1

TABLE 44

**Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2019**

(Millions of U.S. dollars)

Funders' business activity <sup>a</sup>	Business code <sup>b</sup>	Amount	
Research and development services in social sciences and humanities	54172	2	
Research and development services in biotechnology	54173	104	i
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	2,088	i
Advertising and related services	54180	0	
Professional, scientific, and technical services (not listed elsewhere)	54190	269	
Management of companies and enterprises	55100	11	
Administrative and support services	56100	0	
Waste management and remediation services	56200	2	
Offices of physicians	62110	5	
Medical and diagnostic laboratories	62150	0	
Other ambulatory health care services (ambulance, dental, home health care)	62199	0	
Hospitals and nursing care facilities	62200	1	
Social assistance services	62400	0	
Arts, entertainment, and recreation	71000	*	
Accommodation and food services	72000	5	
Other services (not listed elsewhere)	81000	53	
Undistributed	-	603	i

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

<sup>a</sup> Data are tabulated independent of the industry classification and business activities of the company that performs R&D.

<sup>b</sup> Business codes and descriptions are based on 2012 North American Industry Classification System industry definitions.

**Note(s):**

Detail may not add to total because of rounding. For an R&D performer that did not report the R&D funders' business activities, no systematic imputation of these business activities was conducted. The business activities of the R&D funders may not be assumed to be the same as those of the R&D performer. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 45

**Domestic R&D paid for by the U.S. federal government and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
All industries	21-23, 31-33, 42-81	21,941	2,313 i	4,883	14,745
Manufacturing industries	31-33	16,023 i	1,590 i	2,391 i	12,042 i
Food	311	* i	* i	0	* i
Beverage and tobacco products	312	0	0	0	0
Textile, apparel, and leather products	313-16	7 i	0	4 i	3
Wood products	321	0	0	0	0
Paper	322	* i	* i	0	0
Printing and related support activities	323	0	0	0	0
Petroleum and coal products	324	* i	0	* i	0
Chemicals	325	289	13	57	219
Basic chemicals	3251	2 i	* i	* i	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	* i	* i	* i	* i
Pesticide, fertilizer, and other agricultural chemicals	3253	0 - 8 i	0	0 - 8 i	0
Pharmaceuticals and medicines	3254	269	12	42	214
Soap, cleaning compound, and toilet preparation	3256	* i	* i	* i	* i
Paint, coating, adhesive, and other chemicals	3255, 3259	11 - 20	*	6 - 16	4
Plastics and rubber products	326	* i	0	0	* i
Nonmetallic mineral products	327	2 i	0	1 i	1 i
Primary metals	331	2	0 - 2 i	0 - 2	1
Fabricated metal products	332	4	* i	2 i	2 i
Machinery	333	193	5	14 i	173
Agricultural implement	33311	1 i	*	* i	* i
Semiconductor machinery	333242	* i	* i	0	* i
Engine, turbine, and power transmission equipment	3336	155	5	7 i	143
Other machinery	other 333	37	*	6 i	31
Computer and electronic products	334	5,802	146	910	4,746
Communications equipment	3342	320 - 453 i	3	102 i	214 - 347 i
Semiconductor and other electronic components	3344	468	26 i	68	374 i
Navigational, measuring, electromedical, and control instruments	3345	4,852	104	721	4,027
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	11 i	* i	1 i	10 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,813	98	709	4,006
Other measuring and controlling device	other 3345	28	6	12	10
Other computer and electronic products	other 334	31 - 161	13	19	0 - 130
Electrical equipment, appliances, and components	335	27	* i	1 i	26
Transportation equipment	336	9,652 i	1,422 i	1,394 i	6,835 i
Motor vehicles, bodies, trailers, and parts	3361-63	38 - 481	10	28 - 158	0 - 442
Aerospace products and parts	3364	8,454 i	1,413 i	1,237 i	5,804 i
Aircraft, aircraft engine, and aircraft parts	336411-13	7,558 i	1,410 i	1,235 i	4,913 i
Guided missile, space vehicle, and related parts	336414-15, 336419	896	2	2	891
Military armored vehicle, tank, and tank component	336992	0 - 11	0	0 - 11 i	0 - 11
Other transportation	other 336	706 - 1,160	*	0 - 128	580 - 1,032
Furniture and related products	337	0 - 3 i	0 - 2 i	* i	0 - 1 i
Miscellaneous	339	36 - 48	0 - 6	4 - 13 i	29 - 41
Medical equipment and supplies	3391	25	1	5 i	19

TABLE 45

**Domestic R&D paid for by the U.S. federal government and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Other miscellaneous manufacturing	3399	11 - 24	0 - 5	0 - 8	10 - 22
Nonmanufacturing industries	21-23, 42-81	5,918	724	2,491	2,703
Mining, quarrying, oil and gas extraction, and support activities	21	1	0	0	1
Utilities	22	27 - 34	*	5	21 - 28
Wholesale trade	42	0	0	0	0
Electronic shopping and electronic auctions	454111-12	0 - 8 i	* i	* i	0 - 8 i
Transportation and warehousing	48-49	2	0	0	2 i
Information	51	185	11	52	122
Publishing	511	57	10	33	13
Newspaper, periodical, book, and directory publishers	5111	* i	* i	0	0
Software publishers	5112	57	10	33	13
Telecommunications	517	4 i	0	* i	3 i
Data processing, hosting, and related services	518	116	*	11	105
Other information	other 51	8 i	* i	8 i	0
Finance and insurance	52	0	0	0	0
Real estate and rental and leasing	53	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0
Professional, scientific, and technical services	54	5,685	712	2,429	2,544
Architectural, engineering, and related services	5413	1,214	96	801	316
Computer systems design and related services	5415	454	28 i	158	268
Scientific research and development services	5417	3,343	562	1,415	1,365
Research and development in biotechnology	541711	108	3	47 i	58
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,571	167	1,186	1,218
Research and development in the social sciences and humanities	541720	664	392	182 i	89 i
Other professional, scientific, and technical services	other 54	674	25	54	595
Health care services	621-23	2	*	1	1 i
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	9 - 19	1	4	3 - 15
All companies (number of domestic employees)	-	21,941	2,313 i	4,883	14,745
Small companies					
10-19 <sup>a</sup>	-	502	28 i	146 i	328 i
20-49	-	811	30	188	593
Medium companies					
50-99	-	697	45	162	489
100-249	-	988	97	279	612
Large companies					
250-499	-	1,393	121	384	889 i
500-999	-	248 i	22	77	149 i
1,000-4,999	-	1,710	29 i	639	1,042
5,000-9,999	-	977	378	93	506
10,000-24,999	-	1,717 i	55 i	255 i	1,407 i
25,000 or more	-	12,897 i	1,509 i	2,660 i	8,729 i



\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 46

**Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	DOD	DOE	NASA	NIH	DHS	DOT	EPA	NSF	All other agencies
All industries	21-23, 31-33, 42-81	21,941	15,141	519	4,534	519	124	30	1	8	1,064
Manufacturing industries	31-33	16,023	11,174	266	3,905	84	96	7	1	1	489
Food	311	*	0	*	0	0	0	0	0	0	0
Beverage and tobacco products	312	0	0	0	0	0	0	0	0	0	0
Textile, apparel, and leather products	313-16	7	3	0	4	0	0	0	0	0	0
Wood products	321	0	0	0	0	0	0	0	0	0	0
Paper	322	*	0	*	0	*	0	0	0	0	0
Printing and related support activities	323	0	0	0	0	0	0	0	0	0	0
Petroleum and coal products	324	*	0	*	0	0	0	0	0	0	0
Chemicals	325	289	61	10	*	63	82	0	0	0	74
Basic chemicals	3251	2	0	0-3	0	0-3	0	0	0	0	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	*	0	0-1	0	0-1	0	0	0	0	0
Pesticide, fertilizer, and other agricultural chemicals	3253	0-8	0	0-4	0	0-8	0	0	0	0	0
Pharmaceuticals and medicines	3254	269	49	7	0	54-64	82	0	0	0	65-75
Soap, cleaning compound, and toilet preparation	3256	*	0	0-1	0	0-1	0	0	0	0	0
Paint, coating, adhesive, and other chemicals	3255, 3259	11-20	12	0-4	*	0-8	0	0	0	0	0-8
Plastics and rubber products	326	*	*	0	0	*	0	0	0	0	0
Nonmetallic mineral products	327	2	2	*	*	*	0	0	0	0	0
Primary metals	331	2	*	1	*	0	0	0	0	0	0
Fabricated metal products	332	4	3	*	1	*	0	0	0	0	0
Machinery	333	193	105	87	1	0	0	0	0	0	0
Agricultural implement	33311	1	0	1	0	0	0	0	0	0	0
Semiconductor machinery	333242	*	0	*	0	0	0	0	0	0	0
Engine, turbine, and power transmission equipment	3336	155	89	65	0	0	0	0	0	0	0
Other machinery	other 333	37	15	21	1	0	0	0	0	0	0
Computer and electronic products	334	5,802	5,019	73	275	13	2	7	0	1	411
Communications equipment	3342	320-453	188-329	1	0-130	*	0	0	0	0	0-133
Semiconductor and other electronic components	3344	468	85	26	0-130	*	0	0	0	0	225-358
Navigational, measuring, electromedical, and control instruments	3345	4,852	4,607	27	146	8	2	7	0	*	54
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	11	3	1	3	3	0	0	0	*	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,813	4,586	22	141	0	2	7	0	0	54
Other measuring and controlling device	other 3345	28	18	4	1	5	0	0	0	0	0

TABLE 46

**Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	DOD	DOE	NASA	NIH	DHS	DOT	EPA	NSF	All other agencies
Other computer and electronic products	other 334	31 - 161	0 - 138	19	0 - 130	i 5	0	*	0	1	0 - 133
Electrical equipment, appliances, and components	335	27	17	5	4	0	0	0	0	0	1
Transportation equipment	336	9,652	i 5,944	i 74	3,619	i 0	12	*	1	0	1
Motor vehicles, bodies, trailers, and parts	3361-63	38 - 481	0 - 469	0 - 74	0	0	12	*	1	0	0
Aerospace products and parts	3364	8,454	i 4,758 - 4,835	i 0 - 74	3,619	i 0	0	0	0	0	1
Aircraft, aircraft engine, and aircraft parts	336411-13	7,558	i 4,577	i 0	2,980	i 0	0	0	0	0	1
Guided missile, space vehicle, and related parts	336414-15, 336419	896	182 - 258	0 - 74	639	0	0	0	0	0	0
Military armored vehicle, tank, and tank component	336992	0 - 11	0 - 11	*	0	0	0	0	*	0	0
Other transportation	other 336	706 - 1,160	705 - 1,159	1	i 0	0	0	0	0	0	0
Furniture and related products	337	0 - 3	i 0	0 - 2	i 1	i *	i 0	0	0	0	0
Miscellaneous	339	36 - 48	20	8 - 20	*	i 8	i 0	0	0	0	2
Medical equipment and supplies	3391	25	11	5	i *	i 8	i 0	0	0	0	2
Other miscellaneous manufacturing	3399	11 - 24	9	2 - 15	*	0	0	0	0	0	0
Nonmanufacturing industries	21-23, 42-81	5,918	3,968	253	629	435	29	22	1	7	575
Mining, quarrying, oil and gas extraction, and support activities	21	1	*	i 1	0	0	0	0	0	0	0
Utilities	22	27 - 34	0	27 - 34	0	0	0	0	0	0	0
Wholesale trade	42	0	0	0	0	0	0	0	0	0	0
Electronic shopping and electronic auctions	454111-12	0 - 8	i 0	0	0	0 - 8	i 0	0	0	0	0
Transportation and warehousing	48-49	2	0	0	2	0	0	0	0	0	0
Information	51	185	134	21 - 28	1	6 - 14	4	*	0	0	3 - 11
Publishing	511	57	26	18	*	0 - 8	0	*	0	0	3 - 11
Newspaper, periodical, book, and directory publishers	5111	*	i 0	*	i 0	0	0	0	0	0	0
Software publishers	5112	57	26	18	*	0 - 8	0	*	0	0	3 - 11
Telecommunications	517	4	i 1	1	i 0	1	i 0	0	0	0	0
Data processing, hosting, and related services	518	116	106	0	0	6	4	0	0	0	*
Other information	other 51	8	i 0	1 - 8	i *	i 0 - 7	i 0	0	0	0	0
Finance and insurance	52	0	0	0	0	0	0	0	0	0	0
Real estate and rental and leasing	53	0	0	0	0	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0	0	0	0	0	0	0
Professional, scientific, and technical services	54	5,685	3,824	195	626	421	24	22	1	7	565

TABLE 46

**Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	DOD	DOE	NASA	NIH	DHS	DOT	EPA	NSF	All other agencies
Architectural, engineering, and related services	5413	1,214	1,027	76 i	79	0	0	11	0	0	21
Computer systems design and related services	5415	454	405	27	14 i	3 i	2	3	0	*	*
Scientific research and development services	5417	3,343	1,870	90	413	415	18	6	1	4	527
Research and development in biotechnology	541711	108	39	12	*	54	0	0	0	1	1
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,571	1,747	77	412	186	18	1	1	3	126
Research and development in the social sciences and humanities	541720	664	83	0	1 i	176	0	5	0	0	400
Other professional, scientific, and technical services	other 54	674	523	2	121	3 i	4	2	*	2	17
Health care services	621-23	2	0	0	0	2	0	0	0	0	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	9 - 19	10	* i	* i	* i	0	0	0	0	0 - 8
All companies (number of domestic employees)	-	21,941	15,141	519	4,534 i	519	124	30	1	8	1,064
Small companies											
10-19 <sup>a</sup>	-	502	231	57 i	91 i	107	2	4	*	2	9
20-49	-	811	528	79 i	99	57	2	9	*	1	37
Medium companies											
50-99	-	697	559	32	22	24	1	*	*	3	56
100-249	-	988	753	42	80	38	17	4	0	1	53
Large companies											
250-499	-	1,393	629	12	271	78	*	0	0	0	402
500-999	-	248 i	137 i	14 i	57 i	30 i	4	0	0	0	6
1,000-4,999	-	1,710	740	15	688	157	0	0	0	0	110
5,000-9,999	-	977	315	134	178 i	19	0	5	0	0	325
10,000-24,999	-	1,717 i	1,629 i	70	9 i	5	0	1	1	1	4
25,000 or more	-	12,897 i	9,620	65	3,040 i	5	98	7	0	0	63

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

DHS = Department of Homeland Security; DOD = Department of Defense; DOE = Department of Energy; DOT = Department of Transportation; EPA = Environmental Protection Agency; NAICS = 2012 North American Industry Classification System; NASA = National Aeronautics and Space Administration; NIH = National Institutes of Health; NSF = National Science Foundation.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&amp;D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. 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&amp;D. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 47

**Domestic R&D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Foreign companies				Foreign government agencies	Foreign universities, colleges, and academic researchers	All other
			Subsidiaries <sup>a</sup>	Company's parent	Unaffiliated companies				
All industries	21-23, 31-33, 42-81	46,840	27,117	17,563	1,991	123	3 - 16	32 - 44	
Manufacturing industries	31-33	35,363	19,475	14,290	1,459	119	0 - 11	11 - 23	
Food	311	365	129	234	2	0	0	0	
Beverage and tobacco products	312	119	8	111	0	0	0	0	
Textile, apparel, and leather products	313-16	13	8	*	5	0	0	0	
Wood products	321	6	0	6	0	0	0	0	
Paper	322	*	0	0	*	0	0	*	
Printing and related support activities	323	0	0	0	0	0	0	0	
Petroleum and coal products	324	154 - 274	74 - 170	72 - 104	0 - 9	0	0	0	
Chemicals	325	12,478	5,011	6,643	816	*	0 - 10	0 - 10	
Basic chemicals	3251	160	19	141	*	0	0	0	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	77	0 - 16	61 - 77	1	0	0	*	
Pesticide, fertilizer, and other agricultural chemicals	3253	391 - 836	73 - 490	287 - 345	0 - 15	0	0	0 - 10	
Pharmaceuticals and medicines	3254	11,204	4,490	5,906	801	*	0 - 9	0 - 9	
Soap, cleaning compound, and toilet preparation	3256	172	14	158	1	0	0	*	
Paint, coating, adhesive, and other chemicals	3255, 3259	27 - 471	0 - 399	14 - 72	0 - 15	0	0 - 10	0 - 10	
Plastics and rubber products	326	14	4	10	*	0	0	1	
Nonmetallic mineral products	327	33	2	31	*	*	0	*	
Primary metals	331	4 - 16	*	0 - 10	5	*	0	0	
Fabricated metal products	332	69	9	60	*	0	0	*	
Machinery	333	723	33	632	57	*	0	*	
Agricultural implement	33311	15	8	6	*	0	0	0	
Semiconductor machinery	333242	559	3	497 - 557	0 - 58	0	0	*	
Engine, turbine, and power transmission equipment	3336	19	8	11	0	0	0	0	
Other machinery	other 333	130	14	57 - 117	0 - 58	*	0	0	
Computer and electronic products	334	17,144	13,501	3,283	321	36	0 - 2	2 - 6	
Communications equipment	3342	3,941	3,593 - 3,767	124 - 297	0 - 53	*	0	*	
Semiconductor and other electronic components	3344	3,485	964	2,379	142	0	0 - 2	0 - 2	

TABLE 47

**Domestic R&D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Foreign companies				Foreign government agencies	Foreign universities, colleges, and academic researchers	All other				
			Subsidiaries <sup>a</sup>	Company's parent	Unaffiliated companies								
Navigational, measuring, electromedical, and control instruments	3345	994	218	609	128	i	36	0	3				
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	266	74	192	*	i	0	0	0				
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	504	17	i	332	119	i	33	0	3			
Other measuring and controlling device	other 3345	224	127	85	9	3	0	0	0				
Other computer and electronic products	other 334	8,724	8,554 - 8,725	0 - 170	0 - 53	*	i	0	0				
Electrical equipment, appliances, and components	335	403	86	315	2	0	0	0	0				
Transportation equipment	336	3,306	196	2,778	242	82	i	0	9	i			
Motor vehicles, bodies, trailers, and parts	3361-63	2,898	144	2,564	190	*	i	0	*	i			
Aerospace products and parts	3364	317 - 400	i	52	i	124 - 205	i	52	82	i	0	9	i
Aircraft, aircraft engine, and aircraft parts	336411-13	317 - 400	i	52	i	124 - 205	i	52	82	i	0	9	i
Guided missile, space vehicle, and related parts	336414-15, 336419	*	*	0	0	0	0	0	0	0			
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0	0	0				
Other transportation	other 336	8 - 91	0	8 - 91	0	0	0	0	0				
Furniture and related products	337	4 - 85	4 - 83	0	*	i	*	i	0	*	i		
Miscellaneous	339	396 - 506	319 - 398	72 - 104	4 - 14	0	0	0	*	i			
Medical equipment and supplies	3391	397	320	73	5	0	0	0	*	i			
Other miscellaneous manufacturing	3399	0 - 108	0 - 78	0 - 30	0 - 9	0	0	0	0				
Nonmanufacturing industries	21-23, 42-81	11,477	7,642	i	3,273	532	5	4	21				
Mining, quarrying, oil and gas extraction, and support activities	21	206	96	92	17	0	0	0	*	i			
Utilities	22	7	0 - 7	0 - 8	0	0	0	0	0				
Wholesale trade	42	76	i	0	76	i	*	i	0	0			
Electronic shopping and electronic auctions	454111-12	232 - 1,209	195 - 1,173	35 - 61	0	0	0	0	0				
Transportation and warehousing	48-49	2 - 969	2 - 969	0	0	0	0	0	0				
Information	51	5,956	i	5,095	i	674	186	*	i	0	*		
Publishing	511	1,305	829	i	345	131	*	i	0	*	i		
Newspaper, periodical, book, and directory publishers	5111	*	i	0	0	*	i	0	0	0			
Software publishers	5112	1,305	829	i	345	131	*	i	0	*	i		
Telecommunications	517	35	8	12 - 28	0 - 14	i	0	0	0				
Data processing, hosting, and related services	518	476	255	178	43	0	0	0	*				

TABLE 47

**Domestic R&D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Foreign companies					Foreign government agencies	Foreign universities, colleges, and academic researchers	All other	
			Subsidiaries <sup>a</sup>	Company's parent	Unaffiliated companies						
Other information	other 51	4,140	i	4,003	i	122 - 138	0 - 14	i	0	0	0
Finance and insurance	52	1,036		1,036		0	0		0	0	0
Real estate and rental and leasing	53	0		0		0	0		0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0		0	0		0	0	0
Other real estate and rental and leasing	other 53	0		0		0	0		0	0	0
Professional, scientific, and technical services	54	2,944		240		2,362	312		5	4	21
Architectural, engineering, and related services	5413	113		41		44	14		3	3	8
Computer systems design and related services	5415	1,581		78		1,491	12		*	i	*
Scientific research and development services	5417	1,112	i	94		760	i	242	2	1	i
Research and development in biotechnology	541711	283	i	8		231	i	38	1	0	6
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	829	i	86		530	i	204	1	1	i
Research and development in the social sciences and humanities	541720	0		0		0	0		0	0	0
Other professional, scientific, and technical services	other 54	139		28		67	44		0	*	*
Health care services	621-23	4		0		0	4		0	0	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	42		0 - 31		0 - 29	12		*	i	0
All companies (number of domestic employees)	-	46,840		27,117		17,563	1,991		123	3 - 16	32 - 44
Small companies											
10-19 <sup>b</sup>	-	199	i	48		99	i	42	i	1	3
20-49	-	782		115		595	65	i	4	0 - 6	0 - 6
Medium companies											
50-99	-	1,027		240		573	211		*	0 - 5	0 - 5
100-249	-	1,716		560		1,060	87		*	0 - 11	0 - 11
Large companies											
250-499	-	1,716		303		1,216	189		*	i	0
500-999	-	2,521		928		1,439	153		*	i	0
1,000-4,999	-	9,904		2,401		6,993	507		3	*	*
5,000-9,999	-	2,461		1,318		795	346		*	0	2
10,000-24,999	-	8,261		3,306		4,623	295	i	36	0	0

TABLE 47

**Domestic R&D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Foreign companies			Foreign government agencies	Foreign universities, colleges, and academic researchers	All other
			Subsidiaries <sup>a</sup>	Company's parent	Unaffiliated companies			
25,000 or more	-	18,254	17,897	171	97	79 i	0-13 i	0-13 i

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics are based on companies in the United States that reported to the survey. No systematic item imputation was applied. These statistics include an adjustment to the weight to account for unit nonresponse.

<sup>b</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. In all other tables, R&D costs of foreign-company subsidiaries of U.S. companies are included in company-funded U.S. domestic R&D totals. Only in this table are such R&D costs classified as being part of R&D paid for by sources located outside of the United States. 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.



TABLE 48

**Domestic R&D paid for by the company's foreign subsidiaries and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total <sup>a</sup>	Basic research <sup>b</sup>	Applied research <sup>b</sup>	Development <sup>b</sup>
All industries	21-23, 31-33, 42-81	27,117	1,005	2,861	23,251
Manufacturing industries	31-33	19,475	901	2,381	16,193
Food	311	129	9	9	110
Beverage and tobacco products	312	8	1	1	6
Textile, apparel, and leather products	313-16	8	0	7	1
Wood products	321	0	0	0	0
Paper	322	0	0	0	0
Printing and related support activities	323	0	0	0	0
Petroleum and coal products	324	74 - 170	20 - 39	54 - 75	0 - 78
Chemicals	325	5,011	759	666	3,585
Basic chemicals	3251	19	0 - 14	0 - 14	6
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	0 - 16	0 - 16	*	0 - 16
Pesticide, fertilizer, and other agricultural chemicals	3253	73 - 490	73 - 186	0 - 135	0 - 188
Pharmaceuticals and medicines	3254	4,490	574	532	3,383
Soap, cleaning compound, and toilet preparation	3256	14	0 - 5	0 - 5	10
Paint, coating, adhesive, and other chemicals	3255, 3259	0 - 399	0 - 76	0 - 135	0 - 188
Plastics and rubber products	326	4	*	*	3
Nonmetallic mineral products	327	2	0 - 1	0 - 1	2
Primary metals	331	*	0	0	*
Fabricated metal products	332	9	0 - 5	0 - 5	5
Machinery	333	33	0 - 5	0 - 5	29
Agricultural implement	33311	8	*	*	7
Semiconductor machinery	333242	3	0	0	3
Engine, turbine, and power transmission equipment	3336	8	0	0	8
Other machinery	other 333	14	0 - 5	0 - 5	10
Computer and electronic products	334	13,501	81	1,602	11,817
Communications equipment	3342	3,593 - 3,767	1	0 - 1,238	2,354 - 3,766
Semiconductor and other electronic components	3344	964	33	144	787
Navigational, measuring, electromedical, and control instruments	3345	218	0 - 33	2 - 35	184
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	74	1	1	72
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	17	*	2	15
Other measuring and controlling device	other 3345	127	0 - 31	0 - 31	97
Other computer and electronic products	other 334	8,554 - 8,725	12 - 48	185 - 1,457	7,078 - 8,494
Electrical equipment, appliances, and components	335	86	1	3	81
Transportation equipment	336	196	11	14	171
Motor vehicles, bodies, trailers, and parts	3361-63	144	10	14	120
Aerospace products and parts	3364	52	*	*	51
Aircraft, aircraft engine, and aircraft parts	336411-13	52	*	*	51
Guided missile, space vehicle, and related parts	336414-15, 336419	*	0	0	*
Military armored vehicle, tank, and tank component	336992	0	0	0	0
Other transportation	other 336	0	0	0	0
Furniture and related products	337	4 - 83	0	5	0 - 78
Miscellaneous	339	319 - 398	4	4	311 - 389

TABLE 48

**Domestic R&D paid for by the company's foreign subsidiaries and performed by the company, by type of R&D, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total <sup>a</sup>	Basic research <sup>b</sup>	Applied research <sup>b</sup>	Development <sup>b</sup>
Medical equipment and supplies	3391	320	4	4	312
Other miscellaneous manufacturing	3399	0 - 78	0	0	0 - 78
Nonmanufacturing industries	21-23, 42-81	7,642	i 104	479	i 7,058
Mining, quarrying, oil and gas extraction, and support activities	21	96	5 - 16	0 - 92	0 - 92
Utilities	22	0 - 7	0 - 7	0	0
Wholesale trade	42	0	0	0	0
Electronic shopping and electronic auctions	454111-12	195 - 1,173	0	195 - 290	i 0 - 965
Transportation and warehousing	48-49	2 - 969	1	2	0 - 965
Information	51	5,095	i 47	128	i 4,921
Publishing	511	829	i 15	i 81	i 734
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0
Software publishers	5112	829	i 15	i 81	i 734
Telecommunications	517	8	*	0	8
Data processing, hosting, and related services	518	255	26	31	197
Other information	other 51	4,003	i 6	16	3,982
Finance and insurance	52	1,036	0	0	1,036
Real estate and rental and leasing	53	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0
Professional, scientific, and technical services	54	240	42	61	138
Architectural, engineering, and related services	5413	41	1	2	38
Computer systems design and related services	5415	78	1	3	74
Scientific research and development services	5417	94	25	55	14
Research and development in biotechnology	541711	8	1	6	2
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	86	24	49	13
Research and development in the social sciences and humanities	541720	0	0	0	0
Other professional, scientific, and technical services	other 54	28	15	1	11
Health care services	621-23	0	0	0	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	0 - 31	0	0	0 - 31
All companies (number of domestic employees)	-	27,117	1,005	2,861	23,251
Small companies					
10-19 <sup>c</sup>	-	48	23	5	20
20-49	-	115	13	37	65
Medium companies					
50-99	-	240	25	24	192
100-249	-	560	116	69	375
Large companies					
250-499	-	303	14	87	202
500-999	-	928	42	83	803
1,000-4,999	-	2,401	134	283	1,983
5,000-9,999	-	1,318	197	227	894
10,000-24,999	-	3,306	339	123	2,844
25,000 or more	-	17,897	103	1,921	15,873

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics are based on companies in the United States that reported to the survey. No systematic item imputation was applied. These statistics include an adjustment to the weight to account for unit nonresponse.

<sup>b</sup> Respondent was not asked to report categorical breakouts of research and development paid for by foreign subsidiaries. Rather, ratios of the company's basic research, applied research, and development were calculated as proportions of the overall domestic R&D performance paid for by the company. These ratios were applied to the company's domestic R&D performance paid for by foreign subsidiaries to get estimates of a company's basic research, applied research, and development paid for by foreign subsidiaries.

<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 49

## Domestic R&amp;D paid for by the company and performed by others, by type of performer, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States	Companies outside the United States		U.S. federal government agencies		U.S. state and local government agencies		U.S. universities, colleges, and academic researchers		All other organizations	
				Company's parent	Other							In the United States	Outside the United States
All industries	21-23, 31-33, 42-81	37,537	31,827	1,347	3,251	64	i	24		439		465	120
Manufacturing industries	31-33	33,886	28,760	1,302	2,866	64	i	13		404		403	75
Food	311	190	152	*	7	*	i	*	i	9	i	20	1
Beverage and tobacco products	312	176	161	0	10	i	0	0		3		2	0
Textile, apparel, and leather products	313-16	16	16	0	*	i	0	0		*	i	*	i
Wood products	321	11	10	0	0	*		0		*		1	0
Paper	322	4	3	0	*		0	0		*		1	0
Printing and related support activities	323	6	6	i	0		0	0		0		0	0
Petroleum and coal products	324	248 - 347	137 - 247	0	0 - 17	5		0		0 - 36		56	0 - 35
Chemicals	325	25,666	22,597	66	2,530	*		*	i	214		224	34
Basic chemicals	3251	63	58	0	1	0		0		5		*	*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	25	24	0	*	0		0		*		*	0
Pesticide, fertilizer, and other agricultural chemicals	3253	192	178	0	2	0		0		2		2	7
Pharmaceuticals and medicines	3254	25,052	22,036	61	2,518	*		*	i	200		214	24
Soap, cleaning compound, and toilet preparation	3256	291	271	1	8	i	*	i	*	i	1	7	3
Paint, coating, adhesive, and other chemicals	3255, 3259	42	30	5	1	0		0		6		*	i
Plastics and rubber products	326	53	41	0 - 12	0 - 12	*		0		2		0 - 12	*
Nonmetallic mineral products	327	23	12	9	2	*		0		*		0	*
Primary metals	331	15	12	0	*	0		0		2		*	0
Fabricated metal products	332	35	29	*	2	i	0	0		3		1	*
Machinery	333	415	353	0 - 14	46	0		0		4		0 - 14	*
Agricultural implement	33311	199	195	0	3	0		0		*		0	0
Semiconductor machinery	333242	5	4	0	1	0		0		*		0	0
Engine, turbine, and power transmission equipment	3336	18	17	*	1	0		0		*		0	0
Other machinery	other 333	194	137	0 - 14	41	0		0		4		0 - 14	*

TABLE 49

## Domestic R&amp;D paid for by the company and performed by others, by type of performer, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States	Companies outside the United States		U.S. federal government agencies		U.S. state and local government agencies		U.S. universities, colleges, and academic researchers	All other organizations				
				Company's parent	Other						In the United States	Outside the United States			
Computer and electronic products	334	2,021	1,115	651 - 733	133	1	i	7		18	8 - 58	1 - 36			
Communications equipment	3342	936	174 - 288	632 - 732	0 - 67	*	i	*	i	0 - 6	i	* i			
Semiconductor and other electronic components	3344	363	295	0 - 16	i	52		1	i	0	0 - 6	i	0 - 16	i	1
Navigational, measuring, electromedical, and control instruments	3345	380	302	1	15 - 48	*		6		13	8 - 41	1			
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	118	97	1	7	i	*	0		3	9	i	* i		
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	158	131	0	9			0		6	10	0	*		
Other measuring and controlling device	other 3345	104	74	0	0 - 31			0		0	0 - 31	*			
Other computer and electronic products	other 334	342	231 - 342	1	0 - 67			0		0	0 - 6	*	0 - 35		
Electrical equipment, appliances, and components	335	124	108	*	i	10		1		0	4	1	0		
Transportation equipment	336	4,055	3,325	496	i	94		56	i	6	i	40	32	6	i
Motor vehicles, bodies, trailers, and parts	3361-63	3,371	2,712	493	i	86		3		3	39	30	4	i	
Aerospace products and parts	3364	632	568	0	4			53	i	3	i	1	1	2	
Aircraft, aircraft engine, and aircraft parts	336411-13	514	450	0	4			53	i	3	i	1	1	2	
Guided missile, space vehicle, and related parts	336414-15, 336419	118	118	0	0			0		0	*	0	0		
Military armored vehicle, tank, and tank component	336992	0	0	0	0			0		0	0	0	0		
Other transportation	other 336	51	45	3	3			0		0	*	i	* i	0	
Furniture and related products	337	23	17	*	i	6		0		0	*	i	* i	* i	
Miscellaneous	339	708 - 800	564 - 657	0 - 56	14 - 32	*	i	*		74 - 111	0 - 56	0 - 35			
Medical equipment and supplies	3391	708	565	0 - 55	15	*	i	*		75	0 - 55	0 - 35			

TABLE 49

## Domestic R&amp;D paid for by the company and performed by others, by type of performer, industry, and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States		Companies outside the United States		U.S. federal government agencies	U.S. state and local government agencies	U.S. universities, colleges, and academic researchers	All other organizations	
			Company's parent	Other	In the United States	Outside the United States					
Other miscellaneous manufacturing	3399	0 - 92	0 - 92	* i	0 - 17 i	0	0	0 - 36	*	* i	
Nonmanufacturing industries	21-23, 42-81	3,651	3,067	45	385	*	11	35	62	45	
Mining, quarrying, oil and gas extraction, and support activities	21	123	100	0	10	0	0	0 - 10	2 - 14	0	
Utilities	22	171	125	0	*	*	11	2	32	*	
Wholesale trade	42	47	37 i	* i	5 i	0	0	1 i	5 i	0	
Electronic shopping and electronic auctions	454111-12	125 i	125 i	0	0	0	0	0	0	0	
Transportation and warehousing	48-49	43	43 i	0	0	0	0	*	0	0	
Information	51	2,061	1,848	6	159	0	0	0 - 6	0 - 7	43	
Publishing	511	1,001	818	5	141	0	0	*	1	36	
Newspaper, periodical, book, and directory publishers	5111	4	4	0	0	0	0	0	0	0	
Software publishers	5112	998	815	5	141	0	0	*	1	36	
Telecommunications	517	416	414	*	1	0	0	0	0	0	
Data processing, hosting, and related services	518	249	221	* i	17	0	0	0 - 5	0 - 5	8	
Other information	other 51	395	394	0	* i	0	0	0	0	* i	
Finance and insurance	52	319	193	0	124	0	0	2	*	0	
Real estate and rental and leasing	53	7	7	0	0	0	0	0	0	0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	*	0	0	0	0	0	0	0	
Other real estate and rental and leasing	other 53	7	7	0	0	0	0	0	0	0	
Professional, scientific, and technical services	54	603	467	39	70	* i	0	12	13	1 i	
Architectural, engineering, and related services	5413	95	65	24	6	* i	0	* i	* i	* i	
Computer systems design and related services	5415	128	98 i	15 i	12 i	* i	0	3 i	1 i	1 i	
Scientific research and development services	5417	316	250	1	44	*	0	9	12	1	
Research and development in biotechnology	541711	118	107	1	5	* i	0	3	1	1	

TABLE 49

**Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States		Companies outside the United States		U.S. federal government agencies		U.S. state and local government agencies		U.S. universities, colleges, and academic researchers		All other organizations	
			Company's parent	Other	U.S. federal government agencies	U.S. state and local government agencies	U.S. universities, colleges, and academic researchers	In the United States	Outside the United States					
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	198	143	0	39	*	0	6	10	*				
Research and development in the social sciences and humanities	541720	*	* i	* i	* i	* i	0	* i	* i	* i	* i	* i	* i	* i
Other professional, scientific, and technical services	other 54	64	54	* i	9	0	0	*	1	0				
Health care services	621-23	66	39	0	16	0	0	10	* i	0				
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	86	84	0	0	*	*	2 i	0	0				
All companies (number of domestic employees)	-	37,537	31,827	1,347	3,251	64 i	24	439	465	120				
Small companies														
10-19 <sup>a</sup>	-	514	432	4 i	37	* i	0	20	9 i	13				
20-49	-	1,214	1,027	0-42 i	100	1	* i	39	0-42	8				
Medium companies														
50-99	-	2,176	1,795	17	242	*	*	55	61 i	7				
100-249	-	1,912	1,538	25	285	* i	*	17	46	* i				
Large companies														
250-499	-	1,719	1,479	0-35	141	* i	* i	54	0-35	12				
500-999	-	2,118	1,857	37	109 i	*	*	16	54	43				
1,000-4,999	-	4,512	3,872	19	554	* i	1	39	22	4				
5,000-9,999	-	5,634	4,763	648-731	70	* i	* i	65	0-81	4				
10,000-24,999	-	8,850	7,549	43	1,090	1 i	10	28 i	121	8				
25,000 or more	-	8,888	7,514	475 i	622	61 i	12	106	75	21				

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. The "undistributed" column shown in prior years is no longer necessary because of processing improvements implemented beginning in 2017. 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.



TABLE 50

**Domestic R&D performance by performer and source of funds, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Performed by the company			Performed by others		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
All industries	21-23, 31-33, 42-81	492,956	428,968	63,989	45,879	37,537	8,342
Manufacturing industries	31-33	285,674	248,109	37,564	40,561	33,886	6,675
Food	311	4,180	3,937	243	193	190	3
Beverage and tobacco products	312	1,082	971	111 i	179	176	3
Textile, apparel, and leather products	313-16	904	873	31	16	16	0
Wood products	321	186	180	6	11	11	*
Paper	322	1,064	1,064	*	4	4	0
Printing and related support activities	323	420 i	420 i	0	6 i	6 i	0
Petroleum and coal products	324	1,306	1,203	103	248 - 350	248 - 347	0 - 3
Chemicals	325	97,063	87,288	9,775	30,566	25,666	4,901
Basic chemicals	3251	2,360	2,198	162	65	63	1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172	1,092	80	24 - 73	25	0 - 47
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846	1,501	320 - 345	191 - 216	192	0 - 24
Pharmaceuticals and medicines	3254	87,619	78,652	8,966	29,875	25,052	4,823
Soap, cleaning compound, and toilet preparation	3256	2,760	2,596	164	322	291	31
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333	1,249	56 - 84	42 - 90	42	0 - 47
Plastics and rubber products	326	2,856	2,770	85	82	53	29
Nonmetallic mineral products	327	1,508 i	1,473 i	35	23	23	*
Primary metals	331	665	649	16	18	15	3
Fabricated metal products	332	2,885	2,632	254	55	35	21
Machinery	333	15,184	13,930	1,254	473	415	58
Agricultural implement	33311	1,921	1,913	9	199	199	0
Semiconductor machinery	333242	4,459	3,854	604	43	5	38
Engine, turbine, and power transmission equipment	3336	1,301	1,096	205	33	18	14
Other machinery	other 333	7,503	7,067	436	199	194	5
Computer and electronic products	334	86,729	75,570	11,159	2,611	2,021	590
Communications equipment	3342	12,595	11,495	1,100 i	969 - 972	936	32 - 35 i
Semiconductor and other electronic components	3344	35,183 i	31,975 i	3,208	418	363	56
Navigational, measuring, electromedical, and control instruments	3345	17,562	10,912	6,650	870	380	490
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342	3,117	225	127	118	9
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662	3,400	6,262	597	158	439
Other measuring and controlling device	other 3345	4,558	4,395	163	146	104	42
Other computer and electronic products	other 334	21,388	21,188	201	352 - 355	342	10 - 13
Electrical equipment, appliances, and components	335	5,263	4,886	377	125	124	1
Transportation equipment	336	45,375	31,505	13,870 i	5,082	4,055	1,027 i

TABLE 50

**Domestic R&D performance by performer and source of funds, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Performed by the company			Performed by others		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Motor vehicles, bodies, trailers, and parts	3361-63	24,117	20,883	3,233 i	3,536	3,371	165
Aerospace products and parts	3364	18,358 i	8,900	9,458 i	1,491 i	632	859 i
Aircraft, aircraft engine, and aircraft parts	336411-13	16,891 i	8,341	8,550 i	1,373 i	514	859 i
Guided missile, space vehicle, and related parts	336414-15, 336419	1,467	559	908	118	118	0
Military armored vehicle, tank, and tank component	336992	35	25	10	0	0	0
Other transportation	other 336	2,865	1,697	1,168	55	51	3
Furniture and related products	337	409	407	2	23	23	*
Miscellaneous	339	18,596	18,352	244	741 - 840	708 - 800	33 - 40
Medical equipment and supplies	3391	16,014	15,812	202	742	708	33
Other miscellaneous manufacturing	3399	2,582	2,540	42	0 - 98	0 - 92	0 - 7
Nonmanufacturing industries	21-23, 42-81	207,283	180,858	26,425	5,318	3,651	1,667
Mining, quarrying, oil and gas extraction, and support activities	21	2,717	2,535	183	123	123	*
Utilities	22	275	237	38	182	171	11
Wholesale trade	42	1,191	1,104	87	50	47	3
Electronic shopping and electronic auctions	454111-12	3,131 - 15,818 i	3,088 - 15,775 i	43 - 61	125 i	125 i	0
Transportation and warehousing	48-49	9,890 i	9,504 i	386	43	43	0
Information	51	110,227	109,062	1,165	2,132	2,061	72
Publishing	511	33,019	32,447	572	1,045	1,001	44
Newspaper, periodical, book, and directory publishers	5111	61	61	*	4	4	0
Software publishers	5112	32,958	32,386	572	1,042	998	44
Telecommunications	517	3,733	3,700	33	418	416	2
Data processing, hosting, and related services	518	30,558	30,154	404	269	249	20
Other information	other 51	42,917	42,761	155	401	395	6
Finance and insurance	52	8,917	8,890	28	319	319	0
Real estate and rental and leasing	53	1,371	1,371	0	7	7	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	45	0	*	*	0
Other real estate and rental and leasing	other 53	1,326	1,326	0	7	7	0
Professional, scientific, and technical services	54	53,233	29,131	24,103	2,182	603	1,579
Architectural, engineering, and related services	5413	4,207	2,288	1,919	465	95	370
Computer systems design and related services	5415	21,046	18,395	2,651	174	128	46
Scientific research and development services	5417	21,669	3,265	18,403	1,397	316	1,081
Research and development in biotechnology	541711	6,457	1,083	5,374	236	118	118
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446 i	2,155	12,291 i	1,039	198	841
Research and development in the social sciences and humanities	541720	766	27	738	122	*	122

TABLE 50

**Domestic R&D performance by performer and source of funds, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Performed by the company			Performed by others		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Other professional, scientific, and technical services	other 54	6,312	5,182	1,129	146	64	82
Health care services	621-23	2,265	1,928	337	69	66	4
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,380 - 14,067	1,322 - 14,012	34 - 58	86	86	0
All companies (number of domestic employees)	-	492,956	428,968	63,989	45,879	37,537	8,342
Small companies							
10-19 <sup>a</sup>	-	5,501	4,432	1,070	657	514	143
20-49	-	12,418	10,040	2,378	1,567	1,214	353
Medium companies							
50-99	-	14,021	11,492	2,529	2,548	2,176	372
100-249	-	19,793	16,520	3,274	2,260	1,912	348
Large companies							
250-499	-	18,883	15,356	3,527	2,120	1,719	402
500-999	-	23,969	21,549	2,420	2,311	2,118	193
1,000-4,999	-	75,671	64,475	11,196	6,733	4,512	2,221
5,000-9,999	-	50,811	44,728	6,083	6,194	5,634	559
10,000-24,999	-	88,263	74,385	13,878	10,996	8,850	2,147
25,000 or more	-	183,626	165,991	17,635	10,492	8,888	1,604

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 51

## Domestic R&amp;D performance by source of funds and performer, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company			Paid for by others								
		Total	R&D performed by others (purchased and collaborative R&D)	R&D performed by the company	Total	R&D performed by others (subcontracted/ passed-through R&D costs)	R&D performed by the company						
							Total	Paid for by the U.S. government	Paid for by non-U.S. government sources				
All industries	21-23, 31-33, 42-81	466,504	37,537	428,968	72,331	8,342	63,989	21,941		42,048			
Manufacturing industries	31-33	281,995	33,886	248,109	44,239	6,675	37,564	16,023	i	21,542			
Food	311	4,127	190	3,937	246	3	243	*	i	242			
Beverage and tobacco products	312	1,146	176	971	114	i	3	111	i	0	111	i	
Textile, apparel, and leather products	313-16	890	16	873	31	0	31	7	i	24	i		
Wood products	321	191	11	180	6	*	6	0		6			
Paper	322	1,068	4	1,064	*	0	*	*	i	*	i		
Printing and related support activities	323	426	i	6	i	420	i	0		0			
Petroleum and coal products	324	1,450 - 1,550	248 - 347	1,203	102 - 106	0 - 3	103	*	i	103			
Chemicals	325	112,954	25,666	87,288	14,675	4,901	9,775	289		9,485			
Basic chemicals	3251	2,261	63	2,198	163	1	162	2	i	160			
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,117	25	1,092	79 - 128	0 - 47	80	*	i	80			
Pesticide, fertilizer, and other agricultural chemicals	3253	1,693	192	1,501	341 - 345	0 - 24	320 - 345	0 - 8	i	312 - 345			
Pharmaceuticals and medicines	3254	103,704	25,052	78,652	13,789	4,823	8,966	269		8,698			
Soap, cleaning compound, and toilet preparation	3256	2,887	291	2,596	195	31	164	*	i	163			
Paint, coating, adhesive, and other chemicals	3255, 3259	1,292	42	1,249	56 - 109	0 - 47	56 - 84	11 - 20		37 - 72			
Plastics and rubber products	326	2,823	53	2,770	114	29	85	*	i	85	i		
Nonmetallic mineral products	327	1,496	i	23	1,473	i	35	*		35	2	i	33
Primary metals	331	663	15	649	19	3	16	2		14			
Fabricated metal products	332	2,666	35	2,632	274	21	254	4		250			
Machinery	333	14,345	415	13,930	1,312	58	1,254	193		1,061			
Agricultural implement	33311	2,111	199	1,913	9	0	9	1	i	8			
Semiconductor machinery	333242	3,859	5	3,854	643	38	604	*	i	604			

TABLE 51

**Domestic R&D performance by source of funds and performer, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company			Paid for by others					
		Total	R&D performed by others (purchased and collaborative R&D)	R&D performed by the company	Total	R&D performed by others (subcontracted/ passed-through R&D costs)	R&D performed by the company			
							Total	Paid for by the U.S. government	Paid for by non-U.S. government sources	
Engine, turbine, and power transmission equipment	3336	1,114	18	1,096	219	14	205	155	51	
Other machinery	other 333	7,260	194	7,067	441	5	436	37	399	
Computer and electronic products	334	77,590	2,021	75,570	11,749	590	11,159	5,802	5,357	
Communications equipment	3342	12,431	936	11,495	1,133 - 1,136 i	32 - 35 i	1,100 i	320 - 453 i	647 - 780 i	
Semiconductor and other electronic components	3344	32,338	363	31,975 i	3,263	56	3,208	468	2,740	
Navigational, measuring, electromedical, and control instruments	3345	11,292	380	10,912	7,141	490	6,650	4,852	1,799	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,235	118	3,117	234	9	225	11 i	214	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,558	158	3,400	6,701	439	6,262	4,813	1,450	
Other measuring and controlling device	other 3345	4,499	104	4,395	205	42	163	28	135	
Other computer and electronic products	other 334	21,530	342	21,188	210 - 213	10 - 13	201	31 - 161	40 - 170	
Electrical equipment, appliances, and components	335	5,010	124	4,886	378	1	377	27	349	
Transportation equipment	336	35,560	4,055	31,505	14,897 i	1,027 i	13,870 i	9,652 i	4,218 i	
Motor vehicles, bodies, trailers, and parts	3361-63	24,254	3,371	20,883	3,398 i	165	3,233 i	38 - 481	2,753 - 3,195 i	
Aerospace products and parts	3364	9,532	632	8,900	10,317 i	859 i	9,458 i	8,454 i	1,005	
Aircraft, aircraft engine, and aircraft parts	336411-13	8,855	514	8,341	9,409 i	859 i	8,550 i	7,558 i	992	
Guided missile, space vehicle, and related parts	336414-15, 336419	677	118	559	908	0	908	896	13	
Military armored vehicle, tank, and tank component	336992	25	0	25	10	0	10	0 - 11	0 - 11	

TABLE 51

**Domestic R&D performance by source of funds and performer, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company			Paid for by others					
		Total	R&D performed by others (purchased and collaborative R&D)	R&D performed by the company	Total	R&D performed by others (subcontracted/ passed-through R&D costs)	R&D performed by the company			
							Total	Paid for by the U.S. government	Paid for by non-U.S. government sources	
Other transportation	other 336	1,749	51	1,697	1,171	3	1,168	706 - 1,160	9 - 461	
Furniture and related products	337	430	23	407	2	*	2	0 - 3	0 - 2	
Miscellaneous	339	19,059 - 19,153	708 - 800	18,352	277 - 284	33 - 40	244	36 - 48	195 - 208	
Medical equipment and supplies	3391	16,520	708	15,812	235	33	202	25	177	
Other miscellaneous manufacturing	3399	2,539 - 2,632	0 - 92	2,540	42 - 48	0 - 7	42	11 - 24	18 - 32	
Nonmanufacturing industries	21-23, 42-81	184,509	3,651	180,858	28,092	1,667	26,425	5,918	20,507	
Mining, quarrying, oil and gas extraction, and support activities	21	2,657	123	2,535	183	*	183	1	181	
Utilities	22	408	171	237	49	11	38	27 - 34	4 - 11	
Wholesale trade	42	1,151	47	1,104	90	3	87	0	87	
Electronic shopping and electronic auctions	454111-12	3,212 - 15,901	125	3,088 - 15,775	43 - 61	0	43 - 61	0 - 8	35 - 61	
Transportation and warehousing	48-49	9,547	43	9,504	386	0	386	2	384	
Information	51	111,123	2,061	109,062	1,236	72	1,165	185	980	
Publishing	511	33,448	1,001	32,447	616	44	572	57	515	
Newspaper, periodical, book, and directory publishers	5111	64	4	61	*	0	*	*	*	
Software publishers	5112	33,384	998	32,386	616	44	572	57	515	
Telecommunications	517	4,116	416	3,700	34	2	33	4	29	
Data processing, hosting, and related services	518	30,403	249	30,154	424	20	404	116	288	
Other information	other 51	43,156	395	42,761	161	6	155	8	148	
Finance and insurance	52	9,208	319	8,890	28	0	28	0	28	
Real estate and rental and leasing	53	1,378	7	1,371	0	0	0	0	0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	*	45	0	0	0	0	0	
Other real estate and rental and leasing	other 53	1,333	7	1,326	0	0	0	0	0	
Professional, scientific, and technical services	54	29,734	603	29,131	25,681	1,579	24,103	5,685	18,418	

TABLE 51

**Domestic R&D performance by source of funds and performer, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company			Paid for by others							
		Total	R&D performed by others (purchased and collaborative R&D)	R&D performed by the company	Total	R&D performed by others (subcontracted/ passed-through R&D costs)	R&D performed by the company					
							Total	Paid for by the U.S. government	Paid for by non-U.S. government sources			
Architectural, engineering, and related services	5413	2,382	95	2,288	2,289	370	1,919	1,214	705			
Computer systems design and related services	5415	18,524	128	18,395	2,697	46	2,651	454	2,197			
Scientific research and development services	5417	3,581	316	3,265	19,484	1,081	18,403	3,343	15,060	i		
Research and development in biotechnology	541711	1,201	118	1,083	5,491	118	5,374	108	5,266			
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,353	198	2,155	13,132	i	841	12,291	i	2,571	9,720	i
Research and development in the social sciences and humanities	541720	27	*	27	860	122	738	664	74			
Other professional, scientific, and technical services	other 54	5,247	64	5,182	1,211	82	1,129	674	455			
Health care services	621-23	1,994	66	1,928	341	4	337	2	335			
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,407 - 14,098	86	1,322 - 14,012	34 - 58	0	34 - 58	9 - 19	19 - 49			
All companies (number of domestic employees)	-	466,504	37,537	428,968	72,331	8,342	63,989	21,941	42,048			
Small companies												
10-19 <sup>a</sup>	-	4,946	514	4,432	1,212	143	1,070	502	568	i		
20-49	-	11,254	1,214	10,040	2,731	353	2,378	811	1,567			
Medium companies												
50-99	-	13,668	2,176	11,492	2,901	372	2,529	697	1,832			
100-249	-	18,432	1,912	16,520	3,621	348	3,274	988	2,285			
Large companies												
250-499	-	17,075	1,719	15,356	3,929	402	3,527	1,393	2,133			
500-999	-	23,667	2,118	21,549	2,613	193	2,420	248	i	2,171		
1,000-4,999	-	68,986	4,512	64,475	13,418	2,221	11,196	1,710	9,487			
5,000-9,999	-	50,362	5,634	44,728	6,642	559	6,083	977	5,106	i		
10,000-24,999	-	83,235	8,850	74,385	16,025	2,147	13,878	i	1,717	i	12,161	

TABLE 51

**Domestic R&D performance by source of funds and performer, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company			Paid for by others					
		Total	R&D performed by others (purchased and collaborative R&D)	R&D performed by the company	Total	R&D performed by others (subcontracted/ passed-through R&D costs)	R&D performed by the company			
							Total	Paid for by the U.S. government	Paid for by non-U.S. government sources	
25,000 or more	-	174,879	8,888	165,991	19,239	1,604	17,635	12,897	i	4,738

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.



TABLE 52

**R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2019**

(Millions of U.S. dollars)

Location	Total	Paid for by the company	Paid for by others
Total	104,464	93,944	10,519 i
Puerto Rico <sup>a</sup>	539 i	519 i	20
Canada	6,862	6,193	669
Latin America and Other Western Hemisphere	5,407 i	4,944	463 i
Argentina	402	287	115 i
Brazil	1,493	1,347	146 i
Chile	117	95	23 i
Mexico	1,022	937	85 i
Other Latin American and Western Hemisphere locations	2,373 i	2,278 i	95
Africa	372	280	92 i
South Africa	229 i	142	87 i
Other African locations	143	138	5 i
Asia and Pacific	32,458	30,227	2,231 i
Australia	2,032	1,873	159 i
China	8,195	7,666	528
Hong Kong	396	375	21 i
India	9,846	9,484	362 i
Indonesia	24	23	1 i
Japan	4,090	3,461	629 i
Malaysia	838	827	11 i
New Zealand	274	239	35
Singapore	2,376	2,187	189 i
South Korea	1,451	1,308	143 i
Taiwan	1,775	1,677	98
Thailand	380	355	25 i
Other Asian or Pacific locations	780	751	29 i
Europe	48,764	43,111	5,652 i
Austria	651 i	595 i	56 i
Belgium	2,324	2,150	174 i
Czechia	527	464	62 i
Denmark	593	551	42 i
Finland	600	564	35
France	3,313	2,831	481
Germany	8,879	8,399	480 i
Hungary	246	163	84 i
Ireland	4,207	4,071	135
Italy	1,611	1,382	229
Luxembourg	274	269	5
Netherlands	2,108	1,832	276 i
Norway	363	354	9
Poland	958	800	159 i
Russia	492	364	128 i
Spain	1,033	843	190 i
Sweden	1,247	1,185	62 i
Switzerland	4,536	4,025	512
Turkey	159	136	23 i
United Kingdom	11,797	9,545	2,252 i
Other European locations	2,847	2,588	259 i
Middle East	6,342	6,231	112 i
Israel	5,974	5,870	104 i

TABLE 52

**R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2019**

(Millions of U.S. dollars)

Location	Total	Paid for by the company	Paid for by others
Other Middle Eastern locations	369 i	361 i	8 i
Undistributed	3,720 i	2,441 i	1,279 i

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

<sup>a</sup> Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.

**Note(s):**

Detail may not add to total because of rounding. Country detail was not collected from companies reporting less than \$1 million of R&D paid for by the company or reporting less than \$1 million of R&D paid for by others. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018.

**Source(s):**

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

TABLE 53-A

## R&amp;D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part A)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Puerto Rico <sup>a</sup>	Canada	Austria	Belgium	Czechia	Denmark	Finland	France	Germany	Hungary	Ireland	Italy	Luxembourg	Netherlands	Norway	Poland	Russia	Spain	Sweden	Switzerland	Turkey	United Kingdom	Other European locations			
All industries	21-23, 31-33, 42-81	104,464	539 i	6,862	651 i	2,324	527	593	600	3,313	8,879	246	4,207	1,611	274	2,108	363	958	492	1,033	1,247	4,536	159	11,797	2,847			
Manufacturing industries	31-33	64,351	516 i	3,610	556 i	2,020	180	375	358	2,091	6,917	96	2,281	1,109	206	1,106	260	608	256	661	639	2,946	75	5,565	1,624			
Food	311	835	2	28	1	11	*	1	*	46	39	*	1	6	0	13	8	17	2	10	2	18	1	82	86			
Beverage and tobacco products	312	674	0	2	0	19	0	0	0	0	0	0	8	32	0	0	0	*	7	*	0	362	2	40	2			
Textile, apparel, and leather products	313-16	157	0	5	0	12	0	0	1	18	7	0	0	5	0	4	0	*	0	0	3	7	0	5	32			
Wood products	321	7	0	*	0	0-8	0	0	0	0-8	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Paper	322	101	0	53	0	0	0	0	1	2	14	0	0	0	0	1	0	1	0	0	*	1	1	4	0			
Printing and related support activities	323	9	i	0	0	0	0	0	0	0	9	i	0	0	0	0	0	0	0	0	0	0	0	0	0			
Petroleum and coal products	324	171 - 176	0	0-70	*	0-39	0	3	0	5	9	0	0	1	*	5	*	*	0	*	*	*	*	0-131	*			
Chemicals	325	18,568	103	789	360 i	1,631	30	119	48	711	1,128	38	1,454	319	181	398	46	100	97	324	175	1,772	57	2,224	1,041			
Basic chemicals	3251	742	0	0-87	0-3	43	0-4	8	0-6	54	60	0-3	0-2	14	0-122	65	1	0-5	0-3	21	0-6	29	8	88	24			
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	523	0	0-87	0	23	0	0	0-6	10	60	0	0	0-16	0-181	24	0	1	0-3	2	0	1	0-3	15	0-52			
Pesticide, fertilizer, and other agricultural chemicals	3253	450	35	0-87	8	0-12	0-4	25	0	2	3	0-3	0	*	0	0	0	*	0	1	0	0-6	0	15	10			
Pharmaceuticals and medicines	3254	15,868	67	684	351 i	1,459	27	87	43	606	810	36	1,453	288	1	277	45	93	95	298	170	1,724	48	1,964	i	956		
Soap, cleaning compound, and toilet preparation	3256	757	1	20	i	0	97	*	0	*	20	173	0-3	0	3	*	8	0	3	1	0-5	0-6	15	0-3	123	2		
Paint, coating, adhesive, and other chemicals	3255, 3259	227	*	0-87	0-3	0-12	0-4	0	0	19	21	0-3	0-2	0-16	0-116	23	0	0-5	0	0-5	0	0-6	0	20	0-52			
Plastics and rubber products	326	503	0	17	0	16	2	0	6	i	40	164	3	7	i	15	4	4	i	0	1	1	5	2	2	0	12	6
Nonmetallic mineral products	327	192	i	0	15	0	4	0	1	i	0	12	i	19	i	0	0	0	4	i	3	i	0	0	3	0	2	3
Primary metals	331	76	0	5	0	0	0	0	0	*	10	0	*	0	0	0	1	0	*	3	1	*	0	5	11			
Fabricated metal products	332	278	0	22	7	3	*	1	5	2	40	*	*	4	0	3	*	*	*	2	*	18	0	41	*			
Machinery	333	4,251	0	147	42 i	25	3	67	58	392	678	3	15	i	104	0	84	12	11	1	39	68	187	*	375	44		
Agricultural implement	33311	857	0	19	0-12	3	0-4	2	46	78	282	1	0	15	0	24	0	0-12	0-2	11	*	126	0-1	5	1			
Semiconductor machinery	333242	915	0	1	0-43	i	0-23	0	0	0	5	i	51	i	0	0-14	i	7	i	0	0	0	0	0	2	i	0	
Engine, turbine, and power transmission equipment	3336	630	0	20	0	*	0-4	51	0	204	40	1	2	i	15	0	5	0	0	0	13	*	31	0-1	41	15		



TABLE 53-A

## R&amp;D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part A)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Puerto Rico <sup>a</sup>	Canada	Austria	Belgium	Czechia	Denmark	Finland	France	Germany	Hungary	Ireland	Italy	Luxembourg	Netherlands	Norway	Poland	Russia	Spain	Sweden	Switzerland	Turkey	United Kingdom	Other European locations
Other transportation	other 336	234	0	59	0	0	1 i	*	0	14-70 i	28 i	0	0	*	0	1	0	3	0	0-64	1 i	0-9	0	21	4
Furniture and related products	337	35	0	3	0	0	0	5	0	7	3	0	0	3	0	0	0	0	0	0	0	0	0	7	0
Miscellaneous	339	3,482 - 3,488	0-159	86-156	25	16-55	19 i	15	33	162-183	436	4	268	31	1 i	125 i	27	12 i	54	20	103	170	5	198-329	41
Medical equipment and supplies	3391	3,069	0-159	87	19	17	6	14	33	163	415	4	265	29 i	0	123 i	27	1	54	18	80	170	3	199	18
Other miscellaneous manufacturing	3399	413-419	0	0-70 i	6	0-39 i	13 i	*	*	0-21	21	0	3 i	2	1 i	1	0	11 i	0	2 i	23	*	2 i	0-131	22
Nonmanufacturing industries	21-23, 42-81	40,113	23	3,252	95	304	346	217	242	1,221	1,961	150 i	1,926	502	68 i	1,002	103	350	236	372	608	1,590	84	6,233	1,222
Mining, quarrying, oil and gas extraction, and support activities	21	589	0	0-328 i	0	2	*	0	0	0-84	91 i	0	0	0-237	0	0-239	4 i	0	1 i	0	0	0	0	88 i	0
Utilities	22	9	0	*	*	0	*	0	0	0	0	0	0	0	0	0	0	*	0	*	0	0	0	8	0
Wholesale trade	42	113	0	0-28	0	0	0	0	0	* i	86	0	0	0	0	1	0	0	0	0	0	0	0	* i	* i
Electronic shopping and electronic auctions	454111-12	69-4,198 i	0	0-328 i	3 i	* i	1 i	0-24	0-6 i	0-84 i	0-387 i	* i	0-738 i	0-237 i	0-62 i	0-239	0-11 i	0-31 i	* i	0-38 i	14-43 i	6	0-29	0-332 i	0-44 i
Transportation and warehousing	48-49	62	0	0-37	0	1	0	0	0	1	0	0	0	0	0	0-37	0	0-31	9	0	0	0	0	3	0
Information	51	19,051	0-18	1,877	46	164	201	156	204	549	636	72	851	56	6-32	470	86	188	90	157	453	1,032	5-31	2,984	641
Publishing	511	6,949	0-6	1,015	0-12	0-137	63	108	42	225	235	0-15	0-332	27	7	0-227	49	41	45	94	352	72	6	671	358
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Software publishers	5112	6,949	0-6	1,015	0-12	0-137	63	108	42	225	235	0-15	0-332	27	7	0-227	49	41	45	94	352	72	6	671	358
Telecommunications	517	124	0	0-28	0	0	0	0-28	0	*	0-28	0	0-28	0	0	*	0	21	0	3	0-28	0	0	25	7
Data processing, hosting, and related services	518	5,891	*	634	35	28	135	19	0-163	205	198	58 i	317	0-30	0-25	244	0-38	75	43	50	48	0-205	0-25 i	591	240
Other information	other 51	6,087	0-18	198-230	0-12	0-137	4	0-31	0-163	118	173-205	0-15	173-535	0-30	0-25	0-227	0-38	51	1	11	23-55	754-961	0-25	1,697	36
Finance and insurance	52	1,175	0	43	* i	6 i	6	0	0	15 i	0-176 i	5	0-176	1 i	*	0-176	0	0-31 i	12	0-38 i	61	21	*	315	62
Real estate and rental and leasing	53	104	0	3-98	*	*	*	0-24	0	0-84	0-94	*	0-94	*	0	*	0	0	5	*	*	*	0	0-94	*



TABLE 53-A

**R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part A)**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Puerto Rico <sup>a</sup>	Canada	Austria	Belgium	Czechia	Denmark	Finland	France	Germany	Hungary	Ireland	Italy	Luxembourg	Netherlands	Norway	Poland	Russia	Spain	Sweden	Switzerland	Turkey	United Kingdom	Other European locations							
250-499	-	2,709	*	201	5	1	3	4	2	127	120	2	144	20	*	50	9	42	23	30	19	54	2	276	78							
500-999	-	2,953	0	300	4	34	18	42	38	108	249	31	97	32	0 - 39	45	16	16	43	15	11	52	0 - 39	497	181							
1,000-4,999	-	16,553	27	2,294	35	216	68	136	130	546	1,260	62	i	491	192	49	390	33	132	77	139	341	594	42	1,344	893						
5,000-9,999	-	11,965	18	809	62	i	81	86	94	55	i	514	878	51	349	151	0 - 50	498	35	i	213	i	52	i	181	243	393	i	0 - 50	1,239	161	i
10,000-24,999	-	23,612	446	i	839	388	i	643	45	i	146	75	1,074	2,105	54	i	332	548	92 - 159	511	75	194	104	i	373	i	283	567	5 - 72	2,983	i	610
25,000 or more	-	43,148	44	2,087	142	1,312	284	160	294	895	4,036	36	2,776	608	67	i	572	188	333	145	278	321	2,443	45	5,176	747						

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.<sup>b</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Country detail was not collected from companies reporting less than \$1 million of R&D paid for by the company or reporting less than \$1 million of R&D paid for by others. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 53-B

## R&amp;D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part B)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Argentina	Brazil	Chile	Mexico	Other Latin American locations	Australia	China	Hong Kong	India	Indonesia	Japan	Malaysia	New Zealand	Singapore	South Korea	Taiwan	Thailand	Other Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed
All industries	21-23, 31-33, 42-81	104,464	402	1,493	117	1,022	2,373 i	2,032	8,195	396	9,846	24	4,090	838	274	2,376	1,451	1,775	380	780	5,974	369 i	229 i	143	3,720 i
Manufacturing industries	31-33	64,351	172	1,101	51	841	1,449 i	1,113	5,923	263	4,483	16	2,722	811	201	1,563	1,097	972	281	612	3,894	226	73	114	2,318 i
Food	311	835	3	58 i	*	23	11	39	105 i	2	16	2	5	2	3	22	2	*	8	5	0-32	0-17	3	3	82-168 i
Beverage and tobacco products	312	674	1	7	1	21	24	5	45	0	8	1	28	0	0	28	0	0	0-17	0-9	0	16	2	0	0
Textile, apparel, and leather products	313-16	157	*	0-14	*	0-14	5	2	18	16	*	0	2	*	4	*	2	1	0	5	0	0	0	0	* i
Wood products	321	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper	322	101	0	7	0	*	1	0	3	0	0	0	0	0	0	*	12	0	0	*	0	*	0	0	* i
Printing and related support activities	323	9 i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	* i
Petroleum and coal products	324	171-176	*	0-20	0	0	0	0-25	17	0	1	0	1	*	0	2	0-10	0	0-17	0	0	0-17	0	0	* i
Chemicals	325	18,568	133	449	31	172	265	316	1,043	76	400 i	9	1,219	10	108	259	137	84	34	186	276	112	52	37	14 i
Basic chemicals	3251	742	3	24	1	8	5	5	70	1	10	3	14	1	*	61	1	4	2	5	0-63	0-32	3	0-24	* i
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	523	1	16	*	0-16	3	0-6	34	0-6	7	*	27	*	0-102	0-11	10	1	0-13	0-56	0	0-32	0	0-24	0-1 i
Pesticide, fertilizer, and other agricultural chemicals	3253	450	11	72	*	2	3	0-6	2	0-6	0-27	0-7	1	*	1-103	9	8	*	0-13	61	0	0	0	0	0-1 i
Pharmaceuticals and medicines	3254	15,868	115	309	29	144	243	305	803	70	350 i	0-7	1,139	6	6-25	108	114	79	19	65	214	81 i	26-50	13-38 i	14 i
Soap, cleaning compound, and toilet preparation	3256	757	3	27	*	5	12	2	106	1	9 i	*	33	3	*	73	2	*	2	2	*	0-25	0-24	0-24	0
Paint, coating, adhesive, and other chemicals	3255, 3259	227	*	1	*	0-16	*	0-6	27	0-6	0-27	0-7	3	*	0	0-11	2	*	0	0-56	0-63	0	0-24	*	0-1 i
Plastics and rubber products	326	503	3	25 i	0	26	2	2	66	*	3 i	*	24	1	*	1	4	0	5	0	9	0	0	0	27 i
Nonmetallic mineral products	327	192 i	0	0	0	3 i	0	0	13 i	0	1 i	0	31	0	0	0	48 i	10 i	0	0	21 i	0	*	0	0
Primary metals	331	76	0	4	0	*	*	15	5	0	0	0	0	0	0	*	0	1	0	0	0	0	0	0	13 i
Fabricated metal products	332	278	1	1	*	4	1	3	22	0	5	*	60	1	11	1	0	1	*	13	1	2	*	0	* i
Machinery	333	4,251	3	96	2	36	* i	35	396	4	384	* i	190	5	10	59	146	111 i	4	27	363	2 i	8	1	11 i
Agricultural implement	33311	857	3	76	2	21	*	2	36	0	100	0	*	1	3	*	0	0	0	*	0	0	*	0	0





TABLE 53-B

**R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part B)**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Argentina	Brazil	Chile	Mexico	Other Latin American locations	Australia	China	Hong Kong	India	Indonesia	Japan	Malaysia	New Zealand	Singapore	South Korea	Taiwan	Thailand	Other Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other transportation	other 336	234	0	1 i	0	*	0	2 i	0-11 i	3 i	0-15 i	0	0	0	0	0	* i	0-29	0-25 i	0	0	*	* i	* i	3 i
Furniture and related products	337	35	0	0	0	2	0	0	2	1	1	0	0	*	0	0	0	*	0	0	0	0	0	0	1 i
Miscellaneous	339	3,482 - 3,488	3-23	31	15	9-23	72	99-124	351	33 i	171	1	188	4	6	89	20-31	13	3	24-33	131-163	50-67 i	1	1	0-219 i
Medical equipment and supplies	3391	3,069	4	30	11	10	51	100	310	3	138	1	188	4	3	85	21	12	3	25	132	51 i	1	1	0-159 i
Other miscellaneous manufacturing	3399	413-419	0-20 i	*	4 i	0-14 i	20 i	0-25	41 i	30 i	33	0	*	0	3	3	0-10	1	0	0-9 i	0-32	0-17 i	0	* i	0-185
Nonmanufacturing industries	21-23, 42-81	40,113	230 i	393 i	66	181	924 i	919	2,272	133	5,364	9	1,369 i	26	73	813 i	354 i	804	99	169	2,080	143 i	156 i	29	1,402 i
Mining, quarrying, oil and gas extraction, and support activities	21	589	0-5	0-138	0	* i	0-20	0-238	14	0	0-393	*	0-393 i	0	0	0-214	0	0	*	0	0	0-107	0	0-10	0-59 i
Utilities	22	9	0	*	0	*	0	0-2	*	0	0	*	0	0	0-2	0	0	0	*	0	0	0	*	0	0
Wholesale trade	42	113	0	0	0	0	0	0	0-28	0-28	0	0	0-28 i	0-13	0	0	0	0	0	0	0	0	0	0	0-28 i
Electronic shopping and electronic auctions	454111-12	69-4,198 i	0-5 i	0-138 i	1 i	0-17 i	0-20 i	0-238 i	0-285 i	0-48 i	0-462 i	0-8 i	0-468 i	0-13 i	0-14 i	0-214 i	0-162 i	0-19 i	0-82 i	1 i	0-182 i	0-107 i	0-40 i	0-10 i	0
Transportation and warehousing	48-49	62	0	*	0	0	0	1	8	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Information	51	19,051	67	104	37	75	71	450	1,173	57	3,231	1-9	237-349	0-13	37	297	65	520	0-82	114	1,346	25	27-36	11-20	29-53
Publishing	511	6,949	11	0-35	0-35	0-12	9	0-237	690	17	1,446	1	84	0-13	15	59	26	0-237	0-82	79	468	8	4	9	16-29
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Software publishers	5112	6,949	11	0-35	0-35	0-12	9	0-237	690	17	1,446	1	84	0-13	15	59	26	0-237	0-82	79	468	8	4	9	16-29
Telecommunications	517	124	0	0	0	0-12	5	0-28	10	0-28	10	0	0-28	0	0	*	0	0	0-28	0	19	*	0	0	* i
Data processing, hosting, and related services	518	5,891	53	31	1	64	57	148	347	0-41	1,530	1 i	44	0-13	20	0-205	0-40	0-205 i	0-82 i	34	403	15	24	3	8 i
Other information	other 51	6,087	3	37-74	0-37	0-12	1	36-303	126	0-41	245	0-8	80-222	0-13	2	32-239	0-40	78-521	0-82	1	456	1	0-9	0-9	0-29 i
Finance and insurance	52	1,175	0-5	0-138	4	0-17	22	23 i	21	9 i	320	0	0-176	0-13	0-14 i	63	0-162	0-19	0-82 i	0-24	0-176	0-107	0-40 i	0-10 i	0-59 i

TABLE 53-B

## R&amp;D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part B)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Argentina	Brazil	Chile	Mexico	Other Latin American locations	Australia	China	Hong Kong	India	Indonesia	Japan	Malaysia	New Zealand	Singapore	South Korea	Taiwan	Thailand	Other Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed
Real estate and rental and leasing	53	104	*	*	0	*	0 - 20	*	0 - 94	*	*	*	0 - 94	*	*	3	*	*	*	*	*	*	0	*	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	101	*	*	0	*	0 - 20	*	0 - 94	*	*	*	0 - 94	*	*	3	*	*	*	*	*	*	0	*	0
Professional, scientific, and technical services	54	14,790	160 i	152 i	25 i	91	813 i	210 i	774	21 i	1,347	1 i	665 i	14 i	24 i	239 i	129 i	266 i	18 i	32 i	554	12 i	89 i	8 i	1,313 - 1,338 i
Architectural, engineering, and related services	5413	37	0	*	* i	*	0	* i	1 i	*	17	*	*	0	0	*	*	*	0	*	*	2	* i	*	3 i
Computer systems design and related services	5415	5,370	48 i	32	*	23	767 i	45	347	* i	994	0	70	3	2 i	71 i	6	194 i	1	13	463	3	9	3	118 - 146 i
Scientific research and development services	5417	9,006 i	111 i	109 i	23 i	68 i	46 i	158 i	403	21 i	267 i	1 i	595 i	11 i	21 i	167 i	120 i	56 i	17 i	19 i	74 i	7 i	80 i	5 i	1,190 i
Research and development in biotechnology	541711	2,793	22	24	7	30	12	67	195	6	103	0	145	2	11	15	39	14	3	4	24	0	5	0	* i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	6,205 i	89 i	85 i	15 i	38 i	26 - 35 i	92 i	208 i	15 i	163 i	1 i	449 i	9 i	11 i	152 i	81 i	42 i	14 i	15 i	49 i	7 i	74 i	5 i	1,181 - 1,191 i
Research and development in the social sciences and humanities	541720	8	0	0	0	0	0 - 7	0	0	0	1	0	0	0	0	0	0	0	*	0	0	0	1	0	0 - 8 i
Other professional, scientific, and technical services	other 54	376	1	12	2	0	*	6	23	0	70	0	*	0	*	1	3	16	0	1	18	*	0	0	1 i
Health care services	621-23	24	0	0	0	0	0	0 - 24	*	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	* i
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2 - 4,124	0 - 5	0 - 138	*	*	0 - 20	0 - 238	0 - 285	0 - 48	0 - 462 i	0	0 - 468	0 - 13	0	0 - 214	0 - 162	0	0 - 82	0 - 24	0 - 182 i	1	0	0	1 i
All companies (number of domestic employees)	-	104,464	402	1,493	117	1,022	2,373 i	2,032	8,195	396	9,846	24	4,090	838	274	2,376	1,451	1,775	380	780	5,974	369 i	229 i	143	3,720 i
Small companies																									
10-19 <sup>a</sup>	-	138	0	0	0	*	2	5	19	1	20	0	*	*	* i	*	11	1	0	0	3	*	0	0	10 i
20-49	-	457	2	2	0	1	2	4	89	3	72	0	6	3	*	4	4	7	0	2	3	*	3	2	28 i

TABLE 53-B

**R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2019 (part B)**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Argentina	Brazil	Chile	Mexico	Other Latin American locations	Australia	China	Hong Kong	India	Indonesia	Japan	Malaysia	New Zealand	Singapore	South Korea	Taiwan	Thailand	Other Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed	
Medium companies																										
50-99	-	737	3	3	2	2	1	11	64	*	107	0	3	*	2	6	*	19	0	4	47	11	*	0	12	i
100-249	-	2,192	3	4	1	8	35	22	270	20	129	1	23	*	7	47	33	118	6	31	264	4	3	*	31	i
Large companies																										
250-499	-	2,709	11	25	1	81	i 6	19	169	43	260	*	47	4	8	55	93	64	1	43	529	*	1	*	36	
500-999	-	2,953	31	17	0	27	12	63	205	15	241	1	i 86	5	11	48	20	57	11	37	182	6	1	i 4	27	i
1,000-4,999	-	16,553	60	i 126	8	77	86	308	1,428	70	2,275	5	345	61	37	447	96	207	174	168	i 752	15	22	1	297	i
5,000-9,999	-	11,965	35	i 149	14	i 127	i 920	i 136	691	i 45	i 916	i *	675	i 275	i 110	317	184	i 185	i 96	i 180	417	28	14	2	258	i
10,000-24,999	-	23,612	202	427	25	219	217	327	1,476	39	1,912	4	1,194	23	40	701	i 306	i 268	i 33	233	382	i 80	108	i 32	2,783	i
25,000 or more	-	43,148	55	740	68	480	1,093	i 1,137	3,784	159	3,912	13	1,712	466	59	751	703	849	58	83	3,395	224	i 77	i 103	239	i

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Country detail was not collected from companies reporting less than \$1 million of R&D paid for by the company or reporting less than \$1 million of R&D paid for by others. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 54

**Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Domestic R&D						
			Total	Land acquisition	Buildings and land improvement	Equipment	Capitalized software	All other	
All industries	21-23, 31-33, 42-81	781,625	29,106	237	3,739	15,663	5,475	3,992	
Manufacturing industries	31-33	337,722	17,674	230	2,987	10,745	1,669	2,043	
Food	311	18,408	432	102	77	180	42	31	
Beverage and tobacco products	312	8,239	160	0	101	46	1	12	i
Textile, apparel, and leather products	313-16	2,717	85	*	14	38	19	15	
Wood products	321	1,445	7	0	*	6	*	*	
Paper	322	6,715	65	0	2	59	1	4	i
Printing and related support activities	323	3,140	i 11	i *	i 0-6	i 7	i 0-6	0-6	i
Petroleum and coal products	324	29,185	125	*	0-14	91	0-29	0-18	
Chemicals	325	69,379	5,634	74	1,934	2,763	309	554	
Basic chemicals	3251	23,038	358	*	81	239	22	17	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	8,732	225	*	42	153	5	25	
Pesticide, fertilizer, and other agricultural chemicals	3253	3,978	57	0	0-20	20	0-18	19	i
Pharmaceuticals and medicines	3254	24,722	4,476	74	1,603	2,054	267	478	
Soap, cleaning compound, and toilet preparation	3256	5,528	170	0	40	114	0-18	0-18	i
Paint, coating, adhesive, and other chemicals	3255, 3259	3,380	347	i 0	143-165	i 184	i 0-18	0-18	
Plastics and rubber products	326	12,138	393	*	20	221	24	129	
Nonmetallic mineral products	327	4,445	69	0	10	42	1	16	
Primary metals	331	6,724	89	3	9	58	1	19	i
Fabricated metal products	332	6,408	204	*	10	136	9	50	
Machinery	333	15,899	953	1	95	588	130	139	
Agricultural implement	33311	1,963	58	*	14	27	4	13	
Semiconductor machinery	333242	1,226	419	1	37	284	39	58	
Engine, turbine, and power transmission equipment	3336	3,190	85	0	15	56	3	11	
Other machinery	other 333	9,521	391	*	29	221	83	58	
Computer and electronic products	334	38,870	i 5,765	18	i 439	4,111	759	438	
Communications equipment	3342	3,712	780	0	21	586	54	120	i
Semiconductor and other electronic components	3344	20,031	i 2,698	i 8	i 67	i 2,016	i 403	204	
Navigational, measuring, electromedical, and control instruments	3345	7,975	899	10	i 41	i 667	74	105	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1,340	222	i 9	i 5	i 181	i 11	15	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	2,429	448	i 1	21	i 302	50	74	i
Other measuring and controlling device	other 3345	4,206	228	0	15	184	14	15	
Other computer and electronic products	other 334	7,151	1,388	0	310	841	228	10	

TABLE 54

**Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Domestic R&D					
			Total	Land acquisition	Buildings and land improvement	Equipment	Capitalized software	All other
Electrical equipment, appliances, and components	335	4,785	477	1	35	346	20	76
Transportation equipment	336	90,041	2,066	13	147	1,366	186	354
Motor vehicles, bodies, trailers, and parts	3361-63	77,242	1,454	12	115	978	176	172
Aerospace products and parts	3364	8,344	486 - 495	1	30	297	4 - 7	156
Aircraft, aircraft engine, and aircraft parts	336411-13	8,090	438	0	12 - 18	265 - 269	3 - 6	146 - 157
Guided missile, space vehicle, and related parts	336414-15, 336419	253	48 - 57	1	12 - 19	30 - 32	1	0 - 11
Military armored vehicle, tank, and tank component	336992	21	1	0	0	1	0	* i
Other transportation	other 336	4,434	117 - 127 i	0	2	90 i	1 - 8	25
Furniture and related products	337	1,293	48	0	11	28	3	6
Miscellaneous	339	17,892	1089	16 i	78	660	144	191
Medical equipment and supplies	3391	13,545	954	16 i	71	561	135	171
Other miscellaneous manufacturing	3399	4,348	135	0	7	99	9	19
Nonmanufacturing industries	21-23, 42-81	443,902	11,432	7	752	4,918	3,807	1,949
Mining, quarrying, oil and gas extraction, and support activities	21	35,505	441	0	4	168	194	75
Utilities	22	104,459	210 i	0	* i	20 - 36 i	1 - 12	175 i
Wholesale trade	42	66 - 26,950 i	66 - 155 i	1	3 i	6 - 90 i	12 - 17 i	45 i
Electronic shopping and electronic auctions	454111-12	77 - 26,961	77 - 89 i	0	4 i	16 - 71 i	14 - 26	0 - 31
Transportation and warehousing	48-49	31,551	495	* i	23	168 i	216 i	88
Information	51	163,057	5,270	2	445	2,641	1,724	458
Publishing	511	21,758	1,166	2	266	548	256	94
Newspaper, periodical, book, and directory publishers	5111	12	1	0	0	*	1	0
Software publishers	5112	21,747	1,165	2	266	548	255	94
Telecommunications	517	72,902	241 i	0	4	182 i	52	4 i
Data processing, hosting, and related services	518	21,341	2,260	*	87	736	1,153	283 i
Other information	other 51	47,056	1,603	0	87	1,175	263	77
Finance and insurance	52	28,091	1,548 i	0	20 i	302 i	796 i	430
Real estate and rental and leasing	53	886	5 - 78	0	0	3	2 - 73	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	9	*	0	0	*	*	i 0
Other real estate and rental and leasing	other 53	878	5 - 78	0	0	3	1 - 73	*
Professional, scientific, and technical services	54	22,719	2,371	4	237	1,114	512	505
Architectural, engineering, and related services	5413	6,585	153	*	4 i	64 i	38 i	47 i
Computer systems design and related services	5415	10,079	935	3	37	506	246	144

TABLE 54

**Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Domestic R&D					
			Total	Land acquisition	Buildings and land improvement	Equipment	Capitalized software	All other
Scientific research and development services	5417	2,990	944	1	194	481	43	224
Research and development in biotechnology	541711	1,035	228	0	27	172	2	27
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	1,945	707	1	166	304	40	196
Research and development in the social sciences and humanities	541720	10	9	0	1	5	1	2
Other professional, scientific, and technical services	other 54	3,064	340	0	3	63	185	90
Health care services	621-23	2,863	385	0	10	308	33-70	0-31
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	27,749	480	*	6	93	234	147
All companies (number of domestic employees)	-	781,625	29,106	237	3,739	15,663	5,475	3,992
Small companies								
10-19 <sup>a</sup>	-	4,330	610	1	33	345	61	171
20-49	-	5,957	1,086	1	77	478	135	394
Medium companies								
50-99	-	9,279	958	* i	127	548	117	166
100-249	-	16,050	1,492	6	167	721	286	311
Large companies								
250-499	-	13,374	1,502	4	185	774	326	213
500-999	-	23,324	1,612	2	119	777	371	344
1,000-4,999	-	85,589	5,382	19	855	2,566	1,082	859
5,000-9,999	-	91,179	3,100	14	449	1,791	616	231
10,000-24,999	-	151,268	4,606	78	783	2,167	844	733
25,000 or more	-	381,274	8,758	112	943	5,497	1,637	569

\* = amount &lt; \$500,000; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. The "undistributed" column shown in prior years is no longer necessary because of processing improvements implemented beginning in 2015. 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.

TABLE 55

**Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2019**

(Thousands and percent)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)
All industries	21–23, 31–33, 42–81	32,296	2,676	8.3	21,213	1,832	8.6	11,083	844	7.6
Manufacturing industries	31–33	17,529	1,409	8.0	10,100	962	9.5	7,429	447	6.0
Food	311	1,558	35	2.2	985	23	2.3	573	12	2.2
Beverage and tobacco products	312	849	8	1.0	391	6	1.5	458	3	0.6
Textile, apparel, and leather products	313–16	401	8	2.1	220	7	3.1	181	1	0.8
Wood products	321	115	3	2.5	105	3	2.7	11	*	1.0
Paper	322	307	7	2.4	193	5	2.8	114	2	1.7
Printing and related support activities	323	305	5	1.5	262	5	1.7	43	*	0.2
Petroleum and coal products	324	155	9	5.8	91	6	7.1	64	3	3.9
Chemicals	325	2,439	255	10.5	1,451	186	12.8	988	70	7.1
Basic chemicals	3251	361	17	4.8	246	12	4.7	115	6	5.0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	156	10	6.5	83	6	7.5	74	4	5.4
Pesticide, fertilizer, and other agricultural chemicals	3253	101	10	9.8	69	7	10.8	31	2	7.4
Pharmaceuticals and medicines	3254	1,068	184	17.3	648	139	21.5	421	45	10.8
Soap, cleaning compound, and toilet preparation	3256	459	17	3.6	245	11	4.5	214	6	2.7
Paint, coating, adhesive, and other chemicals	3255, 3259	293	17	5.8	160	10	6.4	134	7	4.9
Plastics and rubber products	326	694	31	4.4	495	25	5.0	199	6	3.1
Nonmetallic mineral products	327	206	7	3.6	139	7	4.9	67	1	1.1
Primary metals	331	298	9	2.9	216	8	3.7	83	1	0.9
Fabricated metal products	332	558	36	6.4	387	34	8.7	171	2	1.2
Machinery	333	1,599	138	8.7	869	95	10.9	729	43	6.0
Agricultural implement	33311	180	22	12.1	100	13	12.8	80	9	11.1
Semiconductor machinery	333242	96	20	21.2	37	12	34.1	59	8	13.2
Engine, turbine, and power transmission equipment	3336	191	12	6.4	79	7	9.0	112	5	4.6
Other machinery	other 333	1,131	84	7.4	654	63	9.6	478	22	4.5
Computer and electronic products	334	2,525	446	17.7	1,167	264	22.6	1,358	182	13.4
Communications equipment	3342	266	72	27.0	151	40	26.5	114	32	27.7
Semiconductor and other electronic components	3344	890	181	20.3	309	95	30.8	581	85	14.7
Navigational, measuring, electromedical, and control instruments	3345	869	110	12.7	485	75	15.5	384	35	9.2



TABLE 55

**Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2019**

(Thousands and percent)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	181	24 i	13.3	96	16 i	16.8	85	8 i	9.3
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	307	40 i	13.1	205	33	16.1	102	7 i	7.1
Other measuring and controlling device	other 3345	381	46	12.1	185	26	14.1	196	20	10.2
Other computer and electronic products	other 334	500	84	16.7	221	54	24.3	279	30	10.7
Electrical equipment, appliances, and components	335	776	48	6.1	319	25	7.8	458	23 i	5.0
Transportation equipment	336	3,115	254	8.2	1,835	183	9.9	1,280	72	5.6
Motor vehicles, bodies, trailers, and parts	3361-63	2,120	169	8.0	1,040	108	10.4	1,080	61	5.6
Aerospace products and parts	3364	742	70	9.4	612	61	10.0	130	8	6.2
Aircraft, aircraft engine, and aircraft parts	336411-13	717	62	8.7	588	54	9.2	130	8	6.3
Guided missile, space vehicle, and related parts	336414-15, 336419	25	7	29.5	24	7	29.9	*	*	0.7
Military armored vehicle, tank, and tank component	336992	3	1	27.5	3	1	27.6	* i	0	0.0
Other transportation	other 336	250	15	6.0	180	12	6.8	70	3 i	3.9
Furniture and related products	337	164	4	2.7	139	4	2.8	25	*	1.8
Miscellaneous	339	1,466	104	7.1	837	78	9.4	630	26	4.2
Medical equipment and supplies	3391	1,079	82	7.6	586	59	10.1	492	23	4.7
Other miscellaneous manufacturing	3399	388	22	5.8	250	19	7.7	137	3	2.4
Nonmanufacturing industries	21-23, 42-81	14,766	1,267	8.6	11,113	870	7.8	3,654	396	10.9
Mining, quarrying, oil and gas extraction, and support activities	21	392	22 i	5.7	181	12	6.6	211	11 i	5.0
Utilities	22	359	0-35	D	348	0-23	D	12	0-12	D
Wholesale trade	42	303 i	16	5.1	255 i	13	5.2	48	2	4.6
Electronic shopping and electronic auctions	454111-12	1,008	42-114	D	413-1,005	38-64	D	3-595	3-52	D
Transportation and warehousing	48-49	1,357	19 i	1.4	1,047	18 i	1.7	310	1 i	0.2
Information	51	3,043	533	17.5	2,107	359	17.0	936	174	18.6
Publishing	511	599	181	30.2	359	110	30.6	241	71	29.5
Newspaper, periodical, book, and directory publishers	5111	4	1	17.7	3	1	17.5	*	*	27.5

TABLE 55

**Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2019**

(Thousands and percent)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)
Software publishers	5112	596	180	30.3	355	109	30.8	241	71	29.5
Telecommunications	517	682	20	2.9	606	19	3.1	77	1	1.1
Data processing, hosting, and related services	518	1,239	201	16.2	768	126	16.4	471	75	16.0
Other information	other 51	522	130	25.0	375	104	27.7	147	27	18.1
Finance and insurance	52	2,159	71	3.3	1,795	54	3.0	364	17	4.6
Real estate and rental and leasing	53	30	4	12.6	25	4	14.3	5	*	4.2
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1	*	13.4	1	*	13.0	*	*	30.8
Other real estate and rental and leasing	other 53	28	4	12.6	24	3	14.3	5	*	4.0
Professional, scientific, and technical services	54	2,595	441	17.0	1,421	299	21.1	1,175	142	12.1
Architectural, engineering, and related services	5413	464	59	12.7	323	58	18.0	140	1	0.6
Computer systems design and related services	5415	1,068	154	14.4	482	99	20.5	586	55	9.5
Scientific research and development services	5417	418	178	42.6	300	98	32.8	118	i 80	67.5
Research and development in biotechnology	541711	172	59	34.3	141	30	21.6	31	29	91.5
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	232	110	i 47.2	146	59	40.3	87	i 51	i 58.9
Research and development in the social sciences and humanities	541720	13	9	70.5	13	9	70.8	*	*	59.1
Other professional, scientific, and technical services	other 54	646	50	7.7	316	44	14.0	330	i 6	1.7
Health care services	621-23	510	12	2.4	507	12	2.4	3	*	3.1
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	3,010	38-88	D	2,418-3,011	39	D	0-591	0-49	D
All companies (number of domestic employees)	-	32,296	2,676	8.3	21,213	1,832	8.6	11,083	844	7.6
Small companies										
10-19 <sup>a</sup>	-	83	37	44.4	79	35	44.7	4	2	39.8
20-49	-	325	92	28.3	257	83	32.4	69	9	12.9
Medium companies										
50-99	-	423	95	22.5	356	85	23.8	67	10	15.4
100-249	-	975	150	15.4	719	127	17.7	256	23	8.8

TABLE 55

**Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2019**

(Thousands and percent)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)	Total	R&D	R&D employees (%)
Large companies										
250–499	–	991	130	13.1	760	105	13.8	231	25	10.8
500–999	–	1,202	134	11.1	859	100	11.6	343	34	9.9
1,000–4,999	–	4,575	454	9.9	2,854	305	10.7	1,721	149	8.6
5,000–9,999	–	2,971	280	9.4	1,677	182	10.9	1,294	97	7.5
10,000–24,999	–	6,282	465	7.4	3,518	267	7.6	2,764	198	7.2
25,000 or more	–	14,468	840	5.8	10,135	542	5.3	4,334	298	6.9

\* = amount < 500 employees; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 56

**Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, R&D employment, and R&D cost per R&D employee, by industry and company size: 2019**

(Millions of U.S. dollars, number of employees in thousands, and cost per employee in thousands of U.S. dollars)

Industry and company size	NAICS code	Company-performed R&D (US\$millions)			R&D employment (thousands)			Company-performed R&D per R&D employee (US\$thousands per employee)		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
All industries	21-23, 31-33, 42-81	597,420	492,956	104,464	2,676	1,832	844	223.2	269.0	123.8
Manufacturing industries	31-33	350,024	285,674	64,351	1,409	962	447	248.4	297.0	143.8
Food	311	5,015	4,180	835	35	23	12	143.3	184.7	67.5
Beverage and tobacco products	312	1,755	1,082	674	8	6	3	209.1	190.5	248.0
Textile, apparel, and leather products	313-16	1,061	904	157	8	7	1	128.4	132.1	110.4
Wood products	321	193	186	7	3	3	*	66.1	66.0	69.4
Paper	322	1,165	1,064	101	7	5	2	157.4	195.6	51.5
Printing and related support activities	323	429 i	420 i	9 i	5 i	5 i	* i	93.8	93.1	144.4
Petroleum and coal products	324	1,477 - 1,481	1,306	171 - 176	9	6	3	D	202.1	D
Chemicals	325	115,631	97,063	18,568	255	186	70	452.7	523.1	265.8
Basic chemicals	3251	3,102	2,360	742	17	12	6	178.9	203.8	128.8
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,695	1,172	523	10	6	4	166.3	188.1	131.9
Pesticide, fertilizer, and other agricultural chemicals	3253	2,272 - 2,297	1,822 - 1,846	450	10	7	2	D	D	193.3
Pharmaceuticals and medicines	3254	103,487	87,619	15,868	184	139	45	561.0	630.1	349.5
Soap, cleaning compound, and toilet preparation	3256	3,517	2,760	757	17	11	6	210.5	253.1	130.5
Paint, coating, adhesive, and other chemicals	3255, 3259	1,532 - 1,560	1,305 - 1,333	227	17	10	7	D	D	34.5
Plastics and rubber products	326	3,359	2,856	503	31	25	6	109.1	115.7	82.5
Nonmetallic mineral products	327	1,701 i	1,508 i	192 i	7 i	7 i	1 i	227.2	223.0	266.6
Primary metals	331	740	665	76	9	8	1	85.3	83.6	103.9
Fabricated metal products	332	3,163	2,885	278	36	34	2	88.2	85.4	133.0
Machinery	333	19,435	15,184	4,251	138	95	43	140.4	159.8	98.0
Agricultural implement	33311	2,778	1,921	857	22	13	9	127.5	149.1	96.3
Semiconductor machinery	333242	5,374	4,459	915	20	12	8	264.7	356.9	117.2
Engine, turbine, and power transmission equipment	3336	1,931	1,301	630	12	7	5	157.6	183.7	121.8
Other machinery	other 333	9,353	7,503	1,850	84	63	22	111.3	120.0	86.0
Computer and electronic products	334	112,180	86,729	25,452 i	446	264	182	251.4	328.5	139.7
Communications equipment	3342	15,907 - 15,912	12,595	3,312 - 3,316	72	40	32	D	315.1	D
Semiconductor and other electronic components	3344	48,189 i	35,183 i	13,007 i	181	95	85	266.9	369.2	152.6
Navigational, measuring, electromedical, and control instruments	3345	21,512	17,562	3,950	110	75	35 i	195.2	234.2	112.2
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,621 i	3,342	1,280 i	24 i	16 i	8 i	192.1	206.9	161.9

TABLE 56

**Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, R&D employment, and R&D cost per R&D employee, by industry and company size: 2019**

(Millions of U.S. dollars, number of employees in thousands, and cost per employee in thousands of U.S. dollars)

Industry and company size	NAICS code	Company-performed R&D (US\$millions)			R&D employment (thousands)			Company-performed R&D per R&D employee (US\$thousands per employee)		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	10,541	9,662	878	40	i 33	7	i 262.4	294.2	119.9
Other measuring and controlling device	other 3345	6,350	4,558	1,792	46	26	20	138.1	175.3	89.7
Other computer and electronic products	other 334	26,567 - 26,571	21,388	5,179 - 5,183	i 84	54	30	D	397.8	D
Electrical equipment, appliances, and components	335	7,006	5,263	1,743	48	25	23	i 147.1	212.3	76.3
Transportation equipment	336	53,187	45,375	7,812	254	183	72	209.2	248.5	109.0
Motor vehicles, bodies, trailers, and parts	3361-63	31,110	24,117	6,993	169	108	61	184.2	223.2	115.0
Aerospace products and parts	3364	18,943	i 18,358	i 585	70	61	8	272.4	298.8	72.1
Aircraft, aircraft engine, and aircraft parts	336411-13	17,476	i 16,891	i 585	62	54	8	280.9	312.2	72.1
Guided missile, space vehicle, and related parts	336414-15, 336419	1,467	1,467	*	7	7	*	200.1	200.2	100.0
Military armored vehicle, tank, and tank component	336992	35	35	0	1	1	0	39.5	39.5	NA
Other transportation	other 336	3,099	2,865	234	15	12	3	i 207.3	234.4	85.9
Furniture and related products	337	444	409	35	4	4	*	101.7	104.1	79.7
Miscellaneous	339	22,077 - 22,084	18,596	3,482 - 3,488	104	78	26	D	237.4	D
Medical equipment and supplies	3391	19,083	16,014	3,069	82	59	23	232.6	270.7	134.0
Other miscellaneous manufacturing	3399	2,995 - 3,002	2,582	413 - 419	22	19	3	D	134.6	D
Nonmanufacturing industries	21-23, 42-81	247,396	207,283	40,113	1,267	870	396	195.3	238.1	101.2
Mining, quarrying, oil and gas extraction, and support activities	21	3,307	2,717	589	22	i 12	11	i 147.1	228.3	55.7
Utilities	22	284	275	9	0 - 35	0 - 23	0 - 12	D	D	D
Wholesale trade	42	1,304	1,191	113	16	13	2	84.0	89.4	51.4
Electronic shopping and electronic auctions	454111-12	3,200 - 20,013	i 3,131 - 15,818	i 69 - 4,198	i 42 - 114	38 - 64	3 - 52	D	D	D
Transportation and warehousing	48-49	9,952	i 9,890	i 62	19	i 18	i 1	i 532.9	550.9	86.0
Information	51	129,277	110,227	19,051	533	359	174	242.7	307.3	109.5
Publishing	511	39,968	33,019	6,949	181	110	71	220.9	300.8	97.7
Newspaper, periodical, book, and directory publishers	5111	61	61	0	1	1	*	97.4	99.6	0.0
Software publishers	5112	39,907	32,958	6,949	180	109	71	221.3	301.9	97.7
Telecommunications	517	3,856	3,733	124	20	19	1	194.0	196.4	141.8
Data processing, hosting, and related services	518	36,449	30,558	5,891	201	126	75	181.0	242.5	78.2
Other information	other 51	49,004	42,917	6,087	130	104	27	375.6	413.2	228.9
Finance and insurance	52	10,092	8,917	1,175	71	54	17	142.7	164.8	70.8

TABLE 56

**Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, R&D employment, and R&D cost per R&D employee, by industry and company size: 2019**

(Millions of U.S. dollars, number of employees in thousands, and cost per employee in thousands of U.S. dollars)

Industry and company size	NAICS code	Company-performed R&D (US\$millions)			R&D employment (thousands)			Company-performed R&D per R&D employee (US\$thousands per employee)		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Real estate and rental and leasing	53	1,476	1,371	104	4	4	*	395.8	389.0	512.8
Lessors of nonfinancial intangible assets (except copyrighted works)	533	48	45	4	*	*	*	288.6	283.4	373.5
Other real estate and rental and leasing	other 53	1,427	1,326	101	4	3	*	400.8	394.0	519.8
Professional, scientific, and technical services	54	68,023	53,233	14,790	441	299	142	154.3	177.9	104.4
Architectural, engineering, and related services	5413	4,244	4,207	37	59	58	1	71.9	72.3	44.2
Computer systems design and related services	5415	26,416	21,046	5,370	154	99	55	171.5	213.5	96.9
Scientific research and development services	5417	30,675	21,669	9,006	178	98	80	172.3	220.5	112.9
Research and development in biotechnology	541711	9,250	6,457	2,793	59	30	29	156.7	211.9	97.8
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	20,651	14,446	6,205	110	59	51	188.2	246.1	121.6
Research and development in the social sciences and humanities	541720	774	766	8	9	9	*	83.6	84.2	49.5
Other professional, scientific, and technical services	other 54	6,688	6,312	376	50	44	6	134.6	143.0	67.8
Health care services	621-23	2,289	2,265	24	12	12	*	188.1	187.6	247.6
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,382 - 18,191	1,380 - 14,067	2 - 4,124	38 - 88	39	0 - 49	D	D	D
All companies (number of domestic employees)	-	597,420	492,956	104,464	2,676	1,832	844	223.2	269.0	123.8
Small companies										
10-19 <sup>a</sup>	-	5,639	5,501	138	37	35	2	152.5	156.0	80.5
20-49	-	12,875	12,418	457	92	83	9	140.1	149.5	51.7
Medium companies										
50-99	-	14,758	14,021	737	95	85	10	154.9	165.1	71.4
100-249	-	21,986	19,793	2,192	150	127	23	146.7	155.4	97.4
Large companies										
250-499	-	21,592	18,883	2,709	130	105	25	166.6	180.4	108.8
500-999	-	26,922	23,969	2,953	134	100	34	201.5	240.1	87.4
1,000-4,999	-	92,224	75,671	16,553	454	305	149	203.1	247.8	111.3
5,000-9,999	-	62,775	50,811	11,965	280	182	97	224.3	278.6	122.8
10,000-24,999	-	111,876	88,263	23,612	465	267	198	240.6	330.3	119.4
25,000 or more	-	226,773	183,626	43,148	840	542	298	270.0	338.7	144.9

\* = amount < \$500,000 or < 500 employees; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Ratios were calculated using unrounded data. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 57

## Worldwide, domestic, and foreign R&amp;D employment, by sex, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
All industries	21-23, 31-33, 42-81	2,676	1,931	745	1,832	1,344	488	844	587	256
Manufacturing industries	31-33	1,409	1,049	360	962	720	241	447	329	119
Food	311	35	19	16	23	13	10	12	6	6
Beverage and tobacco products	312	8	5	3	6	4	2	3	1	1
Textile, apparel, and leather products	313-16	8	5	3	7	4	3	1	1	1
Wood products	321	3	3	*	3	2	*	*	*	*
Paper	322	7	6	2	5	4	1	2	1	*
Printing and related support activities	323	5 i	3 i	1 i	5 i	3 i	1 i	* i	* i	* i
Petroleum and coal products	324	9	6	3	6	5	2	3	1	1
Chemicals	325	255	135	121	186	99	86	70	35	34
Basic chemicals	3251	17	11	6	12	8	3	6	3	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	10	8	3	6	5	1	4	3	1
Pesticide, fertilizer, and other agricultural chemicals	3253	10	6	3	7	5	3	2	2	1
Pharmaceuticals and medicines	3254	184	88	96	139	68	71	45	20	25
Soap, cleaning compound, and toilet preparation	3256	17	8	8	11	6	5	6	3	3
Paint, coating, adhesive, and other chemicals	3255, 3259	17	12	5	10	8	3	7	5	2
Plastics and rubber products	326	31	25	6	25	20	5	6	5	1
Nonmetallic mineral products	327	7 i	6 i	1 i	7 i	6 i	1 i	1 i	1 i	* i
Primary metals	331	9	8	1	8	7	1	1	1	*
Fabricated metal products	332	36	32	4	34	30	4	2	2	1
Machinery	333	138	118	20	95	82	13	43	36	7
Agricultural implement	33311	22	19	3	13	11	1	9	7	2
Semiconductor machinery	333242	20	17	3	12	11	2	8	7	1
Engine, turbine, and power transmission equipment	3336	12	10	2	7	6	1	5	4	1
Other machinery	other 333	84	72	13 i	63	54	9	22	18 i	4 i
Computer and electronic products	334	446	356	90 i	264	212	52	182	144 i	38 i
Communications equipment	3342	72	60	12	40	33	7	32	27	5
Semiconductor and other electronic components	3344	181	144 i	37 i	95	77 i	19 i	85	67 i	18 i
Navigational, measuring, electromedical, and control instruments	3345	110	85 i	25 i	75	58 i	17 i	35 i	26 i	9 i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	24 i	16 i	8 i	16 i	11 i	5 i	8 i	5 i	3 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	40 i	33 i	7 i	33	27 i	6 i	7 i	6 i	2 i
Other measuring and controlling device	other 3345	46	35	11	26	20	6	20	15	5
Other computer and electronic products	other 334	84	67	16	54	43	10	30	24 i	6 i
Electrical equipment, appliances, and components	335	48	37	10 i	25	20	5	23 i	18 i	5 i
Transportation equipment	336	254	211	43	183	152	30	72	59	12
Motor vehicles, bodies, trailers, and parts	3361-63	169	140	29	108	90	18	61	50	11



TABLE 57

## Worldwide, domestic, and foreign R&amp;D employment, by sex, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Aerospace products and parts	3364	70	59	11	61	52	9	8	7	1
Aircraft, aircraft engine, and aircraft parts	336411-13	62	53	9	54	46	8	8	7	1
Guided missile, space vehicle, and related parts	336414-15, 336419	7	6	1	7	6	1	*	*	0
Military armored vehicle, tank, and tank component	336992	1	1	*	1	1	*	0	0	0
Other transportation	other 336	15	12	3	12	9	3	3	2	*
Furniture and related products	337	4	3	1	4	3	1	*	*	*
Miscellaneous	339	104	71	33	78	54	24	26	17	9
Medical equipment and supplies	3391	82	55	27	59	40	19	23	15	8
Other miscellaneous manufacturing	3399	22	16	6	19	14	5	3	2	1
Nonmanufacturing industries	21-23, 42-81	1,267	882	385	870	624	247	396	259	138
Mining, quarrying, oil and gas extraction, and support activities	21	22	19	4	12	10	2	11	9	2
Utilities	22	0-35	0-35	*	0-23	0-23	*	0-12	0-12	*
Wholesale trade	42	16	13	3	13	10-14	0-4	2	0-3	0-3
Electronic shopping and electronic auctions	454111-12	42-114	12-102	0-40	38-64	12-64	0-27	3-52	0-38	0-19
Transportation and warehousing	48-49	19	14	4	18	14	4	1	1	*
Information	51	533	396	137	359	270	89	174	126	48
Publishing	511	181	129	52	110	81	29	71	48	23
Newspaper, periodical, book, and directory publishers	5111	1	*	*	1	*	*	*	*	*
Software publishers	5112	180	128	52	109	81	29	71	48	23
Telecommunications	517	20	15	5	19	14	5	1	1	*
Data processing, hosting, and related services	518	201	151	51	126	94	32	75	57	19
Other information	other 51	130	101	29	104	80	23	27	21	6
Finance and insurance	52	71	45	26	54	33	21	17	11	5
Real estate and rental and leasing	53	4	3	1	4	3	1	*	*	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	*	*	*	*	*	*	*	*
Other real estate and rental and leasing	other 53	4	2	1	3	2	1	*	*	*
Professional, scientific, and technical services	54	441	274	167	299	198	101	142	76	66
Architectural, engineering, and related services	5413	59	46	13	58	45	13	1	1	*
Computer systems design and related services	5415	154	119	35	99	76	23	55	43	12
Scientific research and development services	5417	178	76	102	98	48	50	80	28	52
Research and development in biotechnology	541711	59	26	33	30	14	17	29	12	17
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	110	48	62	59	32	27	51	16	35
Research and development in the social sciences and humanities	541720	9	3	7	9	3	7	*	*	*

TABLE 57

**Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2019**

(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Other professional, scientific, and technical services	other 54	50	33	17	44	29	16	6	4	2
Health care services	621-23	12	6	6	12	6	6	*	*	*
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	38 - 88	12 - 78	0 - 40	39	12 - 40	0 - 27	0 - 49	0 - 38	0 - 19
All companies (number of domestic employees)	-	2,676	1,931	745	1,832	1,344	488	844	587	256
Small companies										
10-19 <sup>a</sup>	-	37	28	9	35	27	9	2	1	*
20-49	-	92	73	19	83	67	17	9	6	2
Medium companies										
50-99	-	95	73	22	85	65	20	10	8	2
100-249	-	150	117	33	127	100	27	23	16	6
Large companies										
250-499	-	130	99	30	105	80	25	25	19	5
500-999	-	134	101	32	100	76	24	34	26	8
1,000-4,999	-	454	334	121	305	225	80	149	108	40
5,000-9,999	-	280	193	87	182	127	55	97	65	32
10,000-24,999	-	465	307	158	267	181	87	198	127	71
25,000 or more	-	840	606	234	542	396	146	298	210	88

\* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 58

## Worldwide total employment, R&amp;D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment		Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
					Total	With PhD		
All industries	21-23, 31-33, 42-81	32,296		2,676	1,815	165	614	246
Manufacturing industries	31-33	17,529		1,409	1,003	104	265	141
Food	311	1,558		35	21	2 i	9	5
Beverage and tobacco products	312	849		8	5	2	2	1
Textile, apparel, and leather products	313-16	401		8	4	1	3	1
Wood products	321	115		3	1	*	1	*
Paper	322	307		7	5	*	2	*
Printing and related support activities	323	305	i	5 i	3 i	* i	1 i	1
Petroleum and coal products	324	155		9	2	*	6	1
Chemicals	325	2,439		255	173	41	44	38
Basic chemicals	3251	361		17	9	3	7	1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	156		10	7	2	3	1
Pesticide, fertilizer, and other agricultural chemicals	3253	101		10	5	2	2	2
Pharmaceuticals and medicines	3254	1,068		184	126	31	27	32
Soap, cleaning compound, and toilet preparation	3256	459		17	14	2	2	1
Paint, coating, adhesive, and other chemicals	3255, 3259	293		17	12	2	4	1
Plastics and rubber products	326	694		31	14	1 i	13	4
Nonmetallic mineral products	327	206		7 i	5 i	1 i	2 i	1
Primary metals	331	298		9	3	* i	2	3
Fabricated metal products	332	558		36	16	*	15	6
Machinery	333	1,599		138	98	5	29	11
Agricultural implement	33311	180		22	15	*	5	2
Semiconductor machinery	333242	96		20	17	3	3	1
Engine, turbine, and power transmission equipment	3336	191		12	10	*	2	1
Other machinery	other 333	1,131		84	56	2 i	20	8
Computer and electronic products	334	2,525		446	364	30 i	52 i	30
Communications equipment	3342	266		72	57	2	8	6
Semiconductor and other electronic components	3344	890		181	158	15 i	16	6
Navigational, measuring, electromedical, and control instruments	3345	869		110	83 i	8	19 i	8 i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	181		24 i	17 i	2 i	6 i	2 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	307		40 i	32 i	2	5 i	3 i
Other measuring and controlling device	other 3345	381		46	34	4	8 i	4 i
Other computer and electronic products	other 334	500		84	66	5 i	9 i	10
Electrical equipment, appliances, and components	335	776		48	36 i	4 i	9	3
Transportation equipment	336	3,115		254	186	10	44	24
Motor vehicles, bodies, trailers, and parts	3361-63	2,120		169	128	6	25	15
Aerospace products and parts	3364	742		70	49	3 i	14	6
Aircraft, aircraft engine, and aircraft parts	336411-13	717		62	44	3 i	13	5

TABLE 58

## Worldwide total employment, R&amp;D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Guided missile, space vehicle, and related parts	336414-15, 336419	25	7	5	*	2	1
Military armored vehicle, tank, and tank component	336992	3	1	*	*	1	0
Other transportation	other 336	250	15	8	*	4	3
Furniture and related products	337	164	4	2	*	2	1
Miscellaneous	339	1,466	104	66	6	29	10
Medical equipment and supplies	3391	1,079	82	54	5	22	6
Other miscellaneous manufacturing	3399	388	22	12	*	7	4
Nonmanufacturing industries	21-23, 42-81	14,766	1,267	813	61	349	105
Mining, quarrying, oil and gas extraction, and support activities	21	392	22	10	1	9	4
Utilities	22	359	0 - 35	1	*	0 - 33	*
Wholesale trade	42	303	16	7	1	6	3
Electronic shopping and electronic auctions	454111-12	1,008	42 - 114	22 - 91	5	0 - 54	3 - 13
Transportation and warehousing	48-49	1,357	19	13	1	3	2
Information	51	3,043	533	388	26	109	36
Publishing	511	599	181	139	9	30	12
Newspaper, periodical, book, and directory publishers	5111	4	1	*	*	*	*
Software publishers	5112	596	180	139	9	30	12
Telecommunications	517	682	20	9	1	10	*
Data processing, hosting, and related services	518	1,239	201	134	4	48	20
Other information	other 51	522	130	106	12	21	4
Finance and insurance	52	2,159	71	35	1	26	9
Real estate and rental and leasing	53	30	4	3	*	*	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1	*	*	*	*	*
Other real estate and rental and leasing	other 53	28	4	3	*	*	*
Professional, scientific, and technical services	54	2,595	441	256	24	144	40
Architectural, engineering, and related services	5413	464	59	41	3	14	5
Computer systems design and related services	5415	1,068	154	122	7	24	8
Scientific research and development services	5417	418	178	69	11	87	22
Research and development in biotechnology	541711	172	59	26	4	32	1
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	232	110	40	7	54	15
Research and development in the social sciences and humanities	541720	13	9	2	*	1	6
Other professional, scientific, and technical services	other 54	646	50	25	3	20	5
Health care services	621-23	510	12	9	2	2	1
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	3,010	38 - 88	3 - 67	*	0 - 54	0 - 9
All companies (number of domestic employees)	-	32,296	2,676	1,815	165	614	246
Small companies							

TABLE 58

**Worldwide total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019**

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
10–19 <sup>b</sup>	–	83	37	26	4	8	3
20–49	–	325	92	55	8	29	8
Medium companies							
50–99	–	423	95	53	7	33	9
100–249	–	975	150	91	9	42	17
Large companies							
250–499	–	991	130	82	8	35	13
500–999	–	1,202	134	79	7	43	12
1,000–4,999	–	4,575	454	325	26	89	40
5,000–9,999	–	2,971	280	186	19	55	39
10,000–24,999	–	6,282	465	294	28	134	37
25,000 or more	–	14,468	840	625	50	147	68

\* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Researchers include R&D scientists and engineers and their managers.

<sup>b</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 59

## Domestic total employment, R&amp;D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All industries	21-23, 31-33, 42-81	21,213	1,832	1,232	130	426	174
Manufacturing industries	31-33	10,100	962	652	79	206	105
Food	311	985	23	12	2 i	6	4
Beverage and tobacco products	312	391	6	3	1	2	1
Textile, apparel, and leather products	313-16	220	7	3	1	3	1
Wood products	321	105	3	1	*	1	*
Paper	322	193	5	4	*	2	*
Printing and related support activities	323	262 i	5 i	3 i	* i	1 i	1
Petroleum and coal products	324	91	6	1	*	4	1
Chemicals	325	1,451	186	127	34	33	26
Basic chemicals	3251	246	12	7	3	4	1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	83	6	4	1	1	*
Pesticide, fertilizer, and other agricultural chemicals	3253	69	7	4	1	2	1
Pharmaceuticals and medicines	3254	648	139	95	27	22	21
Soap, cleaning compound, and toilet preparation	3256	245	11	9	1	1	1
Paint, coating, adhesive, and other chemicals	3255, 3259	160	10	7	1	2	1
Plastics and rubber products	326	495	25	11	1	10	3
Nonmetallic mineral products	327	139	7 i	4 i	* i	1 i	1
Primary metals	331	216	8	2	*	2	3
Fabricated metal products	332	387	34	14	*	14	6
Machinery	333	869	95	62	4	25	8
Agricultural implement	33311	100	13	8	*	4	1
Semiconductor machinery	333242	37	12	10	2	2	1
Engine, turbine, and power transmission equipment	3336	79	7	5	*	1	*
Other machinery	other 333	654	63	39	2 i	17	6
Computer and electronic products	334	1,167	264	210	22 i	35	19
Communications equipment	3342	151	40	31	1	6	3
Semiconductor and other electronic components	3344	309	95	80	10 i	10	5
Navigational, measuring, electromedical, and control instruments	3345	485	75	56 i	5	14 i	5 i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	96	16 i	12 i	1 i	3 i	1 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	205	33	26 i	2	5	2 i
Other measuring and controlling device	other 3345	185	26	18	3	6	2
Other computer and electronic products	other 334	221	54	43	5 i	5 i	5
Electrical equipment, appliances, and components	335	319	25	16	1	6	2
Transportation equipment	336	1,835	183	126	7	36	20
Motor vehicles, bodies, trailers, and parts	3361-63	1,040	108	78	4	18	12
Aerospace products and parts	3364	612	61	42	3 i	14	6
Aircraft, aircraft engine, and aircraft parts	336411-13	588	54	37	3 i	12	5

TABLE 59

## Domestic total employment, R&amp;D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Guided missile, space vehicle, and related parts	336414–15, 336419	24	7	5	*	2	1
Military armored vehicle, tank, and tank component	336992	3	1	*	*	1	0
Other transportation	other 336	180	12	6	*	4	2
Furniture and related products	337	139	4	2	*	1	1
Miscellaneous	339	837	78	49	5	21	8
Medical equipment and supplies	3391	586	59	38	4	16	5
Other miscellaneous manufacturing	3399	250	19	10	*	6	3
Nonmanufacturing industries	21–23, 42–81	11,113	870	580	51	221	69
Mining, quarrying, oil and gas extraction, and support activities	21	181	12	7	1	3	2
Utilities	22	348	0-23	0-2	*	0-21	*
Wholesale trade	42	255	i 13	4-7	*	3-7	3
Electronic shopping and electronic auctions	454111–12	413-1,005	38-64	22-64	5	i 0-30	0-8
Transportation and warehousing	48–49	1,047	18	i 13	i 1	i 3	i 2
Information	51	2,107	359	266	21	73	20
Publishing	511	359	110	87	7	i 16	6
Newspaper, periodical, book, and directory publishers	5111	3	1	*	*	*	*
Software publishers	5112	355	109	87	7	i 16	6
Telecommunications	517	606	19	9	i 1	i 10	i *
Data processing, hosting, and related services	518	768	126	84	3	i 31	10
Other information	other 51	375	104	86	11	15	3
Finance and insurance	52	1,795	54	27	1	i 21	6
Real estate and rental and leasing	53	25	4	3	*	*	i *
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1	*	*	*	*	i *
Other real estate and rental and leasing	other 53	24	3	3	*	*	i *
Professional, scientific, and technical services	54	1,421	299	181	19	88	31
Architectural, engineering, and related services	5413	323	58	40	3	14	5
Computer systems design and related services	5415	482	99	74	5	i 20	5
Scientific research and development services	5417	300	98	46	9	36	17
Research and development in biotechnology	541711	141	30	14	3	16	1
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	146	59	30	6	19	i 10
Research and development in the social sciences and humanities	541720	13	9	2	*	1	6
Other professional, scientific, and technical services	other 54	316	44	21	i 2	i 19	4
Health care services	621–23	507	12	9	2	2	1
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,418-3,011	39	3-40	*	i 0-30	0-8
All companies (number of domestic employees)	–	21,213	1,832	1,232	130	426	174
Small companies							

TABLE 59

**Domestic total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019**

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
10–19 <sup>b</sup>	–	79	35	25	4	8	3
20–49	–	257	83	50	7	26	8
Medium companies							
50–99	–	356	85	47	7	29	9
100–249	–	719	127	74	8	38	15
Large companies							
250–499	–	760	105	62	7	31	12
500–999	–	859	100	61	6	29	10
1,000–4,999	–	2,854	305	213	20	63	29
5,000–9,999	–	1,677	182	117	14	37	28
10,000–24,999	–	3,518	267	178	20	68	22
25,000 or more	–	10,135	542	405	37 i	98	40

\* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Researchers include R&D scientists and engineers and their managers.

<sup>b</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.



TABLE 60

## Foreign total employment, R&amp;D employment, and level of education of researchers, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All industries	21-23, 31-33, 42-81	11,083	844	584	36	188	72
Manufacturing industries	31-33	7,429	447	351	25	60	36
Food	311	573	12	9	*	2	1 i
Beverage and tobacco products	312	458	3	2	1	1	*
Textile, apparel, and leather products	313-16	181	1	1	*	1	*
Wood products	321	11	*	*	*	*	*
Paper	322	114	2	2	*	*	*
Printing and related support activities	323	43 i	* i	* i	0	*	* i
Petroleum and coal products	324	64	3	1	*	2	*
Chemicals	325	988	70	46	7	11	12
Basic chemicals	3251	115	6	3	1	3	*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	74	4	2	*	1	*
Pesticide, fertilizer, and other agricultural chemicals	3253	31	2	1	*	1	1
Pharmaceuticals and medicines	3254	421	45	31	5	4	10
Soap, cleaning compound, and toilet preparation	3256	214	6	5	1	*	*
Paint, coating, adhesive, and other chemicals	3255, 3259	134	7	5	*	1	*
Plastics and rubber products	326	199	6	3 i	* i	3	1
Nonmetallic mineral products	327	67 i	1 i	* i	* i	* i	* i
Primary metals	331	83	1	*	* i	*	* i
Fabricated metal products	332	171	2	2	*	*	*
Machinery	333	729	43	36	1	4	3
Agricultural implement	33311	80	9	7	* i	1	*
Semiconductor machinery	333242	59	8	7	*	1	*
Engine, turbine, and power transmission equipment	3336	112	5	5	*	*	*
Other machinery	other 333	478	22	17 i	* i	2 i	2
Computer and electronic products	334	1,358	182	153	8 i	17 i	12 i
Communications equipment	3342	114	32	27	* i	2	3
Semiconductor and other electronic components	3344	581	85	78	5 i	6	2 i
Navigational, measuring, electromedical, and control instruments	3345	384	35 i	27 i	3 i	5 i	3 i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	85	8 i	5 i	1 i	2 i	1 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	102	7 i	6 i	*	1	1 i
Other measuring and controlling device	other 3345	196	20	16	2	2 i	1 i
Other computer and electronic products	other 334	279	30	22	1 i	4 i	4 i
Electrical equipment, appliances, and components	335	458	23 i	19 i	3 i	3	1
Transportation equipment	336	1,280	72	60	3	8	4
Motor vehicles, bodies, trailers, and parts	3361-63	1,080	61	50	2	7	4
Aerospace products and parts	3364	130	8	7	*	1	*
Aircraft, aircraft engine, and aircraft parts	336411-13	130	8	7	*	1	*
Guided missile, space vehicle, and related parts	336414-15, 336419	*	*	*	0	0	0



TABLE 60

**Foreign total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2019**

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
10–19 <sup>b</sup>	–	4	2	1	*	* i	*
20–49	–	69	9	5	1	3	1
Medium companies							
50–99	–	67	10	6	1	3	1
100–249	–	256	23	17	1	4	2
Large companies							
250–499	–	231	25	20	1 i	4	1
500–999	–	343	34	18	1	13	3
1,000–4,999	–	1,721	149	112	6	26	11
5,000–9,999	–	1,294	97	69	5 i	18 i	11
10,000–24,999	–	2,764	198	i 116	8 i	67 i	15 i
25,000 or more	–	4,334	298	221	12	49	28

\* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Researchers include R&D scientists and engineers and their managers.

<sup>b</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 61

## Domestic full-time equivalent R&amp;D employees and researchers, by work status, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	FTE R&D employees <sup>a</sup>				FTE R&D scientists and engineers <sup>b</sup>			
		Total	Full-time R&D employees	Full-time employees working on R&D part time	Part-time employees working on R&D	Total	Full-time R&D employees	Full-time employees working on R&D part time	Part-time employees working on R&D
All industries	21-23, 31-33, 42-81	1,677	1,384	277	17	1,147	989	150	8
Manufacturing industries	31-33	878	749	121	9	611	544	63	i 4
Food	311	19	16	3	*	11	10	1	i *
Beverage and tobacco products	312	5	3	1	*	3	2	*	*
Textile, apparel, and leather products	313-16	6	4	1	*	3	3	1	* i
Wood products	321	2	1	1	*	1	1	*	*
Paper	322	4	4	1	*	3	3	*	*
Printing and related support activities	323	3	2	1	*	2	1	1	i * i
Petroleum and coal products	324	6	6	*	*	1	1	*	*
Chemicals	325	181	172	8	1	124	119	4	1
Basic chemicals	3251	11	10	1	*	6	6	*	*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	5	4	*	*	4	3	*	*
Pesticide, fertilizer, and other agricultural chemicals	3253	7	6	1	i *	4	4	*	i *
Pharmaceuticals and medicines	3254	138	132	5	1	94	91	3	*
Soap, cleaning compound, and toilet preparation	3256	11	10	1	*	8	8	*	i *
Paint, coating, adhesive, and other chemicals	3255, 3259	10	8	1	*	7	6	*	*
Plastics and rubber products	326	19	14	5	*	9	8	2	*
Nonmetallic mineral products	327	5	4	1	*	3	2	1	i * i
Primary metals	331	7	2	5	*	2	1	1	0
Fabricated metal products	332	24	11	12	*	11	7	5	* i
Machinery	333	82	57	24	2	57	41	15	1
Agricultural implement	33311	11	10	1	*	7	7	*	*
Semiconductor machinery	333242	12	10	2	*	9	8	1	i * i
Engine, turbine, and power transmission equipment	3336	7	6	1	*	5	4	*	* i
Other machinery	other 333	53	31	21	1	35	21	i 13	1
Computer and electronic products	334	252	227	23	2	202	186	16	i 1 i
Communications equipment	3342	40	38	1	i *	30	29	1	i * i
Semiconductor and other electronic components	3344	88	79	9	i *	76	70	6	i * i
Navigational, measuring, electromedical, and control instruments	3345	70	58	11	1	53	44	9	i * i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	16	15	1	i *	12	11	i 1	i * i

TABLE 61

## Domestic full-time equivalent R&amp;D employees and researchers, by work status, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	FTE R&D employees <sup>a</sup>					FTE R&D scientists and engineers <sup>b</sup>				
		Total	Full-time R&D employees	Full-time employees working on R&D part time	Part-time employees working on R&D	Total	Full-time R&D employees	Full-time employees working on R&D part time	Part-time employees working on R&D		
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	31	22	8	1	25	18	7	*		
Other measuring and controlling device	other 3345	24	21	3	*	16	15	1	* i		
Other computer and electronic products	other 334	54	52	1	i *	43	43	*	i *		
Electrical equipment, appliances, and components	335	22	18	4	*	15	13	2	i *		
Transportation equipment	336	164	139	23	2	117	105	11	1		
Motor vehicles, bodies, trailers, and parts	3361-63	102	92	9	1	75	70	4	1		
Aerospace products and parts	3364	50	39	10	1	35	30	5	1 i		
Aircraft, aircraft engine, and aircraft parts	336411-13	46	37	8	1	33	28	4	1 i		
Guided missile, space vehicle, and related parts	336414-15, 336419	4	i 2	i 1	*	3	i 1	i 1	* i		
Military armored vehicle, tank, and tank component	336992	1	*	1	0	*	*	*	0		
Other transportation	other 336	11	i 8	i 3	i *	6	4	1	i *		
Furniture and related products	337	3	2	1	*	2	1	*	i *		
Miscellaneous	339	72	65	6	1	i 44	41	3	i *		
Medical equipment and supplies	3391	57	54	3	1	36	35	2	*		
Other miscellaneous manufacturing	3399	16	12	3	*	i 8	7	1	i *		
Nonmanufacturing industries	21-23, 42-81	799	635	156	8	536	444	87	4		
Mining, quarrying, oil and gas extraction, and support activities	21	11	10	1	*	7	6	*	*		
Utilities	22	1	*	*	*	*	*	*	*		
Wholesale trade	42	10	5	4	i *	5	3	i 1	i *		
Electronic shopping and electronic auctions	454111-12	38 - 64	13	25 - 52	*	17 - 58	4 - 14	8 - 44	* i		
Transportation and warehousing	48-49	15	i 12	i 3	i *	i 11	i 10	i 1	i *		
Information	51	352	323	27	i 1	260	245	14	i 1		
Publishing	511	107	102	4	1	85	83	2	* i		
Newspaper, periodical, book, and directory publishers	5111	1	*	*	i *	*	*	*	0		
Software publishers	5112	106	102	4	1	85	83	2	* i		
Telecommunications	517	19	7	11	i *	8	i 3	5	i *		
Data processing, hosting, and related services	518	123	113	10	*	81	76	5	*		
Other information	other 51	103	101	2	*	85	84	1	*		
Finance and insurance	52	45	33	i 12	*	i 25	i 22	i 3	i *		

TABLE 61

## Domestic full-time equivalent R&amp;D employees and researchers, by work status, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	FTE R&D employees <sup>a</sup>				FTE R&D scientists and engineers <sup>b</sup>				
		Total	Full-time R&D employees	Full-time employees working on R&D part time	Part-time employees working on R&D	Total	Full-time R&D employees	Full-time employees working on R&D part time	Part-time employees working on R&D	
Real estate and rental and leasing	53	3	3	*	*	3	3	*	*	i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	*	*	i	0	*	*	*	0
Other real estate and rental and leasing	other 53	3	3	*	*	3	3	*	*	i
Professional, scientific, and technical services	54	268	212	50	5	156	126	27	3	
Architectural, engineering, and related services	5413	41	18	21	2	27	13	13	1	
Computer systems design and related services	5415	91	78	12	2	67	61	6	i	1
Scientific research and development services	5417	95	89	4	2	41	39	2	1	
Research and development in biotechnology	541711	30	29	*	*	11	11	*	*	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	56	52	3	1	28	i	26	i	1
Research and development in the social sciences and humanities	541720	9	i	8	i	*	i	2	i	2
Other professional, scientific, and technical services	other 54	41	i	27	i	13	i	*	i	19
Health care services	621-23	11	10	1	*	8	8	*	*	
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	15-40	12	2-28	*	3-40	3-13	i	0-28	*
All companies (number of domestic employees)	-	1,677	1,384	277	17	1,147	989	150	8	
Small companies										
10-19 <sup>c</sup>	-	32	25	7	1	23	20	3	*	
20-49	-	70	52	16	2	44	35	8	1	
Medium companies										
50-99	-	73	51	21	1	41	33	8	*	
100-249	-	104	73	30	2	64	50	13	1	
Large companies										
250-499	-	87	65	21	1	54	45	9	1	
500-999	-	87	72	14	1	53	48	5	*	
1,000-4,999	-	271	233	35	3	194	172	20	1	i
5,000-9,999	-	170	147	22	1	i	110	98	12	i
10,000-24,999	-	255	229	24	2	169	153	15	1	i
25,000 or more	-	527	438	86	3	393	336	56	2	

\* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

FTE = full-time equivalent; NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Includes scientists and engineers and their managers, as well as technicians, technologists, and support staff.

<sup>b</sup> Includes scientists and engineers and their managers.

<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 62

**Domestic employment and R&D employment, by state: 2019**

(Thousands)

State	Employees	
	Total	R&D
All states	21,213	1,832
Alabama	226	15
Alaska	31	1
Arizona	359	27
Arkansas	147	4
California	2,312	409
Colorado	392	33
Connecticut	166	18
Delaware	66	5
District of Columbia	44	3
Florida	759	36
Georgia	552	29
Hawaii	46	1
Idaho	87	6
Illinois	999	64
Indiana	457	32
Iowa	258	19
Kansas	218	16
Kentucky	255	9
Louisiana	175	4
Maine	63	4
Maryland	265	28
Massachusetts	435	84
Michigan	794	101
Minnesota	782	43
Mississippi	112	3
Missouri	318	18
Montana	36	3
Nebraska	162	7
Nevada	108	6
New Hampshire	75	11
New Jersey	495	62
New Mexico	56	3
New York	684	67
North Carolina	519	53
North Dakota	44	3
Ohio	751	56
Oklahoma	139	9
Oregon	283	30
Pennsylvania	764	65
Rhode Island	42	3
South Carolina	241	11
South Dakota	49	2
Tennessee	419	12
Texas	1,534	100
Utah	191	17
Vermont	31	2
Virginia	464	38
Washington	580	121



TABLE 62

**Domestic employment and R&D employment, by state: 2019**

(Thousands)

State	Employees	
	Total	R&D
West Virginia	66	2
Wisconsin	514	41
Wyoming	30	1
Undistributed <sup>a</sup>	2,620	95

<sup>a</sup> 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):**

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.

**Source(s):**

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

TABLE 63

**Foreign employment and R&D employment, by location: 2019**

(Thousands)

Location	Employees	
	Total	R&D
Total	11,083	844
Puerto Rico <sup>a</sup>	40	1
Canada	522	44
Latin America and Other Western Hemisphere	1,664	39
Argentina	76	5
Brazil	358	13
Chile	56	1
Mexico	881	15
Other Latin American and Western Hemisphere locations	292	6
Africa	182	5
South Africa	48	4
Other African locations	134	1
Asia and Pacific	3,184	376
Australia	168	12
China	989	85
Hong Kong	48	2
India	893	196
Indonesia	86	1
Japan	215	21
Malaysia	101	7
New Zealand	15	2
Singapore	133	11
South Korea	90	11
Taiwan	72	14
Thailand	118	4
Other Asian or Pacific locations	255	12
Europe	3,075	281
Austria	26	3
Belgium	111	12
Czechia	68	6
Denmark	25	3
Finland	16	3
France	284	20
Germany	475	55
Hungary	53	3
Ireland	113	14
Italy	158	15
Luxembourg	11	2
Netherlands	119	11
Norway	29	2
Poland	199	10
Russia	103	6
Spain	114	9
Sweden	42	7
Switzerland	71	11
Turkey	45	1
United Kingdom	736	67
Other European locations	276	20
Middle East	184	29

TABLE 63

**Foreign employment and R&D employment, by location: 2019**

(Thousands)

Location	Employees	
	Total	R&D
Israel	59	23
Other Middle Eastern locations	125	5
Undistributed <sup>b</sup>	2,231 i	70 i

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

<sup>a</sup> Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.

<sup>b</sup> Includes data reported that were not allocated to a specific country.

**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. No systematic item imputation was applied. These statistics include an adjustment to the weight to account for unit nonresponse.

**Source(s):**

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

TABLE 64

## Domestic temporary R&amp;D employment, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total	Researchers <sup>a</sup>	R&D technicians and equivalent staff	Other R&D supporting staff
All industries	21–23, 31–33, 42–81	264 i	171 i	60 i	32 i
Manufacturing industries	31–33	98 i	61 i	21 i	16 i
Food	311	1 i	1 i	1 i	* i
Beverage and tobacco products	312	*	*	*	* i
Textile, apparel, and leather products	313–16	1 i	* i	*	1 i
Wood products	321	*	*	*	*
Paper	322	* i	* i	* i	* i
Printing and related support activities	323	* i	* i	* i	* i
Petroleum and coal products	324	1	* i	* i	* i
Chemicals	325	43 i	28 i	6 i	9
Basic chemicals	3251	1 i	* i	* i	* i
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	*	*	* i	*
Pesticide, fertilizer, and other agricultural chemicals	3253	1	*	*	1
Pharmaceuticals and medicines	3254	37 i	25 i	4 i	8
Soap, cleaning compound, and toilet preparation	3256	2 i	1 i	1 i	1 i
Paint, coating, adhesive, and other chemicals	3255, 3259	* i	*	*	* i
Plastics and rubber products	326	2 i	1 i	* i	* i
Nonmetallic mineral products	327	* i	* i	* i	* i
Primary metals	331	* i	* i	* i	*
Fabricated metal products	332	2 i	1 i	1 i	*
Machinery	333	15 i	12 i	2 i	1 i
Agricultural implement	33311	*	*	*	*
Semiconductor machinery	333242	1	*	*	*
Engine, turbine, and power transmission equipment	3336	*	*	* i	* i
Other machinery	other 333	14 i	11 i	2 i	1 i
Computer and electronic products	334	16 i	10 i	4 i	2 i
Communications equipment	3342	5 i	3 i	1 i	1 i
Semiconductor and other electronic components	3344	5 i	4 i	1 i	1 i
Navigational, measuring, electromedical, and control instruments	3345	3 i	2 i	1 i	* i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1 i	* i	* i	* i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	2 i	1 i	*	* i
Other measuring and controlling device	other 3345	1 i	1 i	* i	* i
Other computer and electronic products	other 334	2 i	1 i	1 i	* i
Electrical equipment, appliances, and components	335	3 i	1 i	1 i	* i
Transportation equipment	336	9 i	5 i	3 i	1 i
Motor vehicles, bodies, trailers, and parts	3361–63	7 i	4 i	2 i	1 i
Aerospace products and parts	3364	2	1	1 i	*
Aircraft, aircraft engine, and aircraft parts	336411–13	1	1	* i	*
Guided missile, space vehicle, and related parts	336414–15, 336419	*	*	*	*
Military armored vehicle, tank, and tank component	336992	*	*	*	0
Other transportation	other 336	*	*	* i	*
Furniture and related products	337	*	*	*	*
Miscellaneous	339	5 i	2 i	2 i	* i
Medical equipment and supplies	3391	5 i	2 i	2 i	* i
Other miscellaneous manufacturing	3399	1 i	* i	* i	* i
Nonmanufacturing industries	21–23, 42–81	166 i	110 i	39 i	17 i

TABLE 64

## Domestic temporary R&amp;D employment, by activity, industry, and company size: 2019

(Thousands)

Industry and company size	NAICS code	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff		Other R&D supporting staff	
Mining, quarrying, oil and gas extraction, and support activities	21	4 i	3	i	1		*	
Utilities	22	*	*		*		*	
Wholesale trade	42	1 i	1	i	*	i	*	i
Electronic shopping and electronic auctions	454111-12	6	2		3		2	
Transportation and warehousing	48-49	9 i	2	i	2	i	5	i
Information	51	79 i	57	i	18	i	4	i
Publishing	511	17 i	11	i	6	i	*	i
Newspaper, periodical, book, and directory publishers	5111	* i	*	i	*	i	*	i
Software publishers	5112	17 i	11	i	6	i	*	i
Telecommunications	517	19 i	14	i	5	i	*	i
Data processing, hosting, and related services	518	10 i	7	i	2	i	1	i
Other information	other 51	33 i	26	i	5	i	2	i
Finance and insurance	52	34 i	28	i	5		1	
Real estate and rental and leasing	53	2 i	*		1	i	1	i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	*		*		*	
Other real estate and rental and leasing	other 53	2 i	*		1	i	1	i
Professional, scientific, and technical services	54	24 i	14	i	7	i	2	i
Architectural, engineering, and related services	5413	1	1		*		*	
Computer systems design and related services	5415	10 i	7	i	3	i	1	i
Scientific research and development services	5417	7 i	3	i	3	i	1	i
Research and development in biotechnology	541711	2	*		1		*	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	5 i	2	i	2	i	1	i
Research and development in the social sciences and humanities	541720	* i	*	i	0		0	
Other professional, scientific, and technical services	other 54	5 i	3	i	1	i	1	i
Health care services	621-23	3 i	2		1	i	*	i
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	3 i	2	i	*	i	*	i
All companies (number of domestic employees)	-	264 i	171	i	60	i	32	i
Small companies								
10-19 <sup>b</sup>	-	6	4		2		1	i
20-49	-	8 i	5	i	2	i	1	i
Medium companies								
50-99	-	7 i	3	i	2		1	i
100-249	-	10 i	6	i	3	i	1	i
Large companies								
250-499	-	10 i	6	i	2	i	2	i
500-999	-	12 i	6	i	5	i	1	i
1,000-4,999	-	35 i	18	i	9	i	8	
5,000-9,999	-	24 i	15	i	5	i	4	i
10,000-24,999	-	45 i	28	i	9	i	8	i
25,000 or more	-	107 i	80	i	21	i	6	i

\* = amount < 500 employees; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Researchers include R&D scientists and engineers and their managers.

<sup>b</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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.

**Source(s):**

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

TABLE 65

**R&D costs paid for by the company and others projected for 2020, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost						Projected foreign R&D cost paid for by the company
		Paid for by the company	Paid for by others	Paid for by the company			Paid for by others			
				Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources	
All industries	21-23, 31-33, 42-81	606,520	85,666	499,435	38,256	461,179	66,881	21,811	45,070	107,085
Manufacturing industries	31-33	368,158	47,582	294,784	33,882	260,902	39,632	15,117	24,516	73,373
Food	311	5,672	251	4,800	166	4,634	241	*	241	871
Beverage and tobacco products	312	1,987	124	1,115	149	965	124	0	124	873
Textile, apparel, and leather products	313-16	1,094	31	892	32	861	31	5	26	202
Wood products	321	200	7	194	7	187	7	0	7	6
Paper	322	1,506	1	1,396	7	1,389	*	*	*	110
Printing and related support activities	323	372	0	362	3	358	0	0	0	10
Petroleum and coal products	324	1,365	111	1,178	196	981	108	*	108	187
Chemicals	325	146,932	15,854	120,656	25,215	95,441	10,936	450	10,486	26,276
Basic chemicals	3251	3,080	168	2,303	58	2,245	165	2	164	777
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,669	120	1,132	92	1,039	74	*	74	538
Pesticide, fertilizer, and other agricultural chemicals	3253	1,175	0 - 395	856	71	785	0 - 385	1	0 - 384	318
Pharmaceuticals and medicines	3254	135,729	14,974	112,225	24,667	87,558	10,157	428	9,729	23,504
Soap, cleaning compound, and toilet preparation	3256	3,722	181	2,838	291	2,546	138	*	138	884
Paint, coating, adhesive, and other chemicals	3255, 3259	1,557	18 - 413	1,302	35	1,267	18 - 403	19	0 - 384	255
Plastics and rubber products	326	3,517	167	2,939	38	2,901	143	6	137	579
Nonmetallic mineral products	327	1,702	37	1,483	25	1,458	37	3	35	219
Primary metals	331	841	16	754	17	737	15	*	15	87
Fabricated metal products	332	2,645	270	2,410	82	2,328	175	7	168	234
Machinery	333	19,095	1,344	14,366	419	13,947	1,308	190	1,119	4,729
Agricultural implement	33311	3,008	10	1,971	186	1,786	9	4	6	1,036
Semiconductor machinery	333242	4,986	768	4,095	5	4,090	749	*	749	891
Engine, turbine, and power transmission equipment	3336	2,168	228	1,267	13	1,254	219	153	66	901
Other machinery	other 333	8,933	338	7,032	216	6,816	331	33	298	1,901
Computer and electronic products	334	108,549	12,864	82,301	1,747	80,554	11,583	5,248	6,335	26,249
Communications equipment	3342	15,401	1,442	12,096	762	11,334	1,302	152	1,151	3,305
Semiconductor and other electronic components	3344	48,625	3,477	34,883	437	34,446	3,101	576	2,525	13,742

TABLE 65

## R&amp;D costs paid for by the company and others projected for 2020, by industry and company size: 2019

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost						Projected foreign R&D cost paid for by the company
		Paid for by the company	Paid for by others	Paid for by the company			Paid for by others			
				Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources	
Navigational, measuring, electromedical, and control instruments	3345	15,030	7,690	11,316	290	11,026	6,953	4,433	2,520	3,715
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,432	248	3,227	106	3,121	238	10	229	1,205
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,102	7,207	3,474	93	3,381	6,521	4,392	2,129	628
Other measuring and controlling device	other 3345	6,497	235	4,615	91	4,524	193	32	162	1,882
Other computer and electronic products	other 334	29,493	254	24,006	258	23,748	227	87	140	5,487
Electrical equipment, appliances, and components	335	6,977	426	5,190	175	5,016	402	32	370	1,787
Transportation equipment	336	42,594	15,801	35,167	4,693	30,474	14,298	9,133	5,164	7,427
Motor vehicles, bodies, trailers, and parts	3361-63	30,443	4,218	23,738	3,847	19,891	3,759 - 4,219	0 - 1,188	2,572 - 3,774	6,706
Aerospace products and parts	3364	9,728	10,373	9,325	797	8,528	9,328	7,938	1,390	404
Aircraft, aircraft engine, and aircraft parts	336411-13	9,053	9,392	8,650	663	7,987	8,346	7,007	1,339	403
Guided missile, space vehicle, and related parts	336414-15, 336419	675	982	675	134	541	982	931	51	*
Military armored vehicle, tank, and tank component	336992	23	11	23	0	23	11	9	2	0
Other transportation	other 336	2,399	1,198	2,081	49	2,033	739 - 1,199	0 - 1,188	0 - 1,199	318
Furniture and related products	337	457	2	420	17	403	2	1	1	38
Miscellaneous	339	22,652	278	19,162	895	18,267	223	40	183	3,490
Medical equipment and supplies	3391	19,706	231	16,610	772	15,838	176	18	159	3,097
Other miscellaneous manufacturing	3399	2,945	47	2,552	123	2,429	46	22	24	393
Nonmanufacturing industries	21-23, 42-81	238,363	38,084	204,651	4,374	200,277	27,249	6,695	20,554	33,712
Mining, quarrying, oil and gas extraction, and support activities	21	3,031	155	2,416	118	2,298	147	39	108	615
Utilities	22	382	49	373	149	225	49	43	6	9
Wholesale trade	42	1,287	83	1,174	49	1,125	81	0	81	113
Electronic shopping and electronic auctions	454111-12	23 - 25,450	*	23 - 20,431	24	0 - 20,408	*	*	0	0 - 5,023
Transportation and warehousing	48-49	10,452	208	10,375	30	10,345	208	0	208	77
Information	51	148,502	1,255	126,797	2,536	124,260	1,194	121	1,074	21,705
Publishing	511	44,391	661	37,251	1,175	36,076	611	74	536	7,140
Newspaper, periodical, book, and directory publishers	5111	59	*	58	3	55	*	*	*	1



TABLE 65

**R&D costs paid for by the company and others projected for 2020, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost						Projected foreign R&D cost paid for by the company
		Paid for by the company	Paid for by others	Paid for by the company			Paid for by others			
				Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources	
Software publishers	5112	44,332	661	37,193	1,172	36,021	610	74	536	7,139
Telecommunications	517	4,338	41	4,178	419	3,760	41	12	29	159
Data processing, hosting, and related services	518	39,687	396	32,969	512	32,458	386	26	360	6,718
Other information	other 51	60,086	157	52,399	431	51,967	157	8	149	7,688
Finance and insurance	52	10,797	3	9,581	347	9,233	1	0	1	1,217
Real estate and rental and leasing	53	1,876	0	1,713	*	1,713	0	0	0	163
Lessors of nonfinancial intangible assets (except copyrighted works)	533	56	0	40	*	40	0	0	0	16
Other real estate and rental and leasing	other 53	1,820	0	1,673	*	1,672	0	0	0	148
Professional, scientific, and technical services	54	34,193	35,892	29,422	965	28,456	25,148	6,465	18,683	4,772
Architectural, engineering, and related services	5413	2,552	1,984	2,480	195	2,285	1,937	1,315	622	73
Computer systems design and related services	5415	21,429	2,496	17,238	256	16,982	2,395	601	1,794	4,191
Scientific research and development services	5417	4,163	30,029	3,975	421	3,554	19,481	3,710	15,771	188
Research and development in biotechnology	541711	1,290	8,647	1,248	149	1,099	5,628	138	5,489	42
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,844	20,525	2,699	272	2,427	13,077	2,865	10,212	146
Research and development in the social sciences and humanities	541720	29	856	29	*	29	776	707	70	*
Other professional, scientific, and technical services	other 54	6,049	1,384	5,729	94	5,635	1,335	839	496	320
Health care services	621-23	2,311	389	2,288	70	2,218	374	16	358	23
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	85-25,512	50	85-20,493	86	0-20,408	47	11	36	0-5,023
All companies (number of domestic employees)	-	606,520	85,666	499,435	38,256	461,179	66,881	21,811	45,070	107,085
Small companies										
10-19 <sup>a</sup>	-	5,312	1,161	4,911	434	4,476	1,122	458	664	402
20-49	-	13,559	2,707	12,640	1,561	11,079	2,297	1,030	1,267	919
Medium companies										
50-99	-	15,033	2,947	13,787	2,272	11,515	2,607	911	1,696	1,246
100-249	-	23,287	3,722	20,109	2,138	17,972	3,427	1,166	2,261	3,178
Large companies										
250-499	-	20,623	4,182	17,603	1,793	15,810	3,923	1,600	2,323	3,020

TABLE 65

**R&D costs paid for by the company and others projected for 2020, by industry and company size: 2019**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost							Projected foreign R&D cost paid for by the company				
		Paid for by the company	Paid for by others	Paid for by the company			Paid for by others								
				Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources						
500–999	–	31,319	3,383	28,117	2,761	i	25,355	2,993	455	i	2,537	3,202			
1,000–4,999	–	91,228	14,576	72,823	5,595		67,228	11,850	1,938	i	9,913	18,405			
5,000–9,999	–	61,740	9,696	i	51,198	3,439	47,759	6,648	i	901	5,747	i	10,542		
10,000–24,999	–	106,911	21,790	i	86,851	8,530	78,322	i	14,414	i	750	13,663	i	20,060	
25,000 or more	–	237,509	i	21,500	191,397	i	9,734	181,663	i	17,602	12,602	i	5,000	46,112	i

\* = amount < \$500,000; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. 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.

TABLE 66

**Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–19**

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All industries	21–23, 31–33, 42–81	336,571	338,451	359,490	374,916	396,352	416,343	429,174	457,591	484,740	543,369	597,420
Manufacturing industries	31–33	236,858	243,611	253,821	261,697	276,110	285,661	287,895	303,044	314,167	339,076	350,024
Food	311	4,916	D	5,589	5,163	6,335	6,136	6,058	5,824	5,424	5,459	5,015
Beverage and tobacco products	312	933	D	D	D	1,358	1,423	1,529	1,076 - 1,654	1,769	1,628	1,755
Textile, apparel, and leather products	313–16	519	522	656	605	759	734	818	1,247	1,131	1,223	1,061
Wood products	321	283	254	211	282	222	341	198	166 - 751	174	206	193
Paper	322	NA	1,665	769	858	1,022	880	867	943	1,594	1,013	1,165
Printing and related support activities	323	217	269	212	291	258	238	198	223	236	246	429
Petroleum and coal products	324	NA	D	1,281	D	327	298	252	312	377	1,460 - 1,463	1,477 - 1,481
Chemicals	325	64,442	72,610	72,068	70,218	74,551	79,428	80,961	84,612	90,236	101,132	115,631
Basic chemicals	3251	NA	2,671	5,166	3,400	3,336	3,633	3,677	536 - 5,694	3,101	3,046	3,102
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	NA	1,038	1,117	D	1,794	1,842	1,780	332 - 5,490	805	2,435	1,695
Pesticide, fertilizer, and other agricultural chemicals	3253	NA	D	2,049	D	1,966	2,042	3,405	0 - 5,157	1,864	1,782 - 1,797	2,272 - 2,297
Pharmaceuticals and medicines	3254	53,456	60,537	58,866	58,920	62,480	66,731	D	73,193	79,004	88,776	103,487
Soap, cleaning compound, and toilet preparation	3256	NA	3,285	3,386	3,212	3,358	3,501	D	3,589	3,699	3,567	3,517
Paint, coating, adhesive, and other chemicals	3255, 3259	NA	D	1,485	D	1,617	1,679	1,664	1,806 - 1,830	1,764	1,508 - 1,529	1,532 - 1,560
Plastics and rubber products	326	2,982	2,515	2,640	4,446	4,576	4,519	2,906	4,583	4,626	3,170	3,359
Nonmetallic mineral products	327	1,153	1,596	1,428	1,588	1,578	1,599	1,487	1,474	1,485	1,567	1,701
Primary metals	331	993	802	763	818	700	770	711	662	862	990	740
Fabricated metal products	332	2,174	1,818	1,993	1,949	2,303	2,329	2,467	2,273	2,405	2,533	3,163
Machinery	333	11,156	12,403	18,312	17,462	15,420	15,089	16,827	15,958	16,626	19,279	19,435
Agricultural implement	33311	NA	D	1,570	2,142	2,243	D	2,152	2,189	2,132	2,730	2,778
Semiconductor machinery	333242	NA	2,469	2,727	1,357	3,645	3,434	3,812	4,138	4,530	5,077	5,374
Engine, turbine, and power transmission equipment	3336	NA	D	D	D	1,795	2,894	2,920	2,484	2,577	3,418 - 3,440	1,931
Other machinery	other 333	NA	6,566	D	D	7,736	D	7,943	7,147	7,387	8,030 - 8,057	9,353
Computer and electronic products	334	68,772	75,345	79,145	87,406	90,114	94,199	92,860	98,319	101,910	112,188	112,180
Communications equipment	3342	NA	17,069	15,197	18,877	20,392	22,048	23,049	16,124	15,568	16,467	15,907 - 15,912

TABLE 66

**Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–19**

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Semiconductor and other electronic components	3344	26,082	29,354	32,146	38,300	40,611	42,028	40,348	41,789	41,362	45,795	48,189	i	
Navigational, measuring, electromedical, and control instruments	3345	16,498	17,905	18,242	18,640	18,046	18,993	17,020	18,112	17,965	20,828	21,512		
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	NA	4,548	4,987	4,999	2,837	5,049	3,599	3,553	3,702	1,167 - 14,309	4,621	i	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	NA	8,769	8,641	8,312	8,753	8,486	8,033	8,372	8,347	0 - 13,142	10,541		
Other measuring and controlling device	other 3345	NA	4,588	4,615	5,329	6,456	5,458	5,387	6,187	5,916	6,520	6,350		
Other computer and electronic products	other 334	NA	11,017	13,559	11,589	11,065	11,130	12,443	22,294	27,016	29,099	26,567 - 26,571		
Electrical equipment, appliances, and components	335	4,475	4,767	5,319	4,140	5,738	5,705	5,710	6,207	6,154	6,179	7,006		
Transportation equipment	336	56,183	51,362	49,030	50,415	51,547	56,597	57,698	60,161	59,432	59,850	53,187		
Motor vehicles, bodies, trailers, and parts	3361–63	NA	17,764	D	D	23,610	D	25,735	6,671 - 54,230	30,069	31,869 - 31,899	31,110		
Aerospace products and parts	3364	36,409	31,627	26,858	D	25,684	D	29,113	3,240 - 50,799	26,189	25,006	18,943	i	
Aircraft, aircraft engine, and aircraft parts	336411–13	NA	D	D	D	D	D	27,463	1,812 - 49,371	24,666	23,683	17,476	i	
Guided missile, space vehicle, and related parts	336414–15, 336419	NA	D	D	1,425	D	D	1,649	i	1,428	i	1,523	1,323	1,467
Military armored vehicle, tank, and tank component	336992	NA	D	52	D	9	i	D	16	3 - 38	9	11	35	
Other transportation	other 336	NA	D	D	D	2,245	D	2,834	2,653 - 2,690	i	3,164	2,936 - 2,961	3,099	
Furniture and related products	337	433	407	347	383	401	422	477	381	470	418 - 444	444		
Miscellaneous	339	NA	9,528	D	D	18,900	14,951	15,869	18,045	19,257	20,515	22,077 - 22,084		
Medical equipment and supplies	3391	NA	7,461	D	10,311	15,938	12,091	13,166	15,387 - 15,400	16,470	17,443	19,083		
Other miscellaneous manufacturing	3399	NA	2,066	D	D	2,962	2,860	2,703	i	2,646 - 2,657	i	2,788	3,072	2,995 - 3,002
Nonmanufacturing industries	21–23, 42–81	99,713	94,840	105,669	113,220	120,242	130,682	141,279	154,547	170,574	204,293	247,396		
Mining, quarrying, oil and gas extraction, and support activities	21	NA	2,785	2,597	D	4,452	D	4,348	3,604	3,647	1,990	3,307		
Utilities	22	NA	442	396	368	317	314	483	353	336	283	284		

TABLE 66

## Worldwide R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2009–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Wholesale trade	42	NA	1,145	1,697	2,165	459	D	1,723	489	0 - 12,105	883	1,304
Electronic shopping and electronic auctions	454111–12	NA	D	D	D	1,845	D	D	0 - 14,624	0 - 12,105	11,715 - 15,515	3,200 - 20,013
Transportation and warehousing	48–49	NA	124	159	186	D	692	416	495	1,221	2,562	9,952
Information	51	43,197	45,099	52,341	56,815	68,375	78,013	77,965	84,400	94,412	111,653	129,277
Publishing	511	33,171	33,883	36,310	36,947	43,821	46,806	42,190	42,156	42,368	39,890	39,968
Newspaper, periodical, book, and directory publishers	5111	NA	826	401	221	348	92	107	84	72	150	61
Software publishers	5112	NA	33,058	35,910	36,726	43,473	46,714	42,083	42,073	42,296	39,739	39,907
Telecommunications	517	1,609	2,043	2,267	2,787	3,112	3,830	3,648	3,617 - 3,659	3,828	3,827 - 3,833	3,856
Data processing, hosting, and related services	518	3,008	2,895	5,450	5,574	7,787	10,356	10,600	14,051 - 14,099	18,893	28,214 - 28,226	36,449
Other information	other 51	5,410	6,278	8,313	11,506	13,654	17,022	21,526	24,530	29,323	39,713	49,004
Finance and insurance	52	NA	2,568	3,943	4,159	4,999	4,748	6,359	8,468	8,582	8,347	10,092
Real estate and rental and leasing	53	NA	367	D	400	202	268	313	477	892	1,072	1,476
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	365	379	D	58	D	27	77	6	48
Other real estate and rental and leasing	other 53	NA	NA	D	21	D	210	D	450	814	1,066	1,427
Professional, scientific, and technical services	54	47,709	37,108	39,731	40,843	37,345	37,995	46,255	39,585 - 54,209	46,587	58,333	68,023
Architectural, engineering, and related services	5413	3,384	4,156	D	2,541	3,173	3,374	4,158	56 - 9,557	2,575	4,005	4,244
Computer systems design and related services	5415	15,310	12,458	13,181	13,404	10,535	12,579	17,227	15,483 - 20,617	17,190	20,378	26,416
Scientific research and development services	5417	19,307	16,408	19,295	20,225	18,478	17,870	20,630	20,194	22,635	28,620	30,675
Research and development in biotechnology	541711	8,492	6,266	7,985	8,364	5,889	4,898	7,114	6,062	6,076	8,428 - 8,442	9,250
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	10,129	9,591	10,697	11,261	11,794	12,291	12,807	13,409	15,680	19,507	20,651
Research and development in the social sciences and humanities	541720	686	551	613	600	795	682	709	723	879	672 - 683	774
Other professional, scientific, and technical services	other 54	9,708	4,086	D	4,674	5,158	4,172	4,240	3,852	4,188	5,330	6,688
Health care services	621–23	NA	D	D	708	535	501	771	1,002	1,132	1,497	2,289

TABLE 66

**Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–19**

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71– 72, 81	NA	NA	D	D	D	D	D	1,054 - 6,188	i 1,665	2,162 - 5,963	1,382 - 18,191
All companies (number of domestic employees)	–	336,571	338,451	359,490	374,916	396,352	416,343	429,174	457,591	484,740	543,369	597,420
Micro companies <sup>a</sup>												
5–9	–	NA	3,792	4,143	3,025	i 3,442	i 3,409	i 3,101	i 1,728	i NA	NA	NA
Small companies												
10–19	–	NA	NA	NA	NA	NA	NA	5,750	i 5,031	i 3,532	4,511	5,639
20–49	–	NA	NA	NA	NA	NA	NA	10,654	i 9,972	9,513	11,825	12,875
Medium companies												
50–99	–	13,785	9,470	9,834	9,728	9,289	10,677	11,946	9,639	10,635	13,095	14,758
100–249	–	14,365	12,989	13,354	13,665	14,980	15,081	14,964	16,160	18,584	20,486	21,986
Large companies												
250–499	–	12,315	11,439	14,573	12,693	13,379	13,675	14,837	14,751	16,522	21,971	21,592
500–999	–	12,124	11,794	11,388	12,955	13,663	15,422	17,442	16,601	20,173	20,309	26,922
1,000–4,999	–	54,600	60,782	63,801	62,729	69,212	71,679	71,259	79,017	79,494	83,959	92,224
5,000–9,999	–	27,461	34,453	32,578	41,006	43,087	51,305	48,399	49,479	54,572	61,047	62,775
10,000–24,999	–	61,681	50,710	61,593	60,544	60,844	63,818	70,864	81,547	87,965	108,249	111,876
25,000 or more	–	118,424	125,067	132,719	144,097	152,547	155,180	159,959	173,666	183,750	197,916	226,773

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business Enterprise Research and Development Survey did not include companies with fewer than 5 domestic employees from 2008–16 and does not include fewer than 10 domestic employees beginning in 2017.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey years 2009–13, industry classification was based on the 2007 NAICS. Beginning with survey year 2011, the composition of the Other nonmanufacturing industry changed. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. 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.

TABLE 67

**Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19**

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
All industries	21–23, 31–33, 42–81	290,680	282,505	279,289	290,240	302,759	323,107	340,539	355,671	378,590	396,979	443,633	492,956	
Manufacturing industries	31–33	203,755	196,441	199,147	202,363	208,577	222,718	231,705	236,170	249,999	255,602	274,315	285,674	
Food	311	2,100	4,099	D	4,393	4,087	5,021	4,854	i 4,828	4,830	4,588	4,595	4,180	
Beverage and tobacco products	312	780	477	D	D	D	827	920	1,006	1,076 - 1,099	1,098	1,113	1,082	
Textile, apparel, and leather products	313–16	815	439	482	608	553	662	631	748	1,166	i 959	1,005	904	
Wood products	321	273	280	252	211	280	220	336	i 195	166 - 204	173	203	186	
Paper	322	NA	NA	1,341	676	752	920	723	766	854	1,327	933	1,064	
Printing and related support activities	323	349	210	231	181	256	i 252	i 234	196	i 219	i 231	242	420	i
Petroleum and coal products	324	NA	NA	D	D	888	281	234	214	268	324	1,269	1,306	
Chemicals	325	58,250	54,753	58,343	55,853	56,748	62,086	66,134	68,032	71,803	75,733	84,367	97,063	
Basic chemicals	3251	NA	NA	1,810	D	2,705	2,620	2,849	3,042	0 - 5,157	2,544	2,443	2,360	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	NA	NA	783	798	997	1,197	1,154	1,201	0 - 5,157	541	1,636 - 1,662	1,172	
Pesticide, fertilizer, and other agricultural chemicals	3253	NA	NA	D	D	D	1,691	i 1,743	i D	0 - 5,157	1,469	1,460	1,822 - 1,846	
Pharmaceuticals and medicines	3254	48,131	46,415	49,469	46,308	47,851	52,790	56,482	57,332	62,346 - 67,504	66,870	74,815	87,619	
Soap, cleaning compound, and toilet preparation	3256	NA	NA	2,400	2,476	2,342	2,434	2,548	2,579	2,800	2,860	2,720	2,760	
Paint, coating, adhesive, and other chemicals	3255, 3259	NA	NA	D	1,290	D	1,354	1,357	i D	1,500 - 1,523	1,450	1,265 - 1,294	1,305 - 1,333	
Plastics and rubber products	326	1,817	2,388	2,129	2,278	3,585	3,647	3,614	2,549	3,752	3,722	2,742	2,856	
Nonmetallic mineral products	327	1,556	1,098	i 1,314	i 1,175	1,327	i 1,329	i 1,445	i 1,259	1,289	1,304	1,385	1,508	i
Primary metals	331	695	863	681	655	741	618	677	625	592	747	839	665	
Fabricated metal products	332	2,419	2,057	1,727	1,857	1,827	i 2,194	i 2,107	i 2,273	i 2,094	2,234	2,316	2,885	
Machinery	333	10,104	9,226	10,260	14,725	13,752	12,586	12,106	13,539	12,718	13,341	14,770	15,184	
Agricultural implement	33311	NA	NA	1,345	1,277	1,546	1,597	1,578	1,531	1,565	1,565	1,872	1,921	
Semiconductor machinery	333242	NA	NA	2,173	2,351	1,291	3,194	2,941	3,214	3,411	3,737	4,166	4,459	
Engine, turbine, and power transmission equipment	3336	NA	NA	1,430	4,273	4,336	1,448	2,356	2,515	2,060	649 - 2,579	2,483	1,301	
Other machinery	other 333	NA	NA	5,312	6,824	6,579	6,347	5,229	6,280	5,683	5,459 - 7,388	6,249	7,503	
Computer and electronic products	334	60,464	55,856	61,623	62,438	66,290	68,629	73,256	72,182	77,451	78,003	83,948	86,729	

TABLE 67

**Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19**

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Communications equipment	3342	NA	NA	13,875	12,335	14,352	15,663	18,345	19,424	13,156	12,492	13,090	12,595
Semiconductor and other electronic components	3344	22,324	20,023	23,011	24,237	28,218	30,176	31,668	30,451	31,413	30,373	30,232 - 43,377	35,183 i
Navigational, measuring, electromedical, and control instruments	3345	15,460	14,318	15,747	15,852	15,918	15,119	15,871	14,202	14,885	14,325	4,671 - 17,814	17,562
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	NA	NA	4,189	4,430	4,413	2,634	3,975	2,676	2,632	2,632	0 - 13,142	3,342
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	NA	NA	8,293	8,066	7,734	8,106	7,861	7,360	7,532	7,379	0 - 13,142	9,662
Other measuring and controlling device	other 3345	NA	NA	3,265	3,356	3,772	4,379	4,035	4,165	4,722	4,314	4,672	4,558
Other computer and electronic products	other 334	NA	NA	8,990	10,014	7,801	7,671	7,372	8,105	17,997	20,814	22,811	21,388
Electrical equipment, appliances, and components	335	3,143	3,317	3,320	3,624	3,078	4,133	4,323	4,359	4,771	4,319	4,487	5,263
Transportation equipment	336	50,552	48,209	42,940	41,094	42,340	43,648	46,977	49,286	51,569	50,698	52,446	45,375
Motor vehicles, bodies, trailers, and parts	3361–63	NA	NA	D	D	D	16,733	18,518	19,113	0 - 47,558	23,542	25,393	24,117
Aerospace products and parts	3364	36,941	34,563	29,857	26,086 i	24,874 i	24,783	26,292 i	27,440	1,423 - 48,982	24,154	24,301	18,358 i
Aircraft, aircraft engine, and aircraft parts	336411–13	NA	NA	24,777 i	24,839 i	23,454 i	D	25,002 i	25,793	0 - 47,558	22,629 - 24,155	22,978	16,891 i
Guided missile, space vehicle, and related parts	336414–15, 336419	NA	NA	5,080	1,247	1,420	D	1,290 i	1,647 i	1,424 i	0 - 1,524	1,323	1,467
Military armored vehicle, tank, and tank component	336992	NA	NA	D	51	D	9 i	18	16	3 - 38	9	11	35
Other transportation	other 336	NA	NA	D	D	D	2,124	2,148 i	2,716	2,549 - 2,586 i	2,993	2,741	2,865
Furniture and related products	337	477	395	374	319	360	374	377	452	359	430	409	409
Miscellaneous	339	NA	NA	D	D	D	15,292	12,757	13,662	14,988	16,370	17,245	18,596
Medical equipment and supplies	3391	NA	NA	6,459	7,796	8,333	12,741	10,309	11,353	12,647 - 12,660	13,930	14,559	16,014
Other miscellaneous manufacturing	3399	NA	NA	D	D	D	2,551	2,449	2,309 i	2,329 - 2,340 i	2,439	2,686	2,582
Nonmanufacturing industries	21–23, 42–81	86,926	86,064	80,142	87,877	94,183	100,389	108,834	119,501	128,591	141,377	169,318	207,283



TABLE 67

**Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19**

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Mining, quarrying, oil and gas extraction, and support activities	21	NA	NA	2,545	2,365	3,031	4,000	4,633	4,012	3,296	3,292	1,827	2,717
Utilities	22	NA	NA	425	358	348	294	313	480	351	326	275	275
Wholesale trade	42	NA	NA	1,092	1,556	2,053	452	339	1,698	467	0 - 9,599	851	1,191
Electronic shopping and electronic auctions	454111-12	NA	NA	D	949	1,353	1,356	1,388	D	0 - 9,499	0 - 9,599	11,652	3,131 - 15,818
Transportation and warehousing	48-49	NA	NA	95	132	178	D	679	403	488	1,214	2,548	9,890
Information	51	37,695	35,953	37,088	42,697	46,900	56,608	64,277	65,457	70,946	80,120	94,507	110,227
Publishing	511	28,427	26,838	26,957	28,411	29,067	34,365	36,621	33,348	33,459	33,868	32,716	33,019
Newspaper, periodical, book, and directory publishers	5111	NA	NA	770	372	219	342	88	98	79	66	131	61
Software publishers	5112	NA	NA	26,187	28,039	28,848	34,023	36,533	33,250	33,379	33,802	32,585	32,958
Telecommunications	517	1,684	1,523	1,912	2,169	2,729	3,049	3,768	3,607	3,568 - 3,611	3,733	3,696	3,733
Data processing, hosting, and related services	518	6,567	2,741	2,753	5,111	4,914	7,156	9,062	9,355	9,344 - 14,099	16,623	23,472	30,558
Other information	other 51	1,016	4,850	5,466	7,006	10,190	12,039	14,826	19,147	19,820 - 24,532	25,896	34,623	42,917
Finance and insurance	52	NA	NA	2,101	3,447	3,530	4,412	4,122	5,409	7,331	7,611	7,425	8,917
Real estate and rental and leasing	53	NA	NA	330	343	363	191	262	300	475	772 - 852	1,021	1,371
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	324	342	58	55	68	27	0 - 79	6	45
Other real estate and rental and leasing	other 53	NA	NA	NA	19	21	133	207	232	448	773	1,015	1,326
Professional, scientific, and technical services	54	37,954	42,380	31,798	33,307	34,121	30,926	31,461	38,601	33,839 - 43,338	36,024	45,575	53,233
Architectural, engineering, and related services	5413	3,422	3,258	4,008	3,114	2,483	3,132	3,309	4,100	0 - 9,499	2,525	3,463 - 4,007	4,207
Computer systems design and related services	5415	12,146	13,351	10,359	10,938	11,006	9,241	11,053	14,334	15,484	13,702	16,553	21,046
Scientific research and development services	5417	17,913	16,402	13,712	15,713	16,415	14,219	13,324	16,249	14,778	16,029	20,225	21,669
Research and development in biotechnology	541711	NA	7,809	5,537	7,043	7,387	4,492	3,459	5,594	4,445	4,207	5,848	6,457
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	NA	7,916	7,628	8,058	8,431	8,935	9,187	9,950	9,613	10,946	13,707	14,446

TABLE 67

**Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19**

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Research and development in the social sciences and humanities	541720	NA	676	547	612	598	792	678	705	719	876	671	766
Other professional, scientific, and technical services	other 54	4,474	9,370	3,720	3,542	4,216	4,334	3,775	3,918	3,579	3,770	4,788 - 5,332	6,312
Health care services	621–23	NA	NA	1,049	542	672	i 528	i 501	i 758	i 848	921	1,475	2,265
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	NA	NA	NA	2,181	1,635	D	857	i D	i 1,055	i 1,503	2,163	1,380 - 14,067
All companies (number of domestic employees)	–	290,680	282,505	279,289	290,240	302,759	323,107	340,539	355,671	378,590	396,979	443,633	492,956
Micro companies <sup>a</sup>													
5–9	–	NA	NA	3,614	4,060	2,926	i 3,390	i 3,314	i 2,983	i 1,583	NA	NA	NA
Small companies													
10–19	–	NA	NA	NA	NA	NA	NA	NA	5,674	i 4,930	i 3,390	4,383	5,501
20–49	–	NA	NA	NA	NA	NA	NA	NA	10,281	i 9,635	i 9,084	11,255	12,418
Medium companies													
50–99	–	9,351	13,277	8,781	9,295	9,100	i 8,939	10,130	i 11,538	9,275	10,164	12,412	14,021
100–249	–	14,662	12,791	11,631	12,303	12,454	13,704	13,606	13,586	14,860	17,205	18,611	19,793
Large companies													
250–499	–	10,219	11,330	10,194	13,013	11,387	12,021	12,228	13,686	12,978	14,312	19,775	18,883
500–999	–	11,886	10,131	10,053	9,993	11,499	12,013	13,129	15,005	14,441	17,736	17,753	23,969
1,000–4,999	–	46,336	44,197	49,108	51,110	50,311	55,974	57,336	57,998	63,431	64,838	68,764	75,671
5,000–9,999	–	24,764	21,769	27,546	24,452	30,708	31,657	38,327	38,858	40,530	40,340	45,509	50,811
10,000–24,999	–	48,737	51,239	41,853	49,107	50,226	51,103	54,452	59,330	66,032	73,540	86,463	88,263
25,000 or more	–	100,820	97,056	99,291	102,222	110,042	119,493	122,533	126,732	140,895	146,369	158,707	183,626

D = data withheld to avoid disclosing operations of individual companies; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business Enterprise Research and Development Survey did not include companies with fewer than 5 domestic employees from 2008–16 and does not include fewer than 10 domestic employees beginning in 2017.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Beginning with survey year 2011, the composition of the Other nonmanufacturing industry changed. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. 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.

TABLE 68

## Foreign R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2008–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All industries	21–23, 31–33, 42–81	61,475	54,066	59,162	69,251	72,157	73,245	75,804	73,503	79,001	87,761	99,736	104,464
Manufacturing industries	31–33	46,572	40,417	44,464	51,458	53,120	53,392	53,955	51,725	53,045	58,565	64,761	64,351
Food	311	596	817	1,006	1,195	1,076	1,315	1,282	1,231	994	835	865	835
Beverage and tobacco products	312	123	455	783	599	532	531	503	523	0 - 555	671	516	674
Textile, apparel, and leather products	313–16	367	80	39	49	52	98	103	70	81	172	218	157
Wood products	321	4	2	3	1	2	2	5	3	0 - 555	1	3	7
Paper	322	274	257	324	93	106	103	158	102	89	267	80	101
Printing and related support activities	323	9	7	38	30	35	6	3	2	4	5	4	9
Petroleum and coal products	324	D	156	D	D	D	46	64	38	44	53	192 - 194	171 - 176
Chemicals	325	13,990	9,689	14,267	16,215	13,470	12,464	13,294	12,929	12,809	14,503	16,766	18,568
Basic chemicals	3251	1,198	797	861	D	695	716	784	636	537	557	603	742
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	224	260	255	319	D	597	688	579	333	264	774 - 798	523
Pesticide, fertilizer, and other agricultural chemicals	3253	371	D	D	D	D	275	299	D	0 - 5,157	396	321 - 337	450
Pharmaceuticals and medicines	3254	10,862	7,041	11,068	12,557	11,069	9,690	10,249	D	5,688 - 10,846	12,133	13,962	15,868
Soap, cleaning compound, and toilet preparation	3256	965	873	884	910	870	924	952	D	789	839	847	757
Paint, coating, adhesive, and other chemicals	3255, 3259	370	D	D	195	210	263	321	D	307	314	235 - 259	227
Plastics and rubber products	326	341	595	386	362	861	929	905	358	831	904	428	503
Nonmetallic mineral products	327	106	54	282	253	261	249	155	228	185	181	181	192
Primary metals	331	114	130	121	108	77	82	94	86	69	116	151	76
Fabricated metal products	332	188	117	91	135	122	109	222	194	179	171	216	278
Machinery	333	1,929	1,930	2,143	3,587	3,710	2,833	2,984	3,288	3,239	3,285	4,509	4,251
Agricultural implement	33311	399	391	D	293	596	646	D	621	625	566	858	857
Semiconductor machinery	333242	366	285	296	376	66	451	493	599	727	793	911	915
Engine, turbine, and power transmission equipment	3336	92	83	D	D	D	347	537	405	424	0 - 1,928	935 - 958	630
Other machinery	other 333	1,072	1,170	1,254	D	D	1,389	D	1,664	1,464	0 - 1,928	1,781 - 1,807	1,850
Computer and electronic products	334	15,774	12,917	13,722	16,708	21,117	21,485	20,943	20,678	20,868	23,907	28,240	25,452
Communications equipment	3342	2,951	2,862	3,194	2,863	4,525	4,730	3,702	3,625	2,967	3,076	3,377	3,312 - 3,316

TABLE 68

## Foreign R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2008–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Semiconductor and other electronic components	3344	7,075	6,058	6,343	7,909	10,082	10,434	10,360	9,896	10,377	10,989	2,418 - 15,563	13,007 i
Navigational, measuring, electromedical, and control instruments	3345	2,308	2,180	2,158	2,390	2,722	2,927	3,122	2,819	3,227	3,640	3,015 - 16,157	3,950
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	838	522	360	557	586	202	1,073	923	922	1,069	1,168 i	1,280 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	D	508	475	575	578	647	625	673	840	968	0 - 13,142	878
Other measuring and controlling device	other 3345	D	1,149	1,324	1,258	1,557	2,077	1,423	1,222	1,465	1,603	1,848	1,792
Other computer and electronic products	other 334	3,440	1,817	2,027	3,546	3,788	3,395	3,759	4,338	4,297	6,202 i	6,287	5,179 - 5,183 i
Electrical equipment, appliances, and components	335	1,162	1,158	1,447	1,695	1,062	1,605	1,382	1,351	1,436	1,835	1,692	1,743
Transportation equipment	336	10,267	7,974	8,422	7,936	8,075	7,899	9,621	8,412	8,592	8,734	7,404	7,812
Motor vehicles, bodies, trailers, and parts	3361–63	8,448	6,023	D	D	D	6,877	D	6,622	6,672	6,527	6,476 - 6,506	6,993
Aerospace products and parts	3364	1,816	1,846	1,770	772	D	901	D	1,672	1,817	2,035	705	585
Aircraft, aircraft engine, and aircraft parts	336411–13	1,742	1,760	D	D	D	D	D	1,670	1,813	511 - 2,036	705	585
Guided missile, space vehicle, and related parts	336414–15, 336419	74	85	D	D	5	D	D	2	4	0 - 1,524	1	*
Military armored vehicle, tank, and tank component	336992	0	D	D	1	0	0	D	0	0	0	0	0
Other transportation	other 336	3	D	D	D	D	121	D	118	104	171	195 - 221	234
Furniture and related products	337	27	38	33	28	23	28	45	25	22	40	9 - 33	35
Miscellaneous	339	D	4,044	D	D	D	3,608	2,194	2,207	3,057	2,888	3,271	3,482 - 3,488
Medical equipment and supplies	3391	766	3,813	1,003	D	1,978	3,197	1,782	1,813	2,739	2,539	2,884	3,069
Other miscellaneous manufacturing	3399	D	231	D	D	D	411	412	394 i	317 i	348	386	413 - 419
Nonmanufacturing industries	21–23, 42–81	14,903	13,648	14,698	17,792	19,037	19,853	21,849	21,778	25,956	29,196	34,975	40,113
Mining, quarrying, oil and gas extraction, and support activities	21	D	D	239	232	D	452	D	336	308	355 i	163	589
Utilities	22	6	13	17	38	21	23	1	3	1	10	8	9
Wholesale trade	42	509	D	53	141 i	112 i	7	D	25 i	21 i	0 - 2,590	32	113

TABLE 68

## Foreign R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2008–19

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Electronic shopping and electronic auctions	454111–12	NA	NA	D	D	D	490	D	D	0 - 5,132	0 - 2,590	63 - 3,863	69 - 4,198
Transportation and warehousing	48–49	2	1	29	28	8	D	13	13	7	7	14	62
Information	51	7,657	7,243	8,011	9,644	9,915	11,767	13,736	12,508	13,454	14,292	17,146	19,051
Publishing	511	6,301	6,332	6,926	7,899	7,880	9,456	10,185	8,842	8,698	8,500	7,174	6,949
Newspaper, periodical, book, and directory publishers	5111	27	47	55	29	2	6	4	9	4	6	19	0
Software publishers	5112	6,274	6,285	6,871	7,870	7,878	9,450	10,181	8,833	8,693	8,494	7,154	6,949
Telecommunications	517	175	86	131	98	59	63	61	41	49	96	131 - 138	124
Data processing, hosting, and related services	518	1,089	266	142	339	661	631	1,294	1,245	0 - 4,710	2,270	4,742 - 4,753	5,891
Other information	other 51	93	559	812	1,308	1,316	1,616	2,196	2,378	0 - 4,710	3,427	5,090	6,087
Finance and insurance	52	74	518	467	496	628	587	625	950	1,136	971	923	1,175
Real estate and rental and leasing	53	65	28	37	D	38	11	6	13	2	40 - 120	51	104
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	41	37	D	3	D	*	0 - 79	0	4
Other real estate and rental and leasing	other 53	NA	NA	NA	D	*	D	3	D	2	41	51	101
Professional, scientific, and technical services	54	6,150	5,328	5,309	6,424	6,723	6,418	6,534	7,653	5,744 - 10,877	10,563	12,758	14,790
Architectural, engineering, and related services	5413	200	126	148	D	57	41	65	58	57	50	0 - 542	37
Computer systems design and related services	5415	2,164	1,959	2,099	2,243	2,398	1,293	1,525	2,893	0 - 5,132	3,488	3,825	5,370
Scientific research and development services	5417	3,544	2,905	2,696	3,581	3,810	4,259	4,546	4,380	5,416	6,606	8,394	9,006
Research and development in biotechnology	541711	NA	683	729	942	977	1,398	1,438	1,520	1,616	1,869	2,580 - 2,594	2,793
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	NA	2,213	1,962	2,638	2,830	2,859	3,103	2,858	3,796	4,733	5,801	6,205
Research and development in the social sciences and humanities	541720	NA	9	5	1	2	3	4	3	4	3	1 - 12	8
Other professional, scientific, and technical services	other 54	241	338	366	D	458	825	398	322	273	418	0 - 542	376
Health care services	621–23	1	10	D	D	36	7	*	12	154	211	22	24

TABLE 68

**Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–19**

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55– 56, 624, 71–72, 81	NA	NA	NA	D	D	D	D	D	0 - 5,132	162	0 - 3,800	2 - 4,124
All companies (number of domestic employees)	–	61,475	54,066	59,162	69,251	72,157	73,245	75,804	73,503	79,001	87,761	99,736	104,464
Micro companies <sup>a</sup>													
5–9	–	NA	NA	178	83	99 i	52 i	95 i	118 i	145	NA	NA	NA
Small companies													
10–19	–	NA	NA	NA	NA	NA	NA	NA	76	101	142	128	138
20–49	–	NA	NA	NA	NA	NA	NA	NA	373	337	429	569	457
Medium companies													
50–99	–	976	509	688 i	539	628	351	547	407	364	471	684	737
100–249	–	1,735	1,574	1,358 i	1,051	1,212	1,276	1,475	1,378	1,300	1,379	1,875	2,192
Large companies													
250–499	–	1,178	985	1,245	1,561	1,306	1,359	1,446	1,151	1,773	2,210	2,196	2,709
500–999	–	1,753	1,992	1,741	1,396	1,455	1,650	2,293	2,437	2,159	2,437	2,557	2,953
1,000–4,999	–	11,350	10,403	11,674	12,691	12,419	13,238	14,343	13,261	15,587	14,656	15,195	16,553
5,000–9,999	–	7,000	5,692	6,907	8,126	10,298	11,430	12,979	9,541	8,949	14,232	15,538	11,965
10,000–24,999	–	11,785	10,442	8,856	12,485	10,317	9,741	9,366	11,534	15,515	14,425	21,787	23,612
25,000 or more	–	24,671	21,368	25,777	30,497	34,056	33,054	32,647	33,226	32,771	37,381	39,208	43,148

\* = amount < \$500,000; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business Enterprise Research and Development Survey did not include companies with fewer than 5 domestic employees from 2008–16 and does not include fewer than 10 domestic employees beginning in 2017.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Beginning with survey year 2011, the composition of the Other nonmanufacturing industry changed. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. 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.

TABLE 69

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All business activities	21100–81000	328,040	311,170	316,262	336,629	352,951	376,974	399,656	412,590	440,429	471,440	523,512	571,019
Oil and gas extraction	21100	1,215	1,223	1,268	1,379	D	1,487	1,308	1,486	1,089	986	0 - 23,467	902
Mining	21200	NA	D	75	128	92	114	56	71	63	170	114	93 - 4,956
Support activities for mining, including oil and gas	21300	NA	993	1,638	1,386	1,814	1,749	1,995	1,831	1,380	1,577	951	i 1,650
Utilities	22100	NA	1,607	903	639	686	615	549	726	515	501	0 - 23,467	415
Construction	23000	NA	198	918	269	393	i 307	297	700	276	501	691	899
Food manufacturing	31100	2,983	4,039	4,478	4,970	4,635	7,028	6,842	5,892	6,073	5,827	5,806	5,513
Beverage manufacturing	31210	605	564	926	668	641	772	753	728	787	i 851	762	723
Tobacco manufacturing	31220	D	792	800	717	662	668	672	681	731	853	722	807
Textile, apparel, and leather products manufacturing	31990	NA	673	658	712	759	787	780	847	1,333	1,093	1,155	965
Wood products manufacturing	32100	264	304	239	208	D	244	336	i 251	0 - 7,094	263	297	225 - 5,087
Paper manufacturing	32200	1,130	1,144	1,231	1,156	1,362	1,588	1,614	D	1,555	1,743	1,592	1,791
Printing and related support activities	32300	297	241	244	265	356	i 391	390	321	340	286	359	477
Petroleum refineries	32401	NA	NA	708	591	807	558	617	526	625	567	640	525 - 5,388
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	35	39	45	123	78	75	93	137	134	134
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	403	415	382	488	460	i 416	339	383	258	106 - 4,969
Basic chemicals manufacturing	32510	3,806	2,978	3,133	3,614	4,271	4,136	4,036	3,505	3,579	3,576	3,540	3,267
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,152	1,459	1,444	1,228	1,437	1,383	1,771	1,703	1,401	1,200	1,743	1,803
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	2,100	1,990	1,722	2,333	2,307	2,364	i 2,508	i D	2,338	i 2,479	i 3,196	i 2,919
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	70,016	68,588	71,603	67,688	69,473	68,318	68,846	63,606	69,518	71,762	77,733	81,409
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	1,988	1,159	1,207	1,544	1,371	i 1,066	1,159	972	1,286	1,567	1,381	1,591



TABLE 69

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	10,356	14,947	23,172	24,458	30,555	36,012	40,986
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,787	2,883	3,147	3,472	3,266	3,406	3,493	3,353	3,361	3,257	3,380	3,196
Paint, adhesive, and other chemical manufacturing	32592	2,152	2,320	2,238	2,011	2,087	1,979	2,131	D	2,121	2,094	1,666	1,747
Plastics and rubber products manufacturing	32600	2,536	2,842	3,128	3,689	3,739	3,586	3,592	3,251	3,926	3,904	3,643	3,506
Clay and glass products manufacturing	32710	966 i	312	1,056 i	920 i	1,154 i	1,077	1,130	1,145	1,198	1,345	1,521	1,511
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	738	555	522	590	621	618 i	800	601	652	443	446	546
Primary metal manufacturing	33100	NA	840	933	783	882	792	853	719	0 - 7,094	714	808	851
Fabricated metal products manufacturing	33200	2,935	2,438	1,971	2,471	2,517	2,460	2,560	2,521	2,562	2,695	2,798	3,129
Agricultural machinery and equipment manufacturing	33311	1,404	1,507	1,523	1,430	1,893	2,055	1,990	1,916	1,977	1,867	2,440	2,458
Construction machinery manufacturing	33312	581	653	682	875	816	1,693	1,729	1,556	1,462	1,588	1,880 i	1,871
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	1,629	1,765	2,204	2,589	1,942 i	1,462	2,115	1,528	1,586	1,739	1,300
Semiconductor machinery manufacturing	33321	2,553	1,978	2,279	2,574	1,266 i	3,500	3,363	3,459	3,688	3,996	4,465	4,687
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,191	853	806	1,128	1,031	1,006	1,237	1,181	893	1,222	0 - 23,467	1,406
Photographic and photocopying equipment manufacturing	33331	NA	852	270	757	25 i	108	25	114	59	52	67	147 - 5,010
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	977	1,268	1,143	1,621	1,661	2,251	1,947	0 - 7,094	2,245	2,263	2,169
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	33	587 i	519	571	274	463
Engine, turbine, and power transmission equipment manufacturing	33360	2,386	1,589	3,481	3,623	4,068	3,870	3,346	2,626	2,641	3,164	2,756	3,146
Metalworking and other general purpose machinery manufacturing	33390	2,039	1,618	1,998	2,359	1,916	2,052	2,585	2,728	2,591	2,547	2,996	2,861
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	13,094	12,672	13,319	14,716	15,113	13,437	16,547	23,130	27,553	27,801	25,296
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	6,739	7,758	9,010	9,530	9,335	9,622	10,526	12,366	10,715	10,403	11,487	11,254

TABLE 69

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019				
Radio, television, and wireless communication equipment manufacturing	33422	5,958	5,181	5,719	4,383	4,773	5,967	5,848	i	3,542	2,839	2,482	0 - 23,467	2,475			
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	2,482	1,352	715	1,092	2,111	1,826	1,782		1,844	i	1,660	1,977	0 - 23,467	2,293		
Audio and video equipment manufacturing	33430	773	977	1,352	1,019	1,081	1,108	1,282		1,587		1,535	1,252	1,461	1,714		
Semiconductor and other electronic components manufacturing	33440	29,911	26,118	29,457	32,354	38,109	40,001	41,125		39,810		40,585	41,053	44,130	46,556		
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	3,822	2,544	3,046	3,230	3,494	3,816	4,330		3,875		4,053	3,865	4,815	4,656		
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	1,845	2,229	2,417	2,161	2,337	2,564	2,424		2,033		2,614	2,378	3,136	3,198		
Measuring and control instruments manufacturing (not listed elsewhere)	33459	3,458	4,425	4,579	4,566	4,871	5,308	5,424		5,637		5,662	5,505	5,469	5,370		
Electrical equipment, appliances, and components manufacturing	33500	4,687	4,229	4,500	4,768	4,773	5,272	5,501		5,313		5,905	6,177	5,456	6,455		
Motor vehicles manufacturing	33610	18,296	13,165	14,524	17,011	18,362	17,743	18,984		18,357		20,573	22,481	23,693	21,793		
Motor vehicle body and trailer manufacturing	33620	70	96	190	73	98	i	107	i	104		160	118	47	99	154 - 5,017	
Motor vehicle parts manufacturing	33630	5,401	4,158	4,310	4,681	4,736	5,600	7,146		7,285		6,801	7,621	8,852	9,439		
Aircraft manufacturing	33641	4,053	7,390	4,430	4,512	4,716	i	4,373		4,221		4,859	5,639	4,671	6,467	5,404	
Aircraft engine and engine parts manufacturing	33642	2,433	1,765	1,978	2,136		D	1,787		2,068	i	D	0 - 7,094	1,455	1,759	1,474	
Other aircraft parts and auxiliary equipment manufacturing	33643	1,222	1,135	1,825	1,752	3,121	3,270	2,980		3,482		3,047	3,239	2,054	1,347		
Guided missiles, space vehicles, and related parts manufacturing	33644	1,402	1,176	1,132	1,050	659	487	877		1,034		954	1,055	1,210	1,140		
Railroad rolling stock manufacturing	33651	195	83	177	165	237	224	363		310		224	251	213	210 - 5,073		
Ship and boat building	33660	151	616	i	608	i	154	143	i	192		489	251	618	157	144	182 - 5,045
Motorcycle, bicycle, and parts manufacturing	33691	199	194	186	234	197	231	283		320		335	355	429	437		
Military armored vehicle, tank, and tank components manufacturing	33692	107	228	182	118	135	90	159		202		130	367	i	0 - 23,467	i	381
All other transportation equipment manufacturing	33699	176	135	232	367	437	425	361		430		478	505	521	496		
Furniture and related products manufacturing	33700	511	495	402	344	431	433	455		509		411	479	467	517		

TABLE 69

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Medical equipment and supplies manufacturing	33910	11,587	11,457	13,226	13,701	14,259	15,264	14,317	15,145	15,939	17,055	16,832	18,875
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,976	2,793	2,341	2,698	D	2,976	2,816	D	3,121	3,130	3,415	3,117
Merchant wholesalers, durable goods	42300	449	923 i	714	711	1,277 i	589	516	1,551	637	448	771 i	727
Merchant wholesalers, nondurable goods	42400	257	365 i	348	605	699 i	327	209	484	219	273	322	1,029
Wholesale electronic markets and agents and brokers (business to business)	42500	14	43 i	19 i	70	173 i	18	D	35	24	0 - 12,866 i	89 i	32 - 4,895 i
Retail trade (except electronic shopping and electronic auctions)	44000	NA	50	164	74	100 i	120	65	D	120	119	263	279 - 5,142
Electronic shopping and electronic auctions	45411	NA	NA	753	D	1,749	1,284	D	D	8,200 i	0 - 12,866	0 - 23,467 i	0 - 15,636 i
Transportation	48000	NA	319	211	111	199	377	412	229 i	123	722	2,080	9,072
Couriers, messengers, and express delivery services	49200	D	14	6	D	D	90	348	D	394	425	451	290
Warehousing and storage	49300	26	17	19	16	17	4	3	D	0	82	79	162 i
Newspaper, periodical, book, and directory publishers (except Internet)	51110	180	748	853	408 i	257 i	339 i	103	117	87	99	175	88
Software publishers (except Internet) <sup>e</sup>	51120	31,369	26,362	28,457	29,992	31,209	35,047	41,052	36,040	34,699	31,400	32,842	31,585
Motion picture and sound recording (except Internet)	51200	104	135	93	67	67	38	83 i	12	20	42 i	155	52 - 4,915
Broadcasting (except Internet)	51500	NA	89	100	115	165 i	179	206	306	347	460	424	500
Wired telecommunications carriers	51710	673	D	1,499 i	1,685	1,631 i	1,012 i	1,166	1,269 i	1,180	1,027	476	428
Wireless telecommunications carriers (except satellite)	51720	532 i	186	724 i	815 i	860 i	1,732 i	2,500	1,192 i	1,458 i	1,969	2,439	2,641
Satellite telecommunications	51740	153	108	229	114	163	176	134	705 i	746	625	476	486
Other telecommunications (not listed elsewhere)	51790	501	351	338	462	399	377	330	536	362	381	745	610
Data processing, hosting, and related services <sup>e</sup>	51800	NA	2,889	3,051	5,293	4,406	4,381	5,402	6,895	7,040	6,975	7,699	10,108
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	4,344	6,730	6,801	11,913	19,581	24,607	33,022
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	NA	5,519	7,270	9,456	12,998	15,433	17,443	25,330	27,524	32,484	43,287	53,120
Finance: banking and credit intermediation	52200	NA	D	1,235	1,703	2,454	3,238	3,553	3,299	5,171	5,657	4,975	5,718

TABLE 69

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	678	903	1,347	1,110	1,323	1,147	1,597	1,683	1,785	1,445	1,654
Insurance carriers and related activities	52400	NA	798	611	872	1,429	1,772	1,069	1,573	1,444	1,430	0 - 23,467	2,607
Real estate	53100	20	32	3	13	27	105	199	288	440	253	380	398
Rental and leasing services	53200	NA	129	146	51	59	94	80	80	106	i 571	i 699	1,067
Lessors of nonfinancial intangible assets, including patent licensing	53300	80	259	268	369	437	100	97	104	45	97	24	i 71
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	505	705	i 535	696	1,128	1,587	1,052	1,130	1,426	2,117
Architectural, engineering, and related services	54130	1,742	1,115	1,390	1,380	1,232	1,495	1,649	2,449	1,975	1,795	2,575	2,720
Specialized design services	54140	75	76	65	283	157	i 81	42	13	26	133	0 - 23,467	111 - 4,974
Computer systems design and related services <sup>e</sup>	54150	11,476	12,292	11,528	13,673	13,909	i 12,577	13,288	14,090	14,864	13,998	18,287	22,598
Management, scientific, and technical consulting services	54160	1,110	2,246	1,380	1,618	2,066	i 1,428	1,681	1,531	1,668	1,591	2,443	2,004
Research and development services in social sciences and humanities	54172	NA	96	8	19	64	36	47	15	0 - 7,094	i 348	27	28
Research and development services in biotechnology <sup>c</sup>	54173	NA	6,850	2,601	6,238	6,294	1,723	1,344	2,387	1,176	930	1,147	1,151
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	3,208	1,447	2,751	3,166	2,143	3,040	3,197	2,767	2,226	2,324	2,885
Advertising and related services	54180	37	1,950	422	97	375	i 390	424	452	373	412	1,160	i 1,261
Professional, scientific, and technical services (not listed elsewhere)	54190	439	1,036	543	1,242	1,199	1,627	810	944	622	695	912	1,264
Management of companies and enterprises	55100	11	40	23	43	18	76	43	D	20	71	0 - 23,467	0 - 15,636
Administrative and support services	56100	NA	419	640	348	609	589	459	375	588	1,558	2,668	3,576
Waste management and remediation services	56200	NA	15	684	20	D	23	D	D	8	0 - 12,866	0 - 23,467	16 - 4,879
Offices of physicians	62110	40	37	371	36	42	i 43	39	28	70	102	i 113	196
Medical and diagnostic laboratories	62150	903	246	409	287	364	347	410	424	0 - 7,094	i 855	i 1,739	2,104

TABLE 69

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	47	145 i	15	45 i	52	37	39	23	70	48	146 - 5,009
Hospitals and nursing care facilities	62200	NA	62 i	68	2	2 i	2	2	4	6	18	0 - 23,467	0 - 15,636
Social assistance services	62400	NA	D	15	13	36	47	17	2	2	6	13	0 - 15,636
Arts, entertainment, and recreation	71000	NA	161	137	85	70	29	103 i	50	45	42	45	479
Accommodation and food services	72000	NA	50	119	84	149 i	163	D	106	76	62	126	79 - 4,942
Other services (not listed elsewhere)	81000	NA	89	465	345	484	405	550	669	0 - 7,094	0 - 12,866	0 - 23,467	514
Undistributed	–	10,660	14,175	5,373 i	D	491	359 i	69	0	0	0	0	0

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

<sup>a</sup> Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

<sup>b</sup> Business codes and descriptions are based on 2012 North American Industry Classification System (NAICS) industry definitions.

<sup>c</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).

<sup>d</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

<sup>e</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 51801, Cloud computing applications and Internet-based software services.

**Note(s):**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. 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.

TABLE 70

**Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
All business activities	21100–81000	10,976,518	10,221,923	12,204,773	12,874,185	12,975,886	13,279,075	13,409,822	12,201,595	12,246,930	12,878,032	14,493,394	14,897,629
Oil and gas extraction	21100	271,493	153,939	212,469	331,320	271,983	250,884	241,227	141,687	117,720	108,940	178,064	134,817
Mining	21200	NA	D	38,302	57,661	43,857	54,531	D	D	29,976	23,057	44,867	18,446
Support activities for mining, including oil and gas	21300	NA	45,184	61,062	68,523	79,788	100,175	129,989	74,421	44,705	64,412	84,366	89,977
Utilities	22100	NA	317,243	310,768	348,763	318,893	324,150	356,225	346,925	309,116	407,052	4,778 - 1,152,314	304,374
Construction	23000	NA	42,287	93,305	107,286	107,685	94,057	91,507	64,463	52,363	69,900	87,053	94,478
Food manufacturing	31100	475,588	630,500	694,763	690,698	688,804	941,309	844,673	744,318	705,021	789,784	718,760	779,512
Beverage manufacturing	31210	143,008	129,396	141,259	180,153	167,003	164,270	166,544	170,059	155,459	146,561	138,524	119,563
Tobacco manufacturing	31220	28,970	134,972	133,993	140,998	130,759	69,191	D	D	64,978	72,291	67,629	70,749
Textile, apparel, and leather products manufacturing	31990	NA	56,131	68,515	66,416	89,086	70,260	66,546	83,170	109,296	88,817	84,900	77,152
Wood products manufacturing	32100	34,563	27,826	28,342	24,165	32,908	42,472	51,879	33,713	0 - 373,524	36,180	41,001	41,886
Paper manufacturing	32200	139,953	110,534	136,302	144,064	142,335	146,748	148,797	D	129,369	146,927	157,969	157,322
Printing and related support activities	32300	26,426	37,743	37,398	32,823	32,152	29,576	34,227	42,885	31,310	47,910	36,015	65,659
Petroleum refineries	32401	NA	NA	837,945	954,108	911,784	968,046	787,825	512,224	415,433	325,034 - 733,821	586,670	565,617
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	7,566	8,872	8,563	14,504	11,150	10,324	12,322	16,662	17,798	18,425
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	32,282	43,514	D	23,425	22,348	20,440	15,665	20,790	16,008	11,434
Basic chemicals manufacturing	32510	273,809	179,494	243,193	299,476	473,666	278,661	270,287	212,951	264,935	231,673	262,007	229,696

TABLE 70

**Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	89,805	94,915	108,693	88,762	97,410	95,249	108,867	92,708	91,399	92,324	128,075	111,490
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	40,337	71,003	51,940	47,381	57,246	67,823	68,738	72,737	58,476	74,274	83,310	67,393
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	582,910	438,687	471,763	577,607	594,394	577,930	569,968	564,398	608,453	636,157	669,845	556,641
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	22,317	16,940	20,637	25,005	27,022	13,871	25,365	14,159	7,892 - 171,885	15,915	17,050	16,743
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	40,409	56,454	84,437	0 - 373,524	90,419	110,160	125,658
Soap, cleaning compound, and toilet preparations manufacturing	32591	142,212	151,565	167,258	170,417	166,942	185,266	196,651	180,201	164,810	179,865	192,314	178,605
Paint, adhesive, and other chemical manufacturing	32592	113,118	104,308	103,452	120,242	128,998	113,108	128,730	107,146	118,885	124,026	131,768	122,390
Plastics and rubber products manufacturing	32600	162,401	161,057	193,471	243,447	265,623	219,020	241,780	201,164	232,466	229,347	227,659	208,281
Clay and glass products manufacturing	32710	36,417	27,803	37,853	34,184	36,960	39,365	34,863	39,676	47,603	41,355	48,534	39,831

TABLE 70

**Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	48,680	35,530	31,789	32,864	40,193	42,592	35,322	35,377	34,503	29,688	41,567	46,774
Primary metal manufacturing	33100	NA	124,478	197,315	179,318	176,544	161,443	128,532	103,093	121,321	100,279	158,304	152,375
Fabricated metal products manufacturing	33200	188,359	132,465	161,593	179,228	207,423	199,678	235,784	194,098	165,184	175,986	203,494	181,995
Agricultural machinery and equipment manufacturing	33311	48,185	46,695	53,946	43,410	59,651	68,793	63,617	53,559	51,776	60,038	67,224	64,372
Construction machinery manufacturing	33312	32,109	23,195	30,685	42,974	43,355	63,344	65,348	56,090	49,267	60,563	74,106	80,265
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	69,074	75,563	101,549	110,356	84,384	76,466	73,725	48,023	65,286	86,513	68,949
Semiconductor machinery manufacturing	33321	20,019	10,505	21,588	25,960	9,973	24,420	27,333	24,653	30,749	38,320	47,008	45,318
Industrial machinery manufacturing (except semiconductor machinery)	33322	26,984	21,368	30,723	44,666	42,619	39,357	51,615	39,189	37,659	38,252	44,624	38,121
Photographic and photocopying equipment manufacturing	33331	NA	7,471	D	D	307	7,502	9,162	8,602	6,775 - 170,768	6,849	0 - 1,147,536	836
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	49,546	76,811	73,896	90,814	97,984	111,674	101,920	113,832	100,874	116,411	115,672



TABLE 70

**Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D	5,579	5,947	0 - 1,147,536	3,382
Engine, turbine, and power transmission equipment manufacturing	33360	86,660	46,879	84,686	112,562	120,116	146,129	D	85,560	87,887	106,205	95,099	107,601
Metalworking and other general purpose machinery manufacturing	33390	90,067	66,350	95,017	112,947	125,495	105,487	149,607	140,673	116,838	117,535	124,745	101,485
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	273,429	330,020	342,416	304,309	307,523	297,193	282,890	414,641	452,483	479,840	457,916
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	48,816	66,123	87,159	64,811	64,652	75,886	72,421	202,399	76,218	74,054	80,804	79,503
Radio, television, and wireless communication equipment manufacturing	33422	76,167	64,808	79,675	92,884	136,470	148,680	168,774	D	39,937 - 203,930	37,092	0 - 1,147,536	37,126
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	17,976	13,324	12,856	21,004	15,949	23,299	14,548	15,997	0 - 373,524	13,808	14,852 - 257,625	16,059
Audio and video equipment manufacturing	33430	13,212	15,041	22,242	11,476	17,926	19,596	18,333	38,954	35,473	3,724 - 417,696	11,671	16,217

TABLE 70

**Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Semiconductor and other electronic components manufacturing	33440	220,272	196,399	296,058	336,789	332,771	320,780	350,779	D	323,512	373,892	464,768	465,467
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	41,395	27,437	29,041	38,560	39,590	43,130	43,537	44,739	46,152	44,317	54,101	49,345
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	38,474	55,866	68,907	47,701	63,724	66,326	67,154	58,670	59,653	65,730	72,999	73,069
Measuring and control instruments manufacturing (not listed elsewhere)	33459	57,989	78,228	88,305	84,368	99,774	97,153	102,909	101,098	102,226	91,098	80,604	84,362
Electrical equipment, appliances, and components manufacturing	33500	154,206	129,174	160,532	165,156	164,998	182,490	198,505	195,327	213,284	185,233	189,043	222,663
Motor vehicles manufacturing	33610	521,541	399,125	476,726	539,595	541,730	615,136	539,139	646,110	693,548	616,741	700,801	529,227
Motor vehicle body and trailer manufacturing	33620	D	15,688	23,105	15,325	34,284	25,913	32,719	23,229	63,232	20,086	26,219	45,991
Motor vehicle parts manufacturing	33630	163,993	126,638	242,201	224,450	228,418	269,022	379,492	294,414	238,521	270,643	284,735	278,559
Aircraft manufacturing	33641	97,635	75,960	89,235	121,480	97,484	154,241	139,924	148,986	136,497	128,861	190,692	144,831
Aircraft engine and engine parts manufacturing	33642	42,829	37,086	34,925	42,514	40,376	54,024	48,134	D	38,176	42,340	60,557	54,264

TABLE 70

**Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other aircraft parts and auxiliary equipment manufacturing	33643	30,319	36,714	41,704	56,509	44,556	60,520	84,966	97,198	85,111	103,682	67,880	58,491
Guided missiles, space vehicles, and related parts manufacturing	33644	D	51,326	D	D	16,554	17,200	30,237	31,776	30,600	37,204	51,013	35,217
Railroad rolling stock manufacturing	33651	7,248	3,639	9,075	8,870	14,255	12,639	19,679	19,353	14,852	13,416	14,083	13,506
Ship and boat building	33660	16,461	37,439	D	D	23,966	16,927	39,049	15,426	33,496 - 134,100	22,538	16,295	24,057
Motorcycle, bicycle, and parts manufacturing	33691	8,423	6,677	6,646	8,948	7,829	11,331	9,142	9,067	9,507	9,107	4,253 - 1,151,789	10,979
Military armored vehicle, tank, and tank components manufacturing	33692	13,341	10,136	D	6,239	4,893	4,354	7,502	D	77 - 229,474	11,306	18,524	15,405
All other transportation equipment manufacturing	33699	9,513	6,332	13,008	13,415	18,469	28,933	12,026	14,565	14,435	14,658	21,096	17,730
Furniture and related products manufacturing	33700	43,401	35,821	37,487	39,031	43,719	41,407	45,760	43,530	43,362	47,260	48,896	51,330
Medical equipment and supplies manufacturing	33910	164,066	159,611	243,406	304,215	217,549	237,729	234,177	235,706	244,748	250,637	271,188	301,096
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	122,669	114,088	101,526	D	118,660	140,793	134,415	D	131,728	135,910	170,909	119,361
Merchant wholesalers, durable goods	42300	412,269	313,095	334,004	214,772	246,702	378,550	180,014	260,038	221,852	165,345	247,956	165,955

TABLE 70

**Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Merchant wholesalers, nondurable goods	42400	340,956	273,118	280,982	496,309	587,019	571,742	698,182	547,921	512,867	506,120	633,916	602,072
Wholesale electronic markets and agents and brokers (business to business)	42500	2,600	8,684	3,347	4,722	115,452	53,497	86,215	41,905	60,197	50,155	435 - 1,147,971	5,340
Retail trade (except electronic shopping and electronic auctions)	44000	NA	206,489	223,211	104,922	257,466	156,839	442,527	210,412	296,019	322,049	537,429	662,471
Electronic shopping and electronic auctions	45411	NA	NA	D	D	88,213	96,577	D	130,399	110,617 - 274,610	198,755	191,380 - 434,154	168,456 - 333,088
Transportation	48000	NA	D	182,535	109,842	139,615	95,821	117,267	D	0 - 373,524	278,263	277,801	387,986
Couriers, messengers, and express delivery services	49200	D	D	47,619	D	D	D	170,934	D	187,345	136,436	90,988	2,034
Warehousing and storage	49300	31,235	1,536	24,457	22,885	3,983	13,530	2,585	D	4,652	15,714	0 - 1,147,536	15,949
Newspaper, periodical, book, and directory publishers (except Internet)	51110	17,053	24,528	26,671	30,831	33,557	17,955	10,520	7,008	8,704	6,010	0 - 1,147,536	7,147
Software publishers (except Internet) <sup>e</sup>	51120	210,186	195,833	214,359	230,898	237,602	266,587	278,159	272,944	256,293	231,880	244,928	237,902
Motion picture and sound recording (except Internet)	51200	16,774	20,697	18,011	14,964	9,467	20,861	D	7,142	9,353	8,936	37,326	46,587
Broadcasting (except Internet)	51500	NA	39,734	53,313	44,029	67,429	81,499	D	74,473	84,879	88,160	151,227	185,587
Wired telecommunications carriers	51710	D	187,439	210,704	268,345	223,829	181,992	230,630	216,588	181,904	222,699	129,766	139,262

TABLE 70

**Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Wireless telecommunications carriers (except satellite)	51720	135,248	154,682	138,479	156,696	193,408	D	247,759	D	172,416	201,063	264,219	264,976	
Satellite telecommunications	51740	19,330	12,662	16,021	2,783	3,056	D	3,581	44,400	61,927	57,588	53,333	51,337	
Other telecommunications (not listed elsewhere)	51790	5,603	9,122	7,737	18,803	17,803	18,504	6,507	14,561	8,524	16,040	12,551 - 255,324	19,438	
Data processing, hosting, and related services <sup>e</sup>	51800	NA	36,196	38,523	60,641	95,872	i	58,502	81,059	79,017	76,345	77,859	141,006	98,036
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	27,442	D	33,792	57,770	98,224	167,679	218,846	
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	NA	41,660	77,319	39,551	45,729	65,134	102,254	94,541	113,123	160,826	191,042	219,808	
Finance: banking and credit intermediation	52200	NA	D	1,068,703	631,129	673,238	i	347,139	364,224	377,622	400,369	472,203	536,280	629,562
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	148,454	148,014	152,435	104,915	107,027	74,030	75,325	72,115	102,310	20,889 - 1,168,425	97,896	
Insurance carriers and related activities	52400	NA	294,233	281,344	280,278	358,159	397,971	380,117	420,526	372,903	312,922	0 - 1,147,536	1,069,279	
Real estate	53100	D	7,738	D	D	D	D	D	8,537	9,292	10,114	11,565	17,104	
Rental and leasing services	53200	NA	32,231	36,299	23,830	29,033	35,488	21,986	29,238	14,235	21,642	3,607 - 1,151,143	12,743	

TABLE 70

## Worldwide sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	1,835	1,927	2,709	2,890	11,404	i 2,125	2,150	1,468	3,513	0 - 1,147,536	1,671
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	16,188	D	11,315	14,588	22,315	22,259	19,526	21,336	24,044	29,565
Architectural, engineering, and related services	54130	42,680	96,534	147,309	102,126	114,240	i 125,923	134,541	139,846	103,412	84,387	102,795	127,409
Specialized design services	54140	D	6,504	3,976	2,581	3,646	i 3,614	2,165	D	706	4,584	i 25,655	12,640
Computer systems design and related services <sup>e</sup>	54150	210,916	216,477	224,026	377,919	i 272,065	249,600	272,937	243,790	249,430	223,281	251,167	238,778
Management, scientific, and technical consulting services	54160	52,497	60,125	43,190	76,910	85,161	81,834	93,077	92,120	63,143	49,057	69,344	57,882
Research and development services in social sciences and humanities	54172	NA	980	1,170	827	D	1,301	992	D	1,131	1,185	941	1,233
Research and development services in biotechnology <sup>c</sup>	54173	NA	22,354	i 8,493	8,657	11,316	12,390	17,543	10,962	9,026	9,340	3,772 - 1,151,308	13,214
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	19,858	18,840	23,446	33,296	36,913	32,703	36,038	37,997	37,955	41,855	49,481
Advertising and related services	54180	D	48,883	12,992	i D	52,764	D	D	D	44,669 - 208,661	107,640	140,254	84,177 - 248,809

TABLE 70

**Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Professional, scientific, and technical services (not listed elsewhere)	54190	19,146	30,323	35,320	50,949	63,254	47,353	32,811	30,775	12,204 - 176,196	31,239	21,496	23,046
Management of companies and enterprises	55100	828	2,333	3,613	17,275	5,435	177,880	9,213	16,180	11,794 i	18,180	13,915	13,249
Administrative and support services	56100	NA	35,867	45,135	32,735	50,684 i	44,004	243,644	50,037	55,602	49,518	66,944	89,404
Waste management and remediation services	56200	NA	6,242	14,172	8,182	6,564	6,245	4,766	24,985	27,470	22,609	88,502	11,623
Offices of physicians	62110	7,492	25,752	24,133	23,844	35,513	36,233	19,041	36,724	40,586	61,118	50,891	102,792
Medical and diagnostic laboratories	62150	20,968	15,216	37,950	17,047	21,038	17,914	5,919	20,904	27,539 i	28,636	39,514 i	38,599
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	8,127	8,487	D	3,361 i	10,919	5,274	5,651	0 - 229,395	10,819	176 - 1,147,712	22,807
Hospitals and nursing care facilities	62200	NA	D	D	D	D	D	26,866	27,616	32,896	32,276	35,119	25,795
Social assistance services	62400	D	286	448	326	249	1,065	1,338	63	77	112	0 - 1,147,536	108
Arts, entertainment, and recreation	71000	NA	17,339	16,089	16,023	18,344	D	D	18,677	17,509 - 181,502	24,540	34,697	37,623
Accommodation and food services	72000	NA	D	69,474	39,421	88,878 i	107,255	46,228	76,898	66,849	26,196	54,566	84,334
Other services (not listed elsewhere)	81000	NA	15,585	43,778	129,084	57,612	142,029	78,365	70,781	237,671	0 - 413,972	0 - 1,147,536	109,756
Less: intersegment eliminations	-	381,031	237,743	234,289	281,460	309,288	301,615	316,930	240,217	226,993	196,040	255,127	182,972
Undistributed	-	1,092,275	1,590,109	516,754	598,369 i	167,240 i	D	4,602	9,547 i	0	0	8 i	0

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

<sup>a</sup> Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

<sup>b</sup> Business codes and descriptions are based on 2012 North American Industry Classification System (NAICS) industry definitions.

<sup>c</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).

<sup>d</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

<sup>e</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 51801, Cloud computing applications and Internet-based software services.

**Note(s):**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. 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.



TABLE 71

**Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
All business activities	21100–81000	7,796,340	7,448,495	8,831,739	9,059,299	9,260,168	9,663,848	9,785,269	9,084,789	9,151,764	9,583,098	10,680,515	11,180,864	
Oil and gas extraction	21100	127,788	61,582	85,797	178,926	i 124,569	120,495	124,534	71,385	58,231	51,790	91,319	76,461	
Mining	21200	NA	D	33,072	38,109	24,837	38,270	22,962	37,589	i 19,449	17,583	25,823	16,249	
Support activities for mining, including oil and gas	21300	NA	23,022	34,840	42,645	51,327	72,553	97,302	47,711	25,825	39,547	54,528	52,988	
Utilities	22100	NA	D	301,613	337,871	309,573	316,082	347,997	336,457	304,643	400,104	0-1,147,536	299,499	
Construction	23000	NA	27,180	81,641	88,626	64,402	60,516	66,835	49,892	45,660	64,968	79,414	86,185	
Food manufacturing	31100	394,404	503,047	501,332	494,683	503,915	693,438	608,765	541,557	520,546	617,230	527,904	565,706	
Beverage manufacturing	31210	83,691	78,740	84,764	95,236	83,774	106,580	109,397	D	111,431	96,676	92,210	78,304	
Tobacco manufacturing	31220	28,680	32,431	31,357	29,645	27,706	35,864	36,177	31,715	34,196	35,945	35,691	38,302	
Textile, apparel, and leather products manufacturing	31990	NA	45,893	56,890	52,532	68,545	55,066	51,532	70,105	89,019	66,734	59,379	52,980	
Wood products manufacturing	32100	28,183	26,213	25,241	22,344	28,764	36,703	44,706	28,998	0-229,395	31,890	34,871	35,775	
Paper manufacturing	32200	100,057	80,030	99,820	103,867	101,033	106,399	106,178	108,659	95,481	110,534	118,261	121,784	
Printing and related support activities	32300	22,678	33,532	32,163	26,809	26,267	26,281	29,178	35,056	26,808	39,492	31,019	55,322	i
Petroleum refineries	32401	NA	NA	540,612	581,297	578,075	639,569	521,504	336,271	245,323	325,035	332,542	362,033	
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	7,549	8,781	8,489	13,260	8,873	9,694	9,088	13,350	11,426	12,625	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	21,658	20,509	20,440	13,722	12,852	11,797	10,565	15,821	13,238	10,453	
Basic chemicals manufacturing	32510	158,621	103,950	150,240	206,723	344,515	i 198,843	195,066	154,351	205,221	164,502	181,046	162,308	
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	60,269	61,805	64,684	58,263	68,104	67,845	73,542	61,729	58,345	56,121	76,816	71,464	

TABLE 71

**Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	28,010	47,317	41,528	33,380	40,317	45,660	55,122	D	41,963	55,687	53,085	55,221
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	445,985	309,750	324,266	414,284	428,486	415,199	414,154	410,983	463,633	486,877	510,204	390,793
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	15,353	9,805	12,835	13,735	14,646	8,141	14,006	6,219	7,893	9,215	8,119	9,203
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	36,856	48,419	71,205	0 - 229,395	0 - 90,420	96,814	110,171
Soap, cleaning compound, and toilet preparations manufacturing	32591	69,942	71,452	81,151	70,851	82,518	87,034	101,458	94,015	83,083	94,133	107,951	98,956
Paint, adhesive, and other chemical manufacturing	32592	63,149	62,724	60,506	64,497	79,372	67,504	73,975	68,020	73,446	78,668	86,077	79,963
Plastics and rubber products manufacturing	32600	118,523	114,191	137,777	173,290	194,568	153,705	165,082	156,033	175,524	162,892	171,981	147,611
Clay and glass products manufacturing	32710	24,394	19,014	25,143	21,754	20,164	22,987	21,577	23,739	30,753	27,302	29,698	24,278
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	43,373	31,599	24,141	24,235	33,359	33,428	25,941	27,882	28,170	25,524	36,064	40,945
Primary metal manufacturing	33100	NA	97,493	161,558	148,670	153,926	137,000	104,419	90,956	105,884	82,674	124,934	124,730
Fabricated metal products manufacturing	33200	142,788	102,595	119,246	130,090	155,294	160,359	168,139	150,860	129,779	128,532	149,664	131,704
Agricultural machinery and equipment manufacturing	33311	27,543	25,669	29,904	29,258	35,667	45,717	36,857	32,054	30,092	38,891	37,208	36,555

TABLE 71

**Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Construction machinery manufacturing	33312	18,228	13,180	19,480	25,854	31,853	42,912	41,256	35,668	34,984	39,464	44,655	49,639
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	33,167	39,264	53,050	60,556	46,949	43,531	37,351	21,606	31,187	46,305	41,577
Semiconductor machinery manufacturing	33321	9,091	4,765	11,918	15,018	6,839	10,807	11,067	8,215	15,676	20,114	21,685	24,628
Industrial machinery manufacturing (except semiconductor machinery)	33322	19,452	15,372	21,762	29,736	31,127	29,265	35,077	32,599	25,317	27,103	31,884	28,420
Photographic and photocopying equipment manufacturing	33331	NA	5,392	3,927	4,791	D	6,885	7,246	7,124	6,776	5,993	0- 1,147,536	710
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	33,493	48,407	43,626	54,363	64,333	71,628	74,207	76,436	68,201	77,939	80,311
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D	0 - 5,580	1,423	0- 1,147,536	1,765
Engine, turbine, and power transmission equipment manufacturing	33360	58,560	30,093	46,693	68,243	74,148	89,526	45,367	50,302	51,113	57,548	49,399	55,906
Metalworking and other general purpose machinery manufacturing	33390	54,007	43,998	58,532	71,081	86,258	81,492	98,230	99,506	78,310	78,019	86,306	75,149
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	136,666	167,290	174,898	143,492	180,146	165,617	153,211	211,415	196,854	214,860	212,050
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	26,447	35,592	40,631	32,334	34,783	39,026	40,004	92,411	44,009	41,110	44,162	44,013

TABLE 71

## Domestic sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–19

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Radio, television, and wireless communication equipment manufacturing	33422	46,641	46,769	61,641	55,217	82,027	94,606	96,564	D	39,938	31,253	1,147,536 <sup>0-</sup>	30,687
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	11,185	8,644	8,841	12,452	13,908	16,604	12,801	14,671	229,395 <sup>0-</sup>	11,789	14,853	14,584
Audio and video equipment manufacturing	33430	10,969	10,929	19,142	7,296	14,633	14,832	13,162	D	25,739	413,972 <sup>0-</sup>	6,363	7,917
Semiconductor and other electronic components manufacturing	33440	119,612	117,302	138,124	151,590	146,764	123,263	162,118	172,062	160,152	182,769	232,283	224,875
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	28,976	18,709	19,647	25,057	27,605	31,248	28,949	29,150	31,400	24,211	31,286	31,332
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	33,348	46,237	57,639	40,372	53,425	52,990	55,142	48,787	47,874	53,371	63,110	62,412
Measuring and control instruments manufacturing (not listed elsewhere)	33459	37,609	42,753	50,643	49,752	58,909	52,984	55,954	61,158	62,658	60,242	52,440	55,700
Electrical equipment, appliances, and components manufacturing	33500	106,551	85,758	105,982	106,576	110,094	133,238	141,600	143,695	139,311	120,116	115,004	145,801
Motor vehicles manufacturing	33610	346,591	274,985	329,874	373,194	375,113	459,721	385,647	526,522	561,193	207,956 - 616,742	580,129	406,293
Motor vehicle body and trailer manufacturing	33620	9,363	15,184	22,168	14,423	31,982	25,726	32,146	23,083	62,848	19,322	25,616	44,214
Motor vehicle parts manufacturing	33630	97,433	77,528	146,257	125,593	130,372	155,179	244,948	192,928	148,781	185,890	202,526	182,796
Aircraft manufacturing	33641	97,973	69,001	81,666	111,748	91,545	145,641	132,472	139,909	130,676	121,866	181,703	139,088

TABLE 71

**Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Aircraft engine and engine parts manufacturing	33642	35,056	24,737	25,563	27,491	26,706	46,618	41,051	D	36,861	40,556	35,583	32,679
Other aircraft parts and auxiliary equipment manufacturing	33643	21,141	26,755	31,157	43,898	34,541	47,588	68,545	77,236	68,063	83,469	56,053	47,652
Guided missiles, space vehicles, and related parts manufacturing	33644	38,114	D	25,391	35,889	14,656	14,770	27,872	29,343	30,261	35,725	46,748	32,444
Railroad rolling stock manufacturing	33651	6,354	2,763	7,095 i	7,204	11,800	10,875	16,122	16,100	11,092	8,252	8,576	8,091
Ship and boat building	33660	14,880	D	10,531	11,647	22,778 i	15,008	32,077 i	13,569	33,497 i	20,861	14,316	21,988
Motorcycle, bicycle, and parts manufacturing	33691	8,078	6,282	6,081	7,422	7,067	10,406	7,777	7,687	6,276 i	5,423	0 - 1,147,536	6,948
Military armored vehicle, tank, and tank components manufacturing	33692	13,092	9,674	9,072	5,755	4,668	4,190 i	4,895	4,304	0 - 229,395	9,662 i	15,846 i	13,848
All other transportation equipment manufacturing	33699	7,131	5,438	11,079	11,066	16,258	15,809	D	11,472	11,940	11,554	17,803	16,191
Furniture and related products manufacturing	33700	36,218	31,479	32,876	32,881	37,447 i	35,446	39,675	38,024	37,737	43,394	44,459	46,013
Medical equipment and supplies manufacturing	33910	105,647	102,585	169,760	225,177	136,664	160,263	155,890	154,650	166,341	165,204	28,416 - 271,189	200,226
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	80,689	84,846	71,000	78,674	80,879	93,078	90,517	95,353	86,197	96,947	104,968	89,861
Merchant wholesalers, durable goods	42300	238,101	196,341	206,240	171,815	221,488	353,401 i	161,500	232,112	194,976	142,659	225,389	149,138
Merchant wholesalers, nondurable goods	42400	274,190	239,385	247,311	266,388	349,833	362,965	457,745	387,489	359,871	349,751	454,966	445,786
Wholesale electronic markets and agents and brokers (business to business)	42500	2,481	D	3,331	3,008	65,076 i	33,264	65,562	21,530	59,653	49,844	0 - 1,147,536	5,089

TABLE 71

**Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019			
Retail trade (except electronic shopping and electronic auctions)	44000	NA	D	195,958	70,424	214,728	i	128,479	400,192	196,896	278,755	305,293	481,549	582,203		
Electronic shopping and electronic auctions	45411	NA	NA	32,624	40,254	53,712	59,174	43,787	i	D	110,618	0 - 198,757	191,381	i	168,457	i
Transportation	48000	NA	D	95,591	83,912	107,212	87,113	111,576	D	0 - 229,395	223,375	219,221	299,235			
Couriers, messengers, and express delivery services	49200	D	D	36,420	D	D	D	123,456	D	141,429	103,001	68,939	2,014			
Warehousing and storage	49300	28,723	1,296	23,982	21,910	3,157	12,235	1,971	2,305	3,358	9,877	0 - 1,147,536	8,413			
Newspaper, periodical, book, and directory publishers (except Internet)	51110	12,383	16,369	18,917	22,488	26,549	i	15,003	8,481	5,743	4,383	0 - 1,147,536	5,585			
Software publishers (except Internet) <sup>e</sup>	51120	121,028	118,001	129,649	132,970	136,905	154,237	163,059	159,688	155,068	133,983	148,758	143,184			
Motion picture and sound recording (except Internet)	51200	10,053	14,356	11,375	9,824	7,281	i	13,722	D	5,203	6,863	6,353	32,874	43,317		
Broadcasting (except Internet)	51500	NA	34,110	45,779	39,563	59,926	73,283	59,724	64,390	70,169	71,335	126,122	145,898			
Wired telecommunications carriers	51710	99,917	D	209,490	261,484	216,736	181,127	227,778	213,921	179,239	220,350	127,438	137,035			
Wireless telecommunications carriers (except satellite)	51720	134,162	153,937	138,473	156,525	193,254	205,148	247,714	210,820	172,357	200,979	264,216	264,971			
Satellite telecommunications	51740	14,005	6,743	i	15,845	2,430	2,822	3,143	3,518	43,812	61,622	57,292	53,242	51,267		
Other telecommunications (not listed elsewhere)	51790	4,374	8,108	7,222	15,929	14,610	16,325	5,973	13,669	7,684	14,142	12,552	13,883			
Data processing, hosting, and related services <sup>e</sup>	51800	NA	29,903	31,417	51,197	82,997	i	49,201	67,167	64,916	59,491	57,183	114,191	69,214		
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	19,455	26,461	26,654	44,759	77,556	131,826	169,605			

TABLE 71

**Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	NA	27,907	47,397	28,424	28,760	36,613	57,405	53,823	75,332	100,436	114,010	124,726
Finance: banking and credit intermediation	52200	NA	D	992,651	601,628	631,902	i 305,994	317,147	312,954	342,319	399,822	479,807	574,882
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	D	113,669	117,167	88,244	83,913	54,342	60,239	55,068	83,537	0 - 1,147,536	67,833
Insurance carriers and related activities	52400	NA	282,640	265,110	265,293	349,252	363,799	347,710	398,746	353,842	294,467	0 - 1,147,536	1,031,450
Real estate	53100	6,053	D	4,615	4,727	8,069	8,227	10,128	8,449	9,235	0 - 10,116	10,982	16,881
Rental and leasing services	53200	NA	D	27,719	18,597	21,801	26,614	15,330	23,848	0 - 14,237	13,623	0 - 1,147,536	8,259
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	1,484	1,702	2,350	2,125	10,764	i 1,608	1,982	1,386	2,785	0 - 1,147,536	1,614
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	14,565	7,394	9,093	11,974	18,498	i 18,538	16,708	18,581	21,142	26,427
Architectural, engineering, and related services	54130	37,749	81,565	113,603	65,209	94,868	i 80,859	85,535	90,666	76,622	65,138	84,645	110,906
Specialized design services	54140	3,325	D	3,522	2,353	3,301	i 2,714	1,487	769	638	2,356	i 7,284	3,752
Computer systems design and related services <sup>e</sup>	54150	124,832	140,234	143,787	224,144	167,759	158,858	168,793	165,417	176,418	152,680	154,615	149,589
Management, scientific, and technical consulting services	54160	33,588	36,811	28,351	52,489	57,925	59,508	84,830	75,668	55,608	42,098	49,590	49,880

TABLE 71

**Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Research and development services in social sciences and humanities	54172	NA	978	1,168	820	934	1,297	969	1,042	1,124	1,179	934	1,144
Research and development services in biotechnology <sup>c</sup>	54173	NA	18,691 i	7,194	7,388	9,769	10,689	15,872	9,381	6,548	6,476	0 - 1,147,536	9,066
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	16,041	15,845	19,094	27,670	32,098	27,450	30,843	30,737	28,218	31,661	38,427
Advertising and related services	54180	14,574	D	11,336 i	21,227	27,500	34,889	34,379	38,454	44,670	52,884	72,957	84,178
Professional, scientific, and technical services (not listed elsewhere)	54190	15,690	28,298	33,134	46,048	53,969	38,936	24,808	28,026	12,205	29,190	16,673	19,061
Management of companies and enterprises	55100	752	2,310	3,347	11,847	4,131	176,993	8,497	D	11,172 i	16,588	12,189	13,209
Administrative and support services	56100	NA	29,045	25,660	22,146	38,874 i	26,981	214,331	23,581	27,504	26,915	38,514	62,356
Waste management and remediation services	56200	NA	D	13,971	7,223	6,080	5,650	4,152	23,159	25,561	21,206	84,142	11,342
Offices of physicians	62110	7,492	25,751	24,133	23,844	35,513	36,233	19,041	36,724	40,586	61,117	50,891	102,792
Medical and diagnostic laboratories	62150	19,930	14,359	36,288	15,778	19,655	17,027	5,024	19,415	25,614 i	27,361	35,193	34,462
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	D	8,333	D	3,334 i	10,919	5,274	5,651	0 - 229,395	10,363	0 - 1,147,536	22,613
Hospitals and nursing care facilities	62200	NA	D	7,831	16,084	870 i	1,227	26,866	27,485	32,609	32,276	35,118	25,795
Social assistance services	62400	D	D	448	326	249	1,036	1,336	63	77	112	0 - 1,147,536	108
Arts, entertainment, and recreation	71000	NA	14,265	12,920	12,727	15,248	13,180	12,903	16,137	17,510	18,945	26,563	31,887
Accommodation and food services	72000	NA	D	37,218	27,476	54,266 i	57,908	31,664	44,505	32,404	21,272	33,736	56,337



TABLE 71

**Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other services (not listed elsewhere)	81000	NA	9,638	35,994	118,268	44,823	120,458	60,949	51,253	173,078	0 - 413,972	0 - 1,147,536	90,936
Less: intersegment eliminations	–	219,384	110,499	132,754	117,417	136,579	136,540	160,374	126,960	129,858	131,717	152,902	117,720
Undistributed	–	756,553	1,137,705	412,892	450,613	i 108,244	D	1,945	D	0	0	8	i 0

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

<sup>a</sup> Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

<sup>b</sup> Business codes and descriptions are based on 2012 North American Industry Classification System (NAICS) industry definitions.

<sup>c</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).

<sup>d</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

<sup>e</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 51801, Cloud computing applications and Internet-based software services.

**Note(s):**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. 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.

TABLE 72

**Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
All business activities	21100–81000	3,180,177	2,773,429	3,373,035	3,814,885	3,715,718	3,615,226	3,624,553	3,116,806	3,095,167	3,294,934	3,812,880	3,716,765		
Oil and gas extraction	21100	143,705	92,357	126,671	152,394	147,415	130,389	116,693	70,302	59,489	57,150	86,746	58,356		
Mining	21200	NA	D	5,230	19,552	19,020	16,261	D	D	10,528	5,473	19,044	2,197		
Support activities for mining, including oil and gas	21300	NA	22,162	26,223	25,878	28,461	27,621	32,686	26,711	i	18,880	24,865	i	29,837	36,989
Utilities	22100	NA	D	9,155	10,892	9,320	8,068	8,229	10,468	4,473	6,948	4,779	4,875		
Construction	23000	NA	15,107	11,664	18,660	43,283	33,541	24,672	14,571	6,703	4,932	7,639	8,293		
Food manufacturing	31100	81,184	127,453	193,432	196,015	184,889	247,871	235,909	202,761	184,474	172,554	190,856	213,805		
Beverage manufacturing	31210	59,317	50,655	56,495	84,916	83,229	57,690	57,147	D	44,029	49,885	46,313	41,260		
Tobacco manufacturing	31220	290	102,541	102,636	111,353	103,052	33,327	D	D	30,782	36,346	31,938	32,447		
Textile, apparel, and leather products manufacturing	31990	NA	10,239	11,625	13,883	20,542	15,193	15,014	13,065	20,278	22,083	25,521	24,172		
Wood products manufacturing	32100	6,381	1,613	3,101	i	1,821	4,144	5,769	7,172	4,715	0 - 163,991	4,290	6,131	6,111	
Paper manufacturing	32200	39,895	30,504	36,481	40,196	41,303	40,349	42,619	D	33,888	36,393	39,708	35,538		
Printing and related support activities	32300	3,748	4,212	5,234	6,013	5,885	3,296	5,049	7,829	i	4,501	8,418	4,995	10,337	i
Petroleum refineries	32401	NA	NA	297,333	372,811	333,710	328,477	266,321	175,953	170,110	0 - 408,784	254,128	203,584		
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	17	91	74	i	1,244	2,278	630	3,234	3,312	6,373	5,800	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	10,623	23,005	D	9,703	9,496	8,643	5,100	4,968	2,770	981		
Basic chemicals manufacturing	32510	115,189	75,544	92,953	92,754	129,151	79,818	75,221	58,600	59,714	67,172	80,961	67,388		
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	29,537	33,110	44,009	30,499	29,307	27,404	35,325	30,979	33,055	36,203	51,259	40,026		
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	12,327	23,686	10,412	14,001	16,929	22,163	i	13,617	D	16,513	18,587	30,225	12,172	

TABLE 72

**Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	136,925	128,937	147,497	163,323	165,908	162,730	155,814	153,415	144,820	149,280	159,641	165,848
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	6,964	7,135	7,802	11,270	12,376	5,730	11,359	7,940	0 - 163,991	6,700	8,931	7,540
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	3,553	8,035	13,232	0 - 163,991	0 - 90,420	13,346	15,487
Soap, cleaning compound, and toilet preparations manufacturing	32591	72,271	80,113	86,107	99,565	84,423	98,232	95,193	86,186	81,727	85,732	84,362	79,648
Paint, adhesive, and other chemical manufacturing	32592	49,968	41,584	42,946	55,746	49,627	45,604	54,754	39,126	45,439	45,358	45,691	42,427
Plastics and rubber products manufacturing	32600	43,878	46,866	55,694	70,156	71,055	65,315	76,697	45,131	56,942	66,455	55,679	60,670
Clay and glass products manufacturing	32710	12,023	8,789	12,710	12,430	16,796	16,378	13,287	15,938	16,850	14,053	18,837	15,553
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	5,307	3,931	7,648	8,629	6,833	9,164	9,381	7,494	6,333	4,163	5,504	5,829
Primary metal manufacturing	33100	NA	26,985	35,756	30,648	22,619	24,443	24,114	12,138	15,437	17,605	33,370	27,645
Fabricated metal products manufacturing	33200	45,571	29,870	42,347	49,138	52,129	39,319	67,646	43,238	35,404	47,454	53,830	50,291
Agricultural machinery and equipment manufacturing	33311	20,642	21,025	24,042	14,152	23,984	23,076	26,760	21,505	21,684	21,146	30,017	27,817
Construction machinery manufacturing	33312	13,881	10,015	11,205	17,120	11,502	20,431	24,092	20,423	14,283	21,099	29,451	30,626
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	35,907	36,300	48,499	49,800	37,434	32,935	36,375	26,418	34,098	40,208	27,372
Semiconductor machinery manufacturing	33321	10,928	5,740	9,670	10,941	3,134	13,613	16,266	16,438	15,074	18,206	25,323	20,690

TABLE 72

**Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Industrial machinery manufacturing (except semiconductor machinery)	33322	7,532	5,996	8,961	14,930	11,492	10,092	16,537	6,590	12,341	11,149	12,740	9,702
Photographic and photocopying equipment manufacturing	33331	NA	2,080	D	D	D	618	1,915	1,477	0 - 163,991	857	0 - 242,771	127
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	16,053	28,404	30,270	36,451	33,652	40,045	27,712	37,396	32,672	38,473	35,361
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	0	D	0 - 5,580	4,524	0 - 242,771	1,617
Engine, turbine, and power transmission equipment manufacturing	33360	28,100	16,787	37,994	44,319	45,968	56,604	D	35,258	36,775	48,658	45,700	51,695
Metalworking and other general purpose machinery manufacturing	33390	36,061	22,352	36,485	41,866	39,237	23,995	51,377	41,166	38,528	39,516	38,439	26,336
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	136,763	162,729	167,518	160,818	127,377	131,576	129,679	203,226	255,629	264,980	245,866
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	22,369	30,531	46,528	32,477	29,869	36,859	32,417	109,988	32,209	32,943	36,643	35,490
Radio, television, and wireless communication equipment manufacturing	33422	29,526	18,039	18,034	37,667	54,443	54,074	72,211	15,183	0 - 163,991	5,839	0 - 242,771	6,439
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	6,791	4,680	4,015	8,552	2,041	6,695	1,747	1,326	0 - 163,991	2,019	0 - 242,771	1,476
Audio and video equipment manufacturing	33430	2,243	4,112	3,100	4,180	3,294	4,764	5,171	D	9,734	3,725	5,308	8,299
Semiconductor and other electronic components manufacturing	33440	100,661	79,098	157,934	185,199	186,007	197,516	188,661	D	163,360	191,123	232,485	240,592

TABLE 72

**Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	12,419	8,728	9,394	13,503	11,985	11,882	14,588	15,589	14,752	20,106 i	22,814 i	18,014 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	5,126	9,629	11,268	7,329	10,300	13,337	12,013	9,882 i	11,779	12,359 i	9,889	10,658
Measuring and control instruments manufacturing (not listed elsewhere)	33459	20,381	35,476	37,663	34,616	40,865	44,169	46,955	39,940	39,568	30,855	28,163	28,662
Electrical equipment, appliances, and components manufacturing	33500	47,654	43,416	54,549	58,580	54,904	49,253	56,905	51,633	73,973	65,117	74,039	76,861
Motor vehicles manufacturing	33610	174,950	124,140	146,852	166,401	166,616	155,415	153,493	119,588	132,355	0 - 408,784	120,673	122,934
Motor vehicle body and trailer manufacturing	33620	D	504	937	903	2,302	187	573	145	384	763	603	1,777
Motor vehicle parts manufacturing	33630	66,559	49,109	95,944	98,857	98,046	113,842	134,544	101,485	89,740	84,753	82,209	95,763 i
Aircraft manufacturing	33641	S	6,959	7,569	9,732 i	5,939	8,600 i	7,452	9,077	5,821	6,995	8,989	5,743
Aircraft engine and engine parts manufacturing	33642	7,773	12,349	9,361	15,023	13,670	7,406	7,083 i	D	1,316	1,784	24,974	21,585
Other aircraft parts and auxiliary equipment manufacturing	33643	9,178	9,959	10,547	12,611	10,015	12,933	16,421	19,962	17,048	20,212	11,827	10,839
Guided missiles, space vehicles, and related parts manufacturing	33644	D	D	D	D	1,899	2,431	2,366	2,434 i	339	1,480 i	4,265	2,774
Railroad rolling stock manufacturing	33651	894	875	1,980	1,666	2,455	1,764	3,557 i	3,253	3,760	5,164	5,507	5,415 i
Ship and boat building	33660	1,581	D	D	D	1,188 i	1,919 i	6,971 i	1,858	0 - 100,602 i	1,677	1,979	2,069
Motorcycle, bicycle, and parts manufacturing	33691	345	395	565	1,526	762	926	1,365	1,381	3,231 i	3,684	4,254	4,031
Military armored vehicle, tank, and tank components manufacturing	33692	249	462	D	484	224	164	2,608	D	78	1,644 i	2,678	1,557

TABLE 72

**Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
All other transportation equipment manufacturing	33699	2,382	895	1,929	2,349	2,212	13,125	D	3,093	2,495	3,104	3,294	1,539		
Furniture and related products manufacturing	33700	7,183	4,342	4,610	6,151	6,272	5,960	6,085	5,506	5,625	3,866	4,438	5,317		
Medical equipment and supplies manufacturing	33910	58,419	57,025	73,646	79,038	80,885	77,466	78,288	81,056	78,407	85,432	0 - 242,771	100,869		
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	41,981	29,242	30,526	D	37,781	47,716	43,898	D	45,531	38,962	65,941	29,501		
Merchant wholesalers, durable goods	42300	174,168	116,754	127,763	42,957	25,213	25,149	i	18,514	27,926	26,876	22,686	16,817		
Merchant wholesalers, nondurable goods	42400	66,765	33,733	33,672	229,921	237,186	208,777	240,437	160,432	152,996	156,369	178,950	156,286		
Wholesale electronic markets and agents and brokers (business to business)	42500	119	D	16	1,714	i	50,376	i	20,233	20,653	20,376	544	312	436	251
Retail trade (except electronic shopping and electronic auctions)	44000	NA	D	27,253	34,498	42,738	28,360	42,336	13,516	17,264	16,756	55,879	80,268		
Electronic shopping and electronic auctions	45411	NA	NA	D	D	34,500	37,403	D	D	0 - 163,991	0 - 198,757	0 - 242,771	i	0 - 164,630	i
Transportation	48000	NA	D	86,945	25,930	32,403	8,708	5,691	D	0 - 163,991	54,889	58,580	88,751		
Couriers, messengers, and express delivery services	49200	D	D	11,199	D	0	30,192	47,478	D	45,916	33,435	22,049	20		
Warehousing and storage	49300	2,512	240	474	975	826	1,295	614	D	1,294	5,837	0 - 242,771	7,536		
Newspaper, periodical, book, and directory publishers (except Internet)	51110	4,670	8,159	7,754	8,343	7,008	i	2,953	i	2,040	1,265	1,441	1,628	0 - 242,771	1,562
Software publishers (except Internet) <sup>e</sup>	51120	89,158	77,832	84,710	97,929	100,697	112,350	115,101	113,255	101,226	97,898	96,171	94,718		
Motion picture and sound recording (except Internet)	51200	6,721	6,341	6,635	5,141	2,185	7,140	D	1,939	2,490	2,583	4,452	3,270		
Broadcasting (except Internet)	51500	NA	5,624	7,533	4,466	7,504	i	8,215	D	10,083	14,710	16,825	25,106	39,689	

TABLE 72

**Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Wired telecommunications carriers	51710	D	D	1,214	6,862	7,093	865	2,852	2,667	2,665	2,349	2,328	2,226	
Wireless telecommunications carriers (except satellite)	51720	1,085	745	6	171	154	i D	45	D	59	84	3	i 5	
Satellite telecommunications	51740	5,325	5,919	i 176	353	i 234	D	63	587	305	296	90	70	
Other telecommunications (not listed elsewhere)	51790	1,230	1,015	515	2,875	3,193	i 2,179	534	893	840	1,898	0 - 242,771	5,555	i
Data processing, hosting, and related services <sup>e</sup>	51800	NA	6,292	7,107	9,443	12,874	9,301	13,891	14,101	16,853	20,676	26,815	28,822	
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	7,987	i D	7,138	13,012	20,668	35,853	49,241	
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	NA	13,753	29,921	11,126	16,969	28,521	44,849	i 40,718	37,792	60,390	77,032	95,082	
Finance: banking and credit intermediation	52200	NA	45,027	76,052	i 29,501	41,335	41,144	47,077	64,668	58,050	72,381	56,472	54,679	
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	D	34,345	35,268	16,671	23,114	19,687	15,087	i 17,046	18,774	20,890	30,063	
Insurance carriers and related activities	52400	NA	11,594	16,234	14,985	8,907	34,172	i 32,407	i 21,780	i 19,060	i 18,456	i 0 - 242,771	i 37,830	i
Real estate	53100	D	D	D	D	D	D	D	88	57	0 - 10,116	583	223	
Rental and leasing services	53200	NA	D	8,580	i 5,232	i 7,232	8,873	6,656	5,390	0 - 14,237	8,019	3,608	4,484	
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	352	225	359	764	640	517	168	82	729	0 - 80,926	i 56	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	864	i 1,623	D	2,222	2,614	3,816	i 3,720	2,818	2,755	2,902	3,139	
Architectural, engineering, and related services	54130	4,931	14,969	33,706	36,917	19,373	45,064	49,007	49,180	26,789	19,248	18,151	16,502	
Specialized design services	54140	D	D	454	228	345	900	678	D	68	2,229	i 18,371	8,888	

TABLE 72

**Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Computer systems design and related services <sup>e</sup>	54150	86,084	76,243	80,239	153,776	104,306	90,742	104,143	78,373	73,013	70,600	96,552	89,189
Management, scientific, and technical consulting services	54160	18,909	23,315	14,838	24,421	27,236	22,327	8,247	16,452	7,535	6,959	19,754	8,002
Research and development services in social sciences and humanities	54172	NA	2	2	7	D	4	22	D	7	5	7	89
Research and development services in biotechnology <sup>c</sup>	54173	NA	3,663	1,299	1,269	1,547	1,701	1,671	1,581	2,478	2,864	3,773	4,148
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	3,817	2,994	4,352	5,625	4,814	5,253	5,194	7,260	9,736	10,193	11,054
Advertising and related services	54180	D	D	1,656	D	25,263	D	D	D	0 - 163,991	54,756	67,297	0 - 164,630
Professional, scientific, and technical services (not listed elsewhere)	54190	3,456	2,025	2,186	4,901	9,285	8,417	8,004	2,749	0 - 163,991	2,049	4,823	3,986
Management of companies and enterprises	55100	76	23	266	5,428	1,304	887	716	D	622	1,592	1,726	40
Administrative and support services	56100	NA	6,821	19,476	10,588	11,810	17,023	29,314	26,456	28,098	22,603	28,430	27,048
Waste management and remediation services	56200	NA	D	201	959	484	595	614	1,827	1,910	1,402	4,360	281
Offices of physicians	62110	0	* i	0	0	0	0	0	0	0	1	0	0
Medical and diagnostic laboratories	62150	1,037	857	1,662	1,269	1,383	887	895	1,488	1,925	1,275	4,320	4,136
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	D	154	D	27	0	0	0	0	455	177	194
Hospitals and nursing care facilities	62200	NA	0	D	D	D	D	0	131	287	0	1	0
Social assistance services	62400	D	D	0	0	0	29	2	0	0	0	0	0
Arts, entertainment, and recreation	71000	NA	3,074	3,169	3,297	3,096	D	D	2,540	0 - 163,991	5,595	8,134	5,736



TABLE 72

**Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Accommodation and food services	72000	NA	9,891	32,256	11,945	34,612	49,347	14,564	32,394	34,445	4,924	20,830	27,997
Other services (not listed elsewhere)	81000	NA	5,946	7,784	10,816	12,789	21,571	17,416	19,528	64,593	0 - 408,784	0 - 242,771	18,820 i
Less: intersegment eliminations	–	161,647	127,244	101,536	164,044	172,709	165,075	156,556	113,257	97,136	64,324	102,225	65,252
Undistributed	–	335,723	452,404	103,862	147,756 i	58,997 i	D	2,657	D	0	0	0	0

\* = amount < \$500,000; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available; S = negative value due to intersegment elimination.

<sup>a</sup> Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.

<sup>b</sup> Business codes and descriptions are based on 2012 North American Industry Classification System (NAICS) industry definitions.

<sup>c</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).

<sup>d</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

<sup>e</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 51801, Cloud computing applications and Internet-based software services.

**Note(s):**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2019 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. 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.

TABLE 73

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019
All business activities	21100–81000	290,240	302,759	323,107	340,539	355,671	378,590	396,979	443,633	492,956
Oil and gas extraction	21100	D	D	D	1,108	D	867	0 - 11,355	0 - 16,964	712
Mining	21200	83	88	80	54	68	58	121	92	122
Support activities for mining, including oil and gas	21300	D	1,860	1,871	2,349	2,076	1,544	1,599	836	1,364
Utilities	22100	298	434	343	343	485	349	323	272	274
Construction	23000	752	756	244	204	521	258	507	686	886
Food manufacturing	31100	3,769	3,565	5,156	4,934	4,388	4,966	4,809	4,678	4,199 - 6,169
Beverage manufacturing	31210	D	D	628	D	664	0 - 28,354	734	702	653
Tobacco manufacturing	31220	D	140	163	D	153	153	175	196	189
Textile, apparel, and leather products manufacturing	31990	623	688	687	662	794	1,244	904	934	831
Wood products manufacturing	32100	202	278	234	322	227	238	236	261	232
Paper manufacturing	32200	755	982	1,166	1,028	D	1,165	1,411	1,302	1,478
Printing and related support activities	32300	244	305	389	363	287	304	265	321	447
Petroleum refineries	32401	D	596	438	D	443	441	396	491	525 - 2,495
Asphalt paving, roofing, and saturated materials manufacturing	32402	38	41	117	66	52	75	124	107	110
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	285	218	312	279	268	202	223	133	106 - 2,076
Basic chemicals manufacturing	32510	3,099	3,228	2,925	3,144	3,071	2,946	2,897	2,897	2,639
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	815	1,093	999	1,054	1,213	930	825	1,262	1,293
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	D	1,951	2,114	2,057	D	1,900	1,977	2,384	2,094
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	42,381	43,672	42,456	43,748	40,540	43,964	45,846	48,489	56,018

TABLE 73

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	1,110	1,044 i	831	729	801	987	1,308	1,151	1,388
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	7,118	10,337	14,071	16,440	18,629	23,591	28,850
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,344	2,261	2,286	2,365	2,451	2,550	2,492	2,534	2,311 - 4,281
Paint, adhesive, and other chemical manufacturing	32592	1,552	1,630	1,489	1,562 i	D	0 - 28,354	1,636	1,361	1,423
Plastics and rubber products manufacturing	32600	2,669	3,277	3,010	3,072 i	2,910	3,396	3,264	3,128	2,997
Clay and glass products manufacturing	32710	801 i	987 i	973 i	1,003 i	948	987	1,199	1,333	1,326 i
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	303	367	458 i	564 i	393 i	374	378	331	439
Primary metal manufacturing	33100	552	750	644	703	596 i	0 - 28,354	608	708	743
Fabricated metal products manufacturing	33200	D	2,236	2,535 i	2,280	2,541	2,321	2,650	2,764	2,816 - 4,786
Agricultural machinery and equipment manufacturing	33311	989	1,175	1,193	1,230	1,172	1,194	1,224	1,529	1,550
Construction machinery manufacturing	33312	655	675	1,340	1,309	1,210	1,209	1,203	1,316 i	1,276
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,735	1,999	1,436 i	1,142	1,431	1,107	1,272	1,324	1,104
Semiconductor machinery manufacturing	33321	2,207	1,308 i	3,146	2,979	3,218	3,374	3,707	4,131	4,396
Industrial machinery manufacturing (except semiconductor machinery)	33322	945	850	878	1,158	1,143	900	1,049	971	1,387
Photographic and photocopying equipment manufacturing	33331	656	23 i	458	79	133	92	61	59 i	162

TABLE 73

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	D	1,182	1,367	1,446	1,380	0-28,354	1,780	1,667	1,712
Digital cameras manufacturing	33333	NA	NA	NA	25	491	421	475	230	415
Engine, turbine, and power transmission equipment manufacturing	33360	3,257	3,603	2,373	1,847	2,304	2,365	2,543	2,273	2,551
Metalworking and other general purpose machinery manufacturing	33390	1,832	1,607	1,780	2,089	2,292	2,139	2,039	2,468	2,396
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	10,311	10,893	11,162	9,651	10,997	18,321	20,751	21,765	20,122
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	7,006	5,101	5,534	7,734	9,529	8,182	7,789	8,550	8,495
Radio, television, and wireless communication equipment manufacturing	33422	4,182	5,851	7,664	6,325	3,387	4,108	3,942	0-16,964	2,589
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	871	1,937	1,729	1,687	1,695	1,798	1,536	0-16,964	1,781
Audio and video equipment manufacturing	33430	798	865	876	1,018	1,071	972	1,058	1,084	1,292
Semiconductor and other electronic components manufacturing	33440	24,580	28,983	30,792	31,986	30,805	31,428	30,858	31,240	35,730
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	2,787	2,868	3,178	3,670	3,409	3,417	3,094	4,079	3,982

TABLE 73

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	5,666	6,403	6,550	6,234	6,503	8,275	6,538	7,819	7,870
Measuring and control instruments manufacturing (not listed elsewhere)	33459	3,191	3,465	3,901	4,045	4,201	4,222	3,885	3,888	3,855
Electrical equipment, appliances, and components manufacturing	33500	3,007	3,391	4,208	4,461	4,378	4,805	4,512	4,362	5,229
Motor vehicles manufacturing	33610	9,320	11,314	11,696	12,134	12,502	15,095	16,308	17,447	15,268
Motor vehicle body and trailer manufacturing	33620	69	91 i	98 i	96	156 i	113	44	93	155
Motor vehicle parts manufacturing	33630	3,010	D	4,554	6,022	6,158	6,401	6,946	7,800	8,030 i
Aircraft manufacturing	33641	5,853	15,380 i	16,607 i	15,632 i	14,757 i	0 - 28,354 i	9,704 i	14,488 i	10,720 i
Aircraft engine and engine parts manufacturing	33642	1,636	1,296	1,758	2,294 i	1,580	1,738	1,850	2,226	2,104
Other aircraft parts and auxiliary equipment manufacturing	33643	1,896	2,655	3,446	4,443	4,919	3,817	4,453	1,887	1,434
Guided missiles, space vehicles, and related parts manufacturing	33644	3,526	2,850	2,703	2,826 i	3,011	3,063 i	3,269	3,405	3,496
Railroad rolling stock manufacturing	33651	136	177	183	295	240	187	0 - 11,355	148	210 - 2,180 i
Ship and boat building	33660	D	D	1,106	1,568 i	D	0 - 28,354 i	1,289	0 - 16,964	182 - 2,152
Motorcycle, bicycle, and parts manufacturing	33691	212 i	176 i	214 i	251	282	286	0 - 11,355	372	367
Military armored vehicle, tank, and tank components manufacturing	33692	D	122	215	358	335	392	653 i	664 i	541
All other transportation equipment manufacturing	33699	415	D	362	428	D	368	564	465	465
Furniture and related products manufacturing	33700	300	382	383	389	458	364	438	428	458

TABLE 73

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019
Medical equipment and supplies manufacturing	33910	10,141	10,703	11,797	10,987	11,336	12,024	13,299	13,211	14,759
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,593	D	2,544	2,387	2,455 i	2,597 i	2,575	2,861	2,558
Merchant wholesalers, durable goods	42300	505	1,461 i	449 i	414 i	1,507 i	551 i	364	730 i	756
Merchant wholesalers, nondurable goods	42400	429	651 i	272 i	D	546 i	153 i	207	273 i	945
Wholesale electronic markets and agents and brokers (business to business)	42500	54	182 i	D	139	D	23	41 i	94 i	37 i
Retail trade (except electronic shopping and electronic auctions)	44000	52	101 i	96 i	58 i	87	149	69	190	280
Electronic shopping and electronic auctions	45411	940 i	1,239	993	1,051	1,543 i	0 - 28,354 i	0 - 11,355	0 - 16,964 i	0 - 13,286 i
Transportation	48000	123	D	D	388	205 i	100	691	2,045 i	9,398 i
Couriers, messengers, and express delivery services	49200	D	D	D	344	D	394	421	446	290
Warehousing and storage	49300	15	15	15	3	3	0	90	76	128 i
Newspaper, periodical, book, and directory publishers (except Internet)	51110	345 i	229 i	316 i	89 i	99 i	80 i	83	151	84
Software publishers (except Internet) <sup>e</sup>	51120	22,635	23,803	26,661	31,392	29,887 i	26,685	24,362	25,742	24,851
Motion picture and sound recording (except Internet)	51200	61	73 i	86	71 i	10	16	27 i	148	72
Broadcasting (except Internet)	51500	94	36	53	70 i	101 i	0 - 28,354 i	0 - 11,355	186	0 - 2,469
Wired telecommunications carriers	51710	867	1,482 i	951 i	945 i	1,229 i	1,067 i	924	469	424
Wireless telecommunications carriers (except satellite)	51720	391 i	739 i	1,768 i	2,481	1,176 i	1,477 i	1,920	2,147	2,306
Satellite telecommunications	51740	D	195	106	107	681 i	699 i	593	451	475

TABLE 73

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other telecommunications (not listed elsewhere)	51790	495	383	322	255	459	448	413	691	492
Data processing, hosting, and related services <sup>e</sup>	51800	4,922	3,997	4,009	4,754	5,839	6,295	6,217	6,809	8,994
Cloud computing applications and Internet-based software services	51801	NA	NA	3,727 i	5,718	5,783	9,981	16,812	20,600	27,957
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	D	11,397	13,485	15,306	21,534	23,962	28,445	37,435	46,100 - 48,070
Finance: banking and credit intermediation	52200	1,365	1,601	1,834	2,451	2,708	4,474	4,819	4,309	4,924
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,148	893	1,153	937	1,352	1,516	1,587	1,248	1,445
Insurance carriers and related activities	52400	D	1,141	1,573	887	1,364	1,216	1,127	1,673	2,202
Real estate	53100	13	26 i	100	193	280	438	251	377	396
Rental and leasing services	53200	27	D	69	59	D	97 i	536 i	639	945
Lessors of nonfinancial intangible assets, including patent licensing	53300	319	369	74	78	79	40	58	23	59
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	578 i	417 i	514 i	826 i	1,283	892	875	1,148	1,979
Architectural, engineering, and related services	54130	2,028	4,206 i	3,398	3,392	4,143 i	3,259	2,664	4,293	4,474
Specialized design services	54140	271	207 i	101	97	83	77	198 i	0 - 16,964	163
Computer systems design and related services <sup>e</sup>	54150	11,129	12,390 i	11,472 i	13,216 i	13,647	14,159	12,607	16,346	19,667
Management, scientific, and technical consulting services	54160	1,745	2,280	2,030	1,958	1,761	2,137 i	1,903	2,796	2,842

TABLE 73

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–19**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019					
Research and development services in social sciences and humanities	54172	D	601	792	745	756	0 - 28,354	1,124	674	764					
Research and development services in biotechnology <sup>c</sup>	54173	6,030	7,146	4,145	3,083	i	5,178	i	3,911	i	3,610	5,398	5,648		
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	7,196	9,427	9,139	9,068	10,907	10,621	11,842	14,904	15,171	i				
Advertising and related services	54180	80	377	i	450	i	435	424	344	381	1,032	i	1,106	i	
Professional, scientific, and technical services (not listed elsewhere)	54190	1,316	2,463	i	1,786	1,020	1,228	874	1,113	1,246	1,646				
Management of companies and enterprises	55100	20	40	68	25	i	D	28	70	0 - 16,964	0 - 13,286				
Administrative and support services	56100	338	436	556	i	401	i	202	i	418	1,405	2,302	3,285		
Waste management and remediation services	56200	19	i	D	39	i	31	24	i	25	20	20	20		
Offices of physicians	62110	24	73	i	74	i	88	i	79	i	106	i	190	155	508
Medical and diagnostic laboratories	62150	764	1,027	959	965	1,204	0 - 28,354	i	1,210	2,049	2,466				
Other ambulatory health care services (ambulance, dental, home health care)	62199	11	41	i	51	i	35	i	42	i	24	i	65	46	148
Hospitals and nursing care facilities	62200	2	2	i	2	7	i	7	9	0 - 11,355	0 - 10,879	0 - 11,355			
Social assistance services	62400	7	36	38	16	2	2	0 - 11,355	0 - 16,964	0 - 11,353					
Arts, entertainment, and recreation	71000	105	108	31	91	i	D	44	48	44	415				
Accommodation and food services	72000	74	131	i	123	i	57	87	61	49	120	80			
Other services (not listed elsewhere)	81000	366	553	366	576	682	0 - 28,354	0 - 11,355	0 - 16,964	660					
Undistributed	-	28,583	i	1,689	i	336	i	63	0	0	0	0	0		

D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

<sup>a</sup> Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.



<sup>b</sup> Business codes and descriptions are based on 2012 North American Industry Classification System (NAICS) industry definitions.

<sup>c</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).

<sup>d</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

<sup>e</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 51801, Cloud computing applications and Internet-based software services.

**Note(s):**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. 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. This change has affected the comparability of these estimates with estimates published for years prior to 2018. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2018 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. 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.

TABLE 74

**Domestic R&D paid for by the company and others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by the company and others	Depreciation		Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
							Amount	Percent
All industries	21-23, 31-33, 42-81	492,956	18,861		29,106	503,201	10,245	2.1
Manufacturing industries	31-33	285,674	12,419		17,674	290,928	5,255	1.8
Food	311	4,180	181		432	4,431	251	6.0
Beverage and tobacco products	312	1,082	52		160	1,190	108	10.0
Textile, apparel, and leather products	313-16	904	14		85	976	72	7.9
Wood products	321	186	2		7	191	5	2.6
Paper	322	1,064	8	i	65	1,121	57	5.3
Printing and related support activities	323	420	5	i	11	425	6	1.3
Petroleum and coal products	324	1,306	40 - 49		125	1,387 - 1,391	81 - 85	D
Chemicals	325	97,063	3,961		5,634	98,737	1,674	1.7
Basic chemicals	3251	2,360	167		358	2,551	191	8.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,172	73		225	1,324	152	13.0
Pesticide, fertilizer, and other agricultural chemicals	3253	1,822 - 1,846	104 - 133		57	1,761 - 1,784	-76 - -62	D
Pharmaceuticals and medicines	3254	87,619	3,451		4,476	88,644	1,025	1.2
Soap, cleaning compound, and toilet preparation	3256	2,760	97		170	2,833	73	2.6
Paint, coating, adhesive, and other chemicals	3255, 3259	1,305 - 1,333	42 - 71		347	1,601 - 1,623	296 - 306	D
Plastics and rubber products	326	2,856	85		393	3,164	309	10.8
Nonmetallic mineral products	327	1,508	61	i	69	1,516	8	0.5
Primary metals	331	665	27		89	727	62	9.4
Fabricated metal products	332	2,885	47		204	3,043	158	5.5
Machinery	333	15,184	605		953	15,532	348	2.3
Agricultural implement	33311	1,921	35		58	1,944	23	1.2
Semiconductor machinery	333242	4,459	351		419	4,526	68	1.5
Engine, turbine, and power transmission equipment	3336	1,301	50		85	1,336	35	2.7
Other machinery	other 333	7,503	168		391	7,726	223	3.0
Computer and electronic products	334	86,729	5,366		5,765	87,128	399	0.5
Communications equipment	3342	12,595	574		780	12,802	207	1.6
Semiconductor and other electronic components	3344	35,183	2,784	i	2,698	35,096	-87	-0.2
Navigational, measuring, electromedical, and control instruments	3345	17,562	333		899	18,128	566	3.2
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,342	73		222	3,492	150	4.5
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,662	162		448	9,949	286	3.0
Other measuring and controlling device	other 3345	4,558	98		228	4,688	130	2.8
Other computer and electronic products	other 334	21,388	1,675		1,388	21,101	-287	-1.3
Electrical equipment, appliances, and components	335	5,263	135		477	5,605	342	6.5
Transportation equipment	336	45,375	1,153		2,066	46,287	913	2.0

TABLE 74

**Domestic R&D paid for by the company and others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by the company and others	Depreciation	Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
Motor vehicles, bodies, trailers, and parts	3361-63	24,117	967	1,454	24,604	488	2.0
Aerospace products and parts	3364	18,358	139 - 165	486 - 495	18,706 - 18,710	349 - 352	D
Aircraft, aircraft engine, and aircraft parts	336411-13	16,891	133	438	17,195	305	1.8
Guided missile, space vehicle, and related parts	336414-15, 336419	1,467	6 - 32	48 - 57	1,511 - 1,514	44 - 46	D
Military armored vehicle, tank, and tank component	336992	35	*	1	35	*	0.8
Other transportation	other 336	2,865	22 - 48	117 - 127	2,936 - 2,943	71 - 77	D
Furniture and related products	337	409	8	48	449	40	9.9
Miscellaneous	339	18,596	666 - 674	1089	19,015 - 19,020	420 - 423	D
Medical equipment and supplies	3391	16,014	623	954	16,345	332	2.1
Other miscellaneous manufacturing	3399	2,582	43 - 52	135	2,670 - 2,674	88 - 92	D
Nonmanufacturing industries	21-23, 42-81	207,283	6,442	11,432	212,273	4,990	2.4
Mining, quarrying, oil and gas extraction, and support activities	21	2,717	92	441	3,066	349	12.8
Utilities	22	275	0 - 100	210	387 - 494	112 - 219	D
Wholesale trade	42	1,191	18	66 - 155	1,239 - 1,330	48 - 139	D
Electronic shopping and electronic auctions	454111-12	3,131 - 15,818	0 - 793	77 - 89	1,871 - 15,762	1,260 - 55	D
Transportation and warehousing	48-49	9,890	71	495	10,314	423	4.3
Information	51	110,227	3,099	5,270	112,398	2,171	2.0
Publishing	511	33,019	382	1,166	33,803	784	2.4
Newspaper, periodical, book, and directory publishers	5111	61	*	1	62	1	1.7
Software publishers	5112	32,958	382	1,165	33,741	783	2.4
Telecommunications	517	3,733	33	241	3,941	208	5.6
Data processing, hosting, and related services	518	30,558	492	2,260	32,325	1,767	5.8
Other information	other 51	42,917	2,191	1,603	42,328	-588	-1.4
Finance and insurance	52	8,917	534	1,548	9,931	1,014	11.4
Real estate and rental and leasing	53	1,371	2 - 258	5 - 78	1,380	9	0.7
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	3	*	42	-3	-6.4
Other real estate and rental and leasing	other 53	1,326	0 - 255	5 - 78	1,338	12	0.9
Professional, scientific, and technical services	54	53,233	1,801	2,371	53,804	571	1.1
Architectural, engineering, and related services	5413	4,207	21	153	4,338	131	3.1
Computer systems design and related services	5415	21,046	722	935	21,260	213	1.0
Scientific research and development services	5417	21,669	838	944	21,774	106	0.5

TABLE 74

**Domestic R&D paid for by the company and others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by the company and others	Depreciation		Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
							Amount	Percent
Research and development in biotechnology	541711	6,457	181		228 i	6,503	46	0.7
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,446 i	641 i		707	14,512 i	65 i	0.5
Research and development in the social sciences and humanities	541720	766	15		9	759	-6	-0.8
Other professional, scientific, and technical services	other 54	6,312	220		340	6,432	120	1.9
Health care services	621-23	2,265	35		385 i	2,616	351 i	15.5
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,380 - 14,067	0 - 794		480	1,380 - 15,265 i	0 - 1,201	D
All companies (number of domestic employees)	-	492,956	18,861		29,106	503,201	10,245	2.1
Small companies								
10-19 <sup>a</sup>	-	5,501	113		610	5,999	498	9.0
20-49	-	12,418	221		1,086	13,283	864	7.0
Medium companies								
50-99	-	14,021	270		958	14,709	688	4.9
100-249	-	19,793	466		1,492	20,819	1,025	5.2
Large companies								
250-499	-	18,883	413		1,502	19,972	1,089	5.8
500-999	-	23,969	739		1,612	24,842	874	3.6
1,000-4,999	-	75,671	2,745		5,382	78,308	2,637	3.5
5,000-9,999	-	50,811	2,268		3,100	51,642	832	1.6
10,000-24,999	-	88,263	4,058		4,606	88,811 i	548 i	0.6
25,000 or more	-	183,626	7,567		8,758	184,817	1,191	0.6

\* = 0 < amount < \$500,000 or greater than 0.00% but less than 0.05%; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development (BERD) Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies. To enable comparisons between U.S. BERD Survey statistics and those of other nations, in this table an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is *included* in U.S. BERD Survey domestic R&D, and adding capital expenditures relating to R&D operations, which is *excluded* from U.S. BERD Survey domestic R&D.

**Source(s):**

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

TABLE 75

**Domestic R&D paid for and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for and performed by the company	Depreciation	Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
All industries	21-23, 31-33, 42-81	428,968	17,058	29,106	441,016	12,048	2.8
Manufacturing industries	31-33	248,109	11,368	17,674	254,415	6,306	2.5
Food	311	3,937	169	432	4,200	263	6.7
Beverage and tobacco products	312	971	43	160	1,088	117	12.1
Textile, apparel, and leather products	313-16	873	14	85	945	72	8.2
Wood products	321	180	2	7	185	5	2.8
Paper	322	1,064	8	65	1,120	57	5.3
Printing and related support activities	323	420	5	11	425	6	1.3
Petroleum and coal products	324	1,203	41	125	1,287	84	7.0
Chemicals	325	87,288	3,475	5,634	89,448	2,160	2.5
Basic chemicals	3251	2,198	152	358	2,404	207	9.4
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,092	62	225	1,255	163	15.0
Pesticide, fertilizer, and other agricultural chemicals	3253	1,501	105	57	1,453	-48	-3.2
Pharmaceuticals and medicines	3254	78,652	3,028	4,476	80,100	1,448	1.8
Soap, cleaning compound, and toilet preparation	3256	2,596	86	170	2,681	85	3.3
Paint, coating, adhesive, and other chemicals	3255, 3259	1,249	43	347	1,554	305	24.4
Plastics and rubber products	326	2,770	83	393	3,080	310	11.2
Nonmetallic mineral products	327	1,473	59	69	1,483	10	0.7
Primary metals	331	649	27	89	711	62	9.6
Fabricated metal products	332	2,632	40	204	2,796	165	6.3
Machinery	333	13,930	556	953	14,327	397	2.9
Agricultural implement	33311	1,913	35	58	1,935	23	1.2
Semiconductor machinery	333242	3,854	308	419	3,965	111	2.9
Engine, turbine, and power transmission equipment	3336	1,096	46	85	1,134	39	3.5
Other machinery	other 333	7,067	166	391	7,292	226	3.2
Computer and electronic products	334	75,570	5,066	5,765	76,269	699	0.9
Communications equipment	3342	11,495	556	780	11,719	224	1.9
Semiconductor and other electronic components	3344	31,975	2,613	2,698	32,060	85	0.3
Navigational, measuring, electromedical, and control instruments	3345	10,912	229	899	11,582	670	6.1
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,117	68	222	3,271	154	5.0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,400	68	448	3,780	380	11.2
Other measuring and controlling device	other 3345	4,395	93	228	4,530	135	3.1
Other computer and electronic products	other 334	21,188	1,668	1,388	20,908	-280	-1.3
Electrical equipment, appliances, and components	335	4,886	118	477	5,245	359	7.3
Transportation equipment	336	31,505	990	2,066	32,581	1,076	3.4

TABLE 75

**Domestic R&D paid for and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for and performed by the company	Depreciation	Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
Motor vehicles, bodies, trailers, and parts	3361-63	20,883	861	1,454	21,477	593	2.8
Aerospace products and parts	3364	8,900	107	486 - 495	9,281 - 9,287	382 - 387	D
Aircraft, aircraft engine, and aircraft parts	336411-13	8,341	100	438	8,679	338	4.0
Guided missile, space vehicle, and related parts	336414-15, 336419	559	7	48 - 57	603 - 608	44 - 48	D
Military armored vehicle, tank, and tank component	336992	25	0	1	25	1	2.1
Other transportation	other 336	1,697	23	117 - 127	1,790 - 1,799	93 - 101	D
Furniture and related products	337	407	8	48	447	40	9.9
Miscellaneous	339	18,352	664	1089	18777	425	2.3
Medical equipment and supplies	3391	15,812	620	954	16,146	334	2.1
Other miscellaneous manufacturing	3399	2,540	44	135	2631	91	3.6
Nonmanufacturing industries	21-23, 42-81	180,858	5,690	11,432	186,601	5,743	3.2
Mining, quarrying, oil and gas extraction, and support activities	21	2,535	86	441	2,889	355	14.0
Utilities	22	237	0 - 96	210	351 - 456	113 - 220	D
Wholesale trade	42	1,104	16	66 - 155	1,153 - 1,244	49 - 140	D
Electronic shopping and electronic auctions	454111-12	3,088 - 15,775	0 - 793	77 - 89	1,828 - 15,719	-1260 - -55	D
Transportation and warehousing	48-49	9,504	71	495	9,928	424	4.5
Information	51	109,062	3,075	5,270	111,257	2,195	2.0
Publishing	511	32,447	372	1,166	33,241	794	2.4
Newspaper, periodical, book, and directory publishers	5111	61	*	1	62	1	1.7
Software publishers	5112	32,386	371	1,165	33,180	793	2.4
Telecommunications	517	3,700	33	241	3,909	209	5.6
Data processing, hosting, and related services	518	30,154	492	2,260	31,922	1,768	5.9
Other information	other 51	42,761	2,179	1,603	42,185	-576	-1.3
Finance and insurance	52	8,890	534	1,548	9,903	1,014	11.4
Real estate and rental and leasing	53	1,371	2 - 258	5 - 78	1,380	9	0.7
Lessors of nonfinancial intangible assets (except copyrighted works)	533	45	3	*	42	-3	-6.4
Other real estate and rental and leasing	other 53	1,326	0 - 255	5 - 78	1,338	12	0.9
Professional, scientific, and technical services	54	29,131	1,081	2,371	30,421	1,290	4.4
Architectural, engineering, and related services	5413	2,288	11	153	2,430	142	6.2
Computer systems design and related services	5415	18,395	707	935	18,623	228	1.2
Scientific research and development services	5417	3,265	161	944	4,049	783	24.0
Research and development in biotechnology	541711	1,083	60	228	1,252	168	15.5

TABLE 75

**Domestic R&D paid for and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for and performed by the company	Depreciation	Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,155	101	707	2,761	606	28.1
Research and development in the social sciences and humanities	541720	27	*	9	36	9	33.4
Other professional, scientific, and technical services	other 54	5,182	203	340	5,319	i 137	2.6
Health care services	621-23	1,928	34	385	i 2,279	351	i 18.2
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,322 - 14,012	0 - 793	480	1,322 - 15,210	i 0 - 1,202	D
All companies (number of domestic employees)	-	428,968	17,058	29,106	441,016	12,048	2.8
Small companies							
10-19 <sup>a</sup>	-	4,432	102	610	4,940	508	11.5
20-49	-	10,040	187	1,086	10,939	899	9.0
Medium companies							
50-99	-	11,492	221	958	12,229	737	6.4
100-249	-	16,520	397	1,492	17,615	1,095	6.6
Large companies							
250-499	-	15,356	336	1,502	16,522	1,167	7.6
500-999	-	21,549	662	1,612	22,499	950	4.4
1,000-4,999	-	64,475	2,191	5,382	67,665	3,190	4.9
5,000-9,999	-	44,728	1,969	3,100	45,859	1,131	2.5
10,000-24,999	-	74,385	3,673	4,606	75,318	932	i 1.3
25,000 or more	-	165,991	7,320	8,758	167,429	1,439	0.9

\* = 0 < amount < \$500,000 or greater than 0.00% but less than 0.05%; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development (BERD) Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies. To enable comparisons between U.S. BERD Survey statistics and those of other nations, in this table an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is *included* in U.S. BERD Survey domestic R&D, and adding capital expenditures relating to R&D operations, which is *excluded* from U.S. BERD Survey domestic R&D.

**Source(s):**

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



TABLE 76

**Domestic R&D paid for by others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by others and performed by the company	Depreciation		Capital expenditures related to R&D <sup>a</sup>	Adjusted domestic R&D paid for by the company and others	Change	
							Amount	Percent
All industries	21-23, 31-33, 42-81	63,989	1,803		0	62,185	-1,803	-2.8
Manufacturing industries	31-33	37,564	1,051		0	36,513	-1,051	-2.8
Food	311	243	12		0	231	-12	-4.8
Beverage and tobacco products	312	111	9		0	102	-9	-7.8
Textile, apparel, and leather products	313-16	31	*		0	30	*	-0.4
Wood products	321	6	*		0	6	*	-0.9
Paper	322	*	0		0	*	0	0
Printing and related support activities	323	0	0		0	0	0	NA
Petroleum and coal products	324	103	0-7		0	95-104	-7-0	D
Chemicals	325	9,775	486		0	9,289	-486	-5.0
Basic chemicals	3251	162	15		0	147	-15	-9.4
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80	11		0	69	-11	-13.9
Pesticide, fertilizer, and other agricultural chemicals	3253	320-345	0-28		0	293-345	-28-0	D
Pharmaceuticals and medicines	3254	8,966	423		0	8,544	-423	-4.7
Soap, cleaning compound, and toilet preparation	3256	164	12		0	152	-12	-7.2
Paint, coating, adhesive, and other chemicals	3255, 3259	56-84	0-28		0	30-84	-28-0	D
Plastics and rubber products	326	85	1		0	84	-1	-1.5
Nonmetallic mineral products	327	35	2		0	33	-2	-6.2
Primary metals	331	16	*		0	16	*	-0.6
Fabricated metal products	332	254	7		0	247	-7	-2.8
Machinery	333	1,254	49		0	1,205	-49	-3.9
Agricultural implement	33311	9	0		0	9	0	0
Semiconductor machinery	333242	604	43		0	561	-43	-7.1
Engine, turbine, and power transmission equipment	3336	205	3		0	202	-3	-1.6
Other machinery	other 333	436	3		0	433	-3	-0.7
Computer and electronic products	334	11,159	301		0	10,859	-301	-2.7
Communications equipment	3342	1,100	18		0	1,083	-18	-1.6
Semiconductor and other electronic components	3344	3,208	172		0	3,036	-172	-5.3
Navigational, measuring, electromedical, and control instruments	3345	6,650	104		0	6,546	-104	-1.6
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	225	5		0	221	-5	-2.0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,262	94		0	6,168	-94	-1.5
Other measuring and controlling device	other 3345	163	6		0	157	-6	-3.4
Other computer and electronic products	other 334	201	7		0	193	-7	-3.7
Electrical equipment, appliances, and components	335	377	16		0	360	-16	-4.4
Transportation equipment	336	13,870	163		0	13,707	-163	-1.2



TABLE 76

**Domestic R&D paid for by others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by others and performed by the company	Depreciation		Capital expenditures related to R&D <sup>a</sup>	Adjusted domestic R&D paid for by the company and others	Change				
							Amount	Percent			
Motor vehicles, bodies, trailers, and parts	3361-63	3,233	i	106	i	0	3,127	i	-106	i	-3.3
Aerospace products and parts	3364	9,458	i	32 - 58		0	9,400 - 9,426	i	-58 - -32		D
Aircraft, aircraft engine, and aircraft parts	336411-13	8,550	i	33		0	8,517	i	-33		-0.4
Guided missile, space vehicle, and related parts	336414-15, 336419	908		0 - 26		0	883 - 909		-26 - 0		D
Military armored vehicle, tank, and tank component	336992	10		*		0	10		*		-2.3
Other transportation	other 336	1,168		0 - 26	i	0	1,142 - 1,169	i	-26 - 0	i	D
Furniture and related products	337	2		*		0	2		*		-0.1
Miscellaneous	339	244		2 - 10		0	234 - 242		-10 - -2		D
Medical equipment and supplies	3391	202		3		0	199		-3		-1.4
Other miscellaneous manufacturing	3399	42		0 - 7		0	34 - 43		-7 - 0		D
Nonmanufacturing industries	21-23, 42-81	26,425		752	i	0	25,672		-752	i	-2.8
Mining, quarrying, oil and gas extraction, and support activities	21	183		6		0	177		-6		-3.1
Utilities	22	38		0 - 4		0	34 - 39		-4 - 0		D
Wholesale trade	42	87		1		0	86		-1		-1.5
Electronic shopping and electronic auctions	454111-12	43 - 61		0		0	43 - 61		0		0
Transportation and warehousing	48-49	386		*		0	386		*		-0.1
Information	51	1,165		23		0	1,141		-23		-2.0
Publishing	511	572		10		0	562		-10		-1.8
Newspaper, periodical, book, and directory publishers	5111	*		0		0	*		0		0
Software publishers	5112	572		10		0	562		-10		-1.8
Telecommunications	517	33		1		0	32		-1		-2.5
Data processing, hosting, and related services	518	404		1		0	404		-1		-0.1
Other information	other 51	155		12		0	144		-12		-7.7
Finance and insurance	52	28		0		0	28		0		0
Real estate and rental and leasing	53	0		0		0	0		0		NA
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0		0	0		0		NA
Other real estate and rental and leasing	other 53	0		0		0	0		0		NA
Professional, scientific, and technical services	54	24,103		719	i	0	23,384		-719	i	-3.0
Architectural, engineering, and related services	5413	1,919		11		0	1,909		-11		-0.6
Computer systems design and related services	5415	2,651		15		0	2,637		-15		-0.6
Scientific research and development services	5417	18,403		677	i	0	17,726		-677	i	-3.7
Research and development in biotechnology	541711	5,374		122		0	5,252		-122		-2.3

TABLE 76

**Domestic R&D paid for by others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2019**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by others and performed by the company		Depreciation		Capital expenditures related to R&D <sup>a</sup>	Adjusted domestic R&D paid for by the company and others	Change			
								Amount	Percent		
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,291	i	540	i	0	11,751	i	-540	i	-4.4
Research and development in the social sciences and humanities	541720	738		15		0	723		-15		-2.1
Other professional, scientific, and technical services	other 54	1,129		17		0	1,113		-17		-1.5
Health care services	621-23	337		1		0	337		-1		-0.2
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	34 - 58		0 - 4		0	31 - 58		-4 - 0		D
All companies (number of domestic employees)	-	63,989		1,803		0	62,185		-1,803		-2.8
Small companies											
10-19 <sup>b</sup>	-	1,070		11		0	1,059		-11		-1.0
20-49	-	2,378		35		0	2,343		-35		-1.5
Medium companies											
50-99	-	2,529		50		0	2,480		-50		-2.0
100-249	-	3,274		70		0	3,204		-70		-2.1
Large companies											
250-499	-	3,527		78		0	3,449		-78		-2.2
500-999	-	2,420		77		0	2,343		-77		-3.2
1,000-4,999	-	11,196		553		0	10,643		-553		-4.9
5,000-9,999	-	6,083		299		0	5,784		-299		-4.9
10,000-24,999	-	13,878	i	385	i	0	13,493	i	-385	i	-2.8
25,000 or more	-	17,635		247		0	17,388		-247		-1.4

\* = -\$500,000 < amount < \$500,000; D = data withheld to avoid disclosing operations of individual companies; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Capital expenditures related to R&D are assumed to be \$0 for domestic R&D paid for by others and performed by the company.

<sup>b</sup> The Business Enterprise Research and Development (BERD) Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Detail may not add to total because of rounding. Industry classification is 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. 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. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies. To enable comparisons between U.S. BERD Survey statistics and those of other nations, in this table an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is *included* in U.S. BERD Survey domestic R&D, and adding capital expenditures relating to R&D operations, which is *excluded* from U.S. BERD Survey domestic R&D.

**Source(s):**

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

## Technical Notes

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### Survey Overview

*Purpose.* The Business Enterprise Research and Development (BERD) Survey, successor to the Business Research and Development Survey (BRDS) (2017–18), Business R&D and Innovation Survey (BRDIS) (2008–16), and the Survey of Industrial Research and Development (SIRD) (1953–2007), is the primary source of information on research and development expenditures and the R&D workforce of businesses operating in the 50 U.S. states and the District of Columbia.

*Data collection authority.* The information collected by the BERD Survey is solicited under the authority of the National Science Foundation (NSF) Act of 1950, as amended, and the America COMPETES Reauthorization Act of 2010. Response to this annual survey is mandatory and confidential; the Census Bureau collects the data under the authority of Title 13, Section 8, of the United States Code. The Office of Management and Budget (OMB) control number is 0607-0912 and expires on 28 February 2022.

*Survey sponsors.* The BERD Survey is cosponsored by the National Center for Science and Engineering Statistics (NCSES) and the Census Bureau.

*Survey collection and tabulation agent.* The survey is conducted annually by the Census Bureau in accordance with an interagency agreement with NCSES within NSF.

### Key Survey Information

*Frequency.* Annual.

*Initial survey year.* 2019. BRDS collected data for 2017–18, BRDIS collected data for 2008–16, and SIRD collected data for 1953–2007.

*Reference period.* Calendar year 2019.

*Response unit.* Company.

*Sample or census.* Sample.

*Population size.* 1,124,000 companies.

*Sample size.* 45,500 companies; the actual number of companies that remained within the scope of the survey between sample selection and tabulation was 42,500.

### Survey Design

The survey is administered both to companies known to have performed R&D and to companies with no known history of R&D activity. The BERD Survey has been designed to provide detailed statistics on global and domestic R&D expenditures of companies located in the United States and on these companies' R&D employees.

The survey is sent to a single coordinator within each company, but it is organized into sections that help the coordinator collect specific types of information from different experts (human resources, accounting, R&D managers, etc.) in the company. Foreign-owned companies are instructed to report only for company operations owned by the U.S. subsidiary and, for purposes of the survey, to treat the U.S. subsidiary's foreign owners as if they were unrelated third parties.

## Target Population

The target population for the BERD Survey consists of all for-profit companies that have 10 or more paid employees in the United States, that have at least one establishment that is in business during the survey year and is located in the United States, and that are classified in certain industries based on the 2012 North American Industry Classification System (NAICS), with a particular focus on those companies that perform R&D in the United States.

The Business Register, a Census Bureau compilation that contains information on more than 7.3 million establishments with paid employees, serves as the primary input to the sampling frame from which the BERD Survey sample is selected. For a given company with more than one establishment, the prior year's annual payroll and employment data for its active establishments are summed to the company level.

## Sampling Frame

The scope of the 2019 BERD Survey is limited to companies that (1) are in business primarily to make a profit; (2) are classified within a specific set of NAICS industries; (3) have 10 or more paid employees in the United States, based on employment on 12 March 2018; (4) have at least one establishment that is physically located in the United States and is in business at the end of calendar year 2019 (the time at which the Census Bureau finished the 2018 Business Register Processing); and (5) are not federally funded R&D centers.

Single-unit company records were extracted from the 2018 Business Register if the company had at least 10 paid employees in 2018 or, when employment information was unavailable, if the company's 2018 payroll was greater than or equal to \$500,000. Companies were removed from the sampling frame if their NAICS codes were designated as Agriculture, forestry, fishing, and hunting (NAICS 11), Postal service (NAICS 491), Educational services (NAICS 61), Private households (NAICS 814), or Public administration (NAICS 92) or if they were no longer in business or were nonprofits. Companies were also removed from the sampling frame if they were not located in the 50 U.S. states or the District of Columbia.

Records for active establishments from multiunit companies were extracted from the 2018 Business Register if the given establishment's 2018 payroll was greater than zero or if the establishment employed at least one person in 2018. Prior to creating records for multiunit companies from these establishments, establishments classified as Postal service (NAICS 491), Private households (NAICS 814), or Public administration (NAICS 92) were removed, as were those that were not physically located in the 50 U.S. states or the District of Columbia. Unlike single-unit companies, establishments classified as Agriculture, forestry, fishing, and hunting (NAICS 11) or Educational services (NAICS 61) were not initially removed during the construction of multiunit company records. Establishments classified in NAICS 11 or NAICS 61 contributed to the classification of the multiunit companies, and their payroll could have been included in determining the company's measure-of-size. From the resulting set of multiunit companies, companies were removed from the sampling frame if they had fewer than 10 paid employees or if the payroll associated with their nonprofit establishments was greater than the payroll of their for-profit establishments.

For each company on the sampling frame, a measure of size was assigned. The measure of size for a given company was based on R&D, if R&D data from the last 5 years were available from (1) BRDS, (2) online financial databases, (3) the Report of Organization conducted as part of the Company Organization Survey (in years not ending in "2" or "7") or as a supplement to the Economic Census (in years ending in "2" or "7"), or (4) qualified R&D expenses from the Internal Revenue Service (IRS). For all other companies, the measure of size was based on total annual payroll for 2018 from the Business Register.

## Industry Classification for Sampling

Each company was assigned to 1 of 60 industry sampling strata based on the reported business segment in which the company performed the largest amount of total domestic R&D, as reported within the previous 5 years (2014–16 BRDIS and 2017–18 BRDS), if available. If these business segment data were not reported for a given company, assignment was based on the NAICS codes of its establishments in the Business Register using the following method, with some adjustments made to account for vertical integration of related business activities within the company. The company was first assigned to the economic sector, defined by a 2-digit NAICS code that accounted for the highest percentage of its aggregated annual payroll. Then the company was assigned to a subsector, defined by a three-digit NAICS code that accounted for the highest percentage of its annual payroll within the economic sector. Next, the company was assigned a four-digit NAICS code within the subsector, again based on the highest percentage of its aggregated annual payroll within the subsector. Finally, the company was assigned a six-digit NAICS code within the four-digit NAICS code, based on the highest percentage of its aggregated annual payroll within the four-digit NAICS code. Companies with an assigned six-digit NAICS code beginning with 11 or 61 were removed from the sampling frame at this point, and their R&D and associated data are not included in the tabulations. The industry used for sampling purposes was not necessarily the same code used for publication; see section “[Postsampling Industry Classification](#).”

## Stratification of the Sampling Frame

Each company in an industry sampling stratum was further assigned to one of three R&D groups based on information about its prior domestic R&D activity: (1) companies with a positive value for the measure of size based on R&D (*known positive R&D group*), (2) companies with a zero value for the measure of size based on R&D (*known zero R&D group*), and (3) companies with unknown R&D activity (*unknown R&D group*). For the 2019 BERD Survey, there were 32,000 companies in the first group, 37,500 companies in the second group, and 1,055,000 companies in the third group, for a total of 1,124,000 companies ([table A-1](#)).

## Sample Selection

In the known positive R&D group, Pareto probability-proportional-to-size (PPS) sampling was used within each noncertainty industry stratum, where the probability of selection was proportional to the company’s measure of size. In the unknown R&D group, Pareto PPS sampling was used within most industry strata; simple random sampling (SRS) was used instead of Pareto PPS for industries in which the number of companies in the sampling frame was high and the likelihood of R&D was low. For both the known positive and unknown groups, a separate stratum was created for companies with fewer than 25 employees, regardless of industry. Pareto PPS sampling was used within these strata. In the known zero R&D group, a single Pareto PPS sample was selected across all industry strata. Each sampling stratum had a certainty and noncertainty portion ([table A-2](#)). Across all three groups (known positive, known zero, and unknown), companies in select industries and companies that exhibited characteristics of having large R&D amounts, including those with the largest annual payroll, were selected for the sample with certainty (i.e., the probability of selection was equal to 1). The probability of selection for other companies in the known positive R&D and unknown R&D groups depended on their size, the number of companies selected, and the total size or number of companies in their strata. The number of companies selected was based on a coefficient of variation constraint on the estimated sample total for the stratum and was increased, if necessary, to ensure that the minimum probability of selection is 0.05 for the known positive R&D group and one of five values for the unknown R&D group: 0.004 or 0.01 for Nonmanufacturing industries (NAICS other than 31–33) and Incomplete manufacturers (incomplete NAICS beginning with 3), depending on the population size and likelihood of R&D; 0.04 for Printing and related support activities manufacturing (NAICS 323), Furniture and related product manufacturing (NAICS 337), and Computer systems design and related services (NAICS 5415); 0.02 for the remaining Manufacturing (NAICS 31–33) industries; and 0.05 for the companies with fewer than 25 employees. For companies in the known zero R&D group, the probability of selection depended on their size and the number of companies selected. The number of companies selected was based on a coefficient of variation constraint and was increased, if necessary, to ensure that the minimum probability of selection is 0.02.

Once selected, each company was assigned a sampling weight equal to the reciprocal of its probability of selection for the sample. Companies that were selected for the sample with certainty were assigned sampling weights equal to 1, and companies that were selected using SRS or Pareto PPS sampling were assigned weights ranging from 1 to 250. A complete and detailed description of the sample design and estimation methodology is given in the annual BERD Survey methodology report available from the NCSES project officer.

## Sample Size

Using the sample design parameters detailed above, a total of 45,500 companies were selected, of which 20,000 companies were in the known positive R&D group, 2,300 companies were in the known zero R&D group, and 23,500 companies were in the unknown R&D group ([table A-3](#) and [table A-4](#)). A complete and detailed description of the selection of additional sampling units is given in the annual BERD Survey methodology report available from the NCSES project officer.

During the survey's annual contact update procedures, 150 large R&D performers from the 2018 sample were found that were not included on the 2019 sampling frame. The primary reasons for this are mergers, acquisitions, or other company structure changes that cause a difference between a company's current Business Register ID and its prior year survey ID—in this case, its ID in the 2018 BRDS file. To follow up with these companies, they were added to the 2019 sample with certainty, and 150 companies were mailed a survey letter. Because it was expected that many of these records would not contribute to 2019 BERD Survey tabulations due to changes in company structure, these companies are not included in sampling frame counts or sample sizes ([table A-5](#)).

## Data Collection and Processing Methods

Starting in the 2017 cycle, an initial letter was mailed to all companies instructing them to report via the Census Bureau's Centurion data collection instrument. Paper questionnaires were mailed by respondent request only and during a later nonresponse follow-up for delinquent companies. For paper versus electronic response rates, see section "[Response by Mode](#)."

### Questionnaires

Beginning in the 2017 cycle, all companies completed the same questionnaire, BRD-1, which combined the standard form BRDI-1 and the abbreviated form BRDI-1(S) used in prior cycles ([table A-6](#)). Companies that reported less than \$1 million in R&D paid for by the company or less than \$1 million in R&D funded by others completed abbreviated worksheet(s) in lieu of more detailed questions asked of companies with \$1 million or more in R&D. As was the case in previous cycles, some companies with decentralized records requested a special reporting arrangement with the Census Bureau. Under this arrangement, the survey form was mailed to multiple operating units within the same company, and each Alternate Reporting Unit (ARU) completed the survey individually. The data for these ARUs were also tabulated separately in published estimates and were not consolidated at the company level ([table A-7](#)).

Because of the potential compartmentalization of organizational knowledge within companies (particularly in larger companies), the BERD Survey questionnaire was organized into sections based on the subject matter of the questions. These sections included the following:

**Section 1. Company information.** Includes basic questions about company ownership, lines of business, sales, and employee data.

**Section 2. R&D paid for by your company.** Includes geographic location and accounting questions about the company's R&D expenses.

**Section 3. Costs paid for by others.** Includes accounting questions about R&D paid for by others, such as the company's customers or grant-giving organizations.



**Section 4. Capital expenditures.** Includes questions on capital expenditures for R&D.

**Section 5. Management and strategy of R&D.** Includes questions related to the characteristics and focus of the company's R&D. This section was targeted toward company employees responsible for managing R&D departments or programs.

**Section 6. Human resources.** Includes questions related to the human resources involved in the company's R&D activities.

**Section 7. Tax topics.** Includes questions on filing federal and state tax credits for research activities.

For specific differences among the BERD Survey questionnaires, see section "[Data Comparability \(Changes\)](#)."

## Response Rates

### **Unit Response Rates**

Of the companies surveyed for the 2019 survey, 28.0% did not submit any response, and an additional 3.0% did not provide enough information to be treated as responses. Nonresponse studies are conducted periodically to assess reasons for nonresponse and possible nonresponse bias. Three metrics used by NCSSES and the Census Bureau to measure unit response to the BERD Survey were check-in rates, unit response rates, and coverage rates.

**Check-in rate.** The check-in rate is defined as the unweighted number of surveys that were either mailed in or submitted online by in-scope companies, divided by the unweighted total number of all in-scope companies in the sample. Response to individual questions did not factor into this metric.

**Coverage rate.** BERD Survey managers track a coverage rate that is a weighted measure of survey response based on the measure of size at the time of sample selection. The coverage rate measures how much of the weighted measure of size for in-scope companies in the sample is accounted for by respondents to the survey.

**Unit response rate (URR).** The URR is the unweighted number of responding companies with positive data for at least one of the survey's key items (i.e., worldwide R&D expenses or R&D costs funded by others, worldwide or domestic sales, or worldwide or domestic employees), divided by the unweighted total number of in-scope companies in the sample.

For the 2019 BERD Survey, the check-in rate was 72%, and the URR was 69%. The coverage rate for the 2019 BERD Survey was 92% for the known positive R&D group, 68% for the unknown R&D group, and 79% for the known zero R&D group ([table A-8](#) and [table A-9](#)).

### **Item Response Rates**

The BERD Survey collects data for over 500 variables, and the distribution of values reported by sample companies is highly skewed. Thus, rather than report unweighted item response rates, total quantity response rates are calculated, which are based on weighted data.

**Total quantity response rate (TQRR).** For a given published estimate other than count or ratio estimates, TQRR is the percentage of the weighted estimate based on data that were reported by units in the sample or on data that were obtained from other sources and were determined to be equivalent in quality to reported data. The TQRR for total R&D performed in the United States in 2019 was 73.9.

**Total quantity nonresponse rate (TQNR).** For a given published estimate, TQNR, defined as 100% minus TQRR, is calculated for each tabulation cell from the BERD Survey, except for cells that contain count or ratio estimates. TQNR measures the combined effect of the procedures used to handle unit and item nonresponse on the weighted BERD Survey estimate. TQNR tables giving imputation rates corresponding to each data table are available from the NCSSES project officer. Also see section "[Item Nonresponse](#)."

## Response by Mode

Overall, 1% of checked-in cases responded to the BERD Survey by mailing in the paper form, and 99% responded using the online version of the survey. Lastly, more than 97% of checked-in companies 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—responded via the Internet.

## Data Editing

Given the size and complexity of the BERD Survey, many survey responses included errors that required correction or had unusual patterns that required validation. Several hundred automated edit checks were programmed to improve the efficiency of analyst data review and correction ([table A-10](#)).

Approximately two-thirds of these edit checks were designed to catch arithmetic errors and logically inconsistent responses (*balance edits*). The remaining edit checks were designed to flag outliers for further analyst review (*analytical edits*). Descriptions of the data edits and edit failure rates are in annual methodology reports that are available from the NCSES project officer.

During the editing and review process, several cases were identified where companies reported zero R&D or a relatively small amount of R&D, even though subject-matter experts expected large amounts of R&D to be reported. Some of these companies were contract research organizations or federal contractors that did not account for the costs they incurred while conducting customer-sponsored research as R&D; instead, they accounted for these as the cost of sales. The largest of these companies were contacted by analysts and asked to resubmit their surveys. In rare cases, if no response could be elicited from a company and public information was available related to costs for customer-sponsored R&D, those data were used to impute an R&D estimate for that company.

## Techniques for Handling Unit and Item Nonresponse

For various reasons, many firms chose to return the survey questionnaire with one or more blank items. For some firms, internal accounting systems and procedures may not have allowed quantification of specific expenditures. Others may have refused to answer any questions as a matter of company policy. Weighted estimates produced from the BERD Survey include adjustments to account for companies that did not respond to the survey (*unit nonresponse*) and for companies that did respond but left some questions blank (*item nonresponse*).

### Unit Nonresponse

The BERD Survey accounts for unit nonresponse by multiplying each company's sampling weight by a nonresponse adjustment factor. To calculate the adjustment factors, each company in the sample that is eligible for tabulation is assigned to one (and only one) adjustment cell. The adjustment cells are based on the three R&D groups, which are subdivided according to R&D size and certainty status and also on the industry sampling strata described in the section "[Stratification of the Sampling Frame](#)" that are updated using information on industry classification reported in the BERD Survey. For a given adjustment cell, the nonresponse adjustment factor is the ratio of the sum of the weighted measure of size for all companies in the cell to the sum of the weighted measure of size for all companies in the cell with reported or imputed data. The measure of size used to select the sample for the 2019 BERD Survey (see section "[Sampling Frame](#)") was also used to adjust for unit nonresponse. For companies in the known positive R&D stratum, the measure of size was based on R&D in the United States. For companies in the unknown R&D stratum, the measure of size was based on total annual payroll in the United States. For companies in the known zero R&D stratum, a value of 1 was assigned as the measure of size so that a company's sample weight alone would be part of each cell's adjustment factor. Beginning in survey year 2018, this unit nonresponse was also applied to counts, patents, patent licensing agreements, and intellectual property protection (though in survey year 2019, questions on patents and intellectual property were cycled off the form). In previous survey years, no such adjustment was applied to those items.



R&D estimates for geographic areas outside the largest countries, states, and core-based statistical areas (CBSAs) that are dominated by a relatively small number of companies are particularly sensitive to changes in survey response because these areas may not be similarly represented by companies in the same adjustment cell.

### ***Item Nonresponse***

Item nonresponse for a given company is handled by item imputation. For account manager companies, large companies, and special cases, analysts impute these data using direct substitution of available company data (e.g., data from the company's website, annual Form 10-K report, or administrative sources) or other methods determined appropriate by NCSSES's and the Census Bureau's subject-matter experts. For other cases, including cases where analysts were unable to provide a superior estimate, data are imputed by programmed item imputation procedures. Depending on the particular item being imputed for a company, these procedures are based on a combination of (1) direct substitution of available company data, (2) ratio imputation using the company's survey data for both the current and prior year, and (3) ratio imputation using survey data from both the company and other similar companies, which reported both the survey item being imputed for the company and the other survey item used in the ratio. Tables of imputation rates corresponding to each data table are available from the NCSSES project officer.

### **Estimation**

The general methodology used to produce estimates from the BERD Survey involves sums of weighted data (reported or imputed) in which the weights are the product of the sampling weight and the nonresponse adjustment factor. However, there are some exceptions, which are described below.

### ***Weighting***

Estimates published for the BERD Survey are computed as sums of weighted data for sample companies that reported to the survey or for sample companies for which data could be reliably imputed based on prior reports or other information. Two types of weights are used for estimates of R&D: sampling weights, and nonresponse adjustment factors. The *sampling weight* for a given company is calculated as the reciprocal of the company's probability of inclusion in the sample. *Nonresponse adjustment factors* are used to represent companies in the sample that did not provide sufficient response data to be directly tabulated and whose data could not be imputed. For information on the calculation of the nonresponse adjustment factors, see section "[Unit Nonresponse](#)."

Each value that contributes to a given BERD Survey estimate is multiplied by both its sampling weight and its nonresponse adjustment factor, and these weighted values are then summed to create the estimate. Beginning in survey year 2018, the nonresponse adjustment factor was also applied to estimates of counts, patents, and patent licensing agreements. In prior survey years, the adjustment was not applied to those items.

### ***Postsampling Industry Classification***

As mentioned in the section "[Industry Classification for Sampling](#)," the industry classification assigned to companies for sampling was based on either reported BERD Survey business segment data from prior years or annual payroll. To produce more accurate estimates for the current survey year, a company's reported business code, if available for the current survey year, was used to assign an updated industry code for tabulations. The company's response to the domestic R&D performance questions from the current survey year was used to classify each company into the business code that accounted for the largest amount of total domestic R&D performance. The business codes reported by companies with large amounts of R&D were validated, and in some cases corrected, by survey staff. If no business code data were available for a company's domestic R&D performance, the industry code used for sampling was also used for tabulations.

### ***R&D, by Core-Based Statistical Area (CBSA) or State***

CBSA-level estimates of business R&D are modeled using BERD Survey data reported by companies on the address of each of their largest R&D locations and administrative data from the Census Business Register on the payroll for each business establishment in the United States. The weighted amount of company R&D is apportioned to CBSAs within states using the same hybrid estimator method used for state estimates (below). Current BERD Survey methodology cannot attribute all R&D to a specific location. For example, R&D reported by companies that did not respond to geographic questions and for whom no method was available to impute locations is not assigned to a location. This R&D was performed in one of the 50 U.S. states or the District of Columbia, but the specific location is not estimated and is reported as “undistributed” in BERD Survey tables.

The estimation methodology for 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.

R&D estimates for CBSAs and states that are dominated by a relatively small number of companies are particularly sensitive to changes in both unit and item response. Because companies rarely publish detailed information about the geographic location of their R&D operations, it is difficult to identify and correct erroneous responses to these questions. And, as noted earlier, the method used to correct for unit nonresponse relies on data from companies in the same industry or size category. These peer companies may report relatively less (or no) R&D in the geographic areas where a nonresponsive company performs R&D.

### ***R&D, by Business Segment Code***

To provide increased granularity on R&D activities, the BERD Survey includes questions asking companies to report data for business units below the company level. To support subcompany reporting, a list of business codes based on NAICS was provided in the BERD Survey for companies to use to categorize their business operations. The list of business codes for the 2019 cycle of the BERD Survey was based on the 2012 NAICS. To assist companies in selecting appropriate business codes, likely business codes were provided to respondents by printing them on the forms mailed to companies and by prepopulating them on the online version of the survey. For companies that reported to the 2017 BRDIS or 2018 BRDS, the most recent business codes reported by the company were used to provide the business codes. For companies that did not report to the 2017 BRDIS or 2018 BRDS, establishment payroll data from the Business Register were used to provide the business codes.

### ***Company Counts***

Beginning in survey year 2019, company count estimates reflect a change in rounding methodology. Beginning in survey year 2018, a weight adjustment to account for unit nonresponse was implemented for company counts; as a result, company count estimates are not comparable with survey years prior to 2018.

The company count estimates for 2017 are not comparable with those for 2016 for two reasons. First, the target population for 2017 was restricted to companies with 10 or more domestic employees, whereas the 2016 survey population included companies with 5 or more employees. Second, no adjustment is applied to count estimates to correct for unit nonresponse, and overall response to the survey declined from 2016 to 2017.

The company count estimates for 2014 and onward are not comparable with estimates published for previous years. BRDIS review and correction procedures were amended beginning in survey year 2014 to include a more systematic analysis of companies reporting small amounts of R&D (less than \$10,000) and no R&D employees. Many of these responses were determined to be reporting errors (false-positive R&D), and their R&D was set to zero. These corrections had a negligible impact on BRDIS R&D estimates compared to earlier years. But because these companies tended to have high sample weights, these corrections had a large impact on the estimate of R&D-active companies compared to prior years (when many fewer such corrections were made).

### ***Tabulation Eligibility***

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 for years prior to 2018. 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 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 approximately 7,500 companies to the estimated count of U.S. companies with R&D expenditures.

## **Survey Quality Measures**

### **Sampling and Nonsampling Errors**

The estimates produced from the BERD Survey are subject to both sampling and nonsampling errors. Sampling error is the difference between estimates obtained from the sample and results theoretically obtainable from a comparable complete enumeration of the sampling frame. This error results because only a subset of the sampling frame is measured in a sample survey. For published estimates from the BERD Survey, standard errors are produced for estimated percentages, while relative standard errors (RSEs) are produced for all other estimates. Tables of the estimated measures of sampling variability corresponding to each data table are available from the NCSES project officer.

Standard errors may be used to define confidence intervals about the corresponding estimates with a desired level of confidence. If a confidence interval were constructed for each possible sample that could be selected using the same sample design, then it would be expected that the percentage of confidence intervals containing the result of a complete enumeration of the sampling frame would equal the percentage of the level of confidence. For example, the interval defined by a margin of error of 2 standard errors yields a confidence interval of approximately 95%.

Because relatively few companies perform R&D in the United States, and because the amount of R&D they perform is quite variable, it is difficult to achieve control over the sampling error of survey estimates produced from the BERD Survey. This depends on the correlation between the measure of size on the sampling frame that was used to assign the selection probabilities and the actual data that are collected in the BERD Survey, which cannot be predicted accurately for all companies when the sample is designed. However, the companies known to perform the greatest amounts of R&D are included in the sample with certainty so that these companies will not contribute to the sampling error of the resulting estimates produced from the BERD Survey.

The sample size is sufficiently large that estimates based on the total sample are subject to low sampling error. However, because priority in designing the sample was given to industries that were identified in previous surveys as conducting large amounts of R&D expenditures, the sampling error may be larger for estimates for the lower-priority industries. The RSE for the estimate of total domestic R&D performed by the company was 0.38% in 2019.

Potential nonsampling errors include coverage error and various response and operational errors, such as errors during data collection, reporting errors, transcription errors, and bias due to nonresponse. These are errors that could also occur if a complete enumeration of the sampling frame had been conducted under the same conditions as the sample survey. Most of the important operational errors were detected and corrected during the course of reviewing the data for reasonableness and consistency. Though nonsampling error is not measured directly, quality control procedures were employed throughout the survey process to minimize this type of error.

## Measurement Error

Variations in respondent interpretations of the definitions of R&D activities and variations in accounting procedures are of particular concern—specifically, the characterization and reporting of R&D activities by large defense contractors funded by the U.S. federal government; the reporting of R&D activities by companies classified in the Scientific R&D services industry (NAICS 5417); and the method used by companies, in general, to count and report numbers of employees in various categories, such as the number of employees who work full time versus part time on R&D. The sophistication and comprehensiveness of a company's accounting and personnel tracking systems often depend on its size and activities and on its willingness to accommodate government-sponsored surveys. While no metric of measurement error is produced, ongoing efforts to minimize measurement error include questionnaire pretesting, improvement of questionnaire wording and format, inclusion of more cues and examples in the questionnaire instructions, in-person and telephone interviews and consultations with respondents, and post-survey evaluations.

## Data Comparability (Changes)

The statistics resulting from this survey are intended primarily as indicators of absolute levels of R&D spending and personnel. Nevertheless, the statistics are often taken to be a continuous time series prepared using the same collection, processing, and tabulation methods. Although estimating the business portion of the nation's R&D enterprise accurately has always been the goal, such strict uniformity has not been the case. Since the survey was first fielded, improvements have been made to increase the reliability of the statistics and to make the survey results more useful. To that end, past practices have been changed and new procedures instituted. Preservation of the comparability of the statistics has, however, been an important consideration in making these improvements. Nonetheless, changes to survey coverage and definitions, the industry classification system, estimation methods, and the procedure used to assign industry codes to multi-establishment companies, which are documented in the annual reports, may have affected the comparability of the statistics. Among the most demonstrable changes are those made to the questionnaires, and those changes are summarized below.

### Differences between the 2018 BRDS and 2019 BERD Survey Questionnaires

The following changes were made to the 2018 BRDS and the 2019 BERD Survey:

- Questions on patents, intellectual property, and technology transfer were removed.
- A question on filing for state tax credit for research activities in 2019 was added.

### Differences between the 2017 BRDS and 2018 BRDS Questionnaires

The following changes were made to the 2018 BRDS from the 2017 BRDS:

- A question on land acquisition capital expenditures for R&D operations was added.
- Questions related to R&D on artificial intelligence (AI) were added.
- Questions asking for country and state location of employees and R&D employees were added.
- A question asking for counts of temporary and leased employees working on R&D was added.

## Differences between the 2016 BRDIS and 2017 BRDS Questionnaires

The following changes were made to the 2017 BRDS from the 2016 BRDIS:

- Questions on product and process innovation were removed from the form.
- A question on whether R&D paid for by the company included customer-sponsored R&D was added.
- Questions on R&D funded by foreign governments or agencies and R&D funded by universities and colleges located outside the United States were added.
- A question on whether any capital expenditures for R&D were funded, paid for, or reimbursed by others not owned by your company was added.

## Differences between the 2015 and 2016 BRDIS Questionnaires

The following changes were made to the 2016 BRDIS from the 2015 BRDIS:

- Questions on royalties and licensing fees were added to both the R&D paid for by the company and the R&D paid for by others type-of-cost sections.
- Questions on the type of worldwide R&D paid for by the company were added to Form BRDI-1(S).
- Questions on the type of worldwide R&D paid for by others were added to Form BRDI-1(S).
- A question on all other contract R&D services paid for by customers was added to Form BRDI-1(S).
- A question on R&D performed by universities, colleges, and academic researchers located inside the United States was added, while a question on R&D performed by foreign governments was removed.
- A question on R&D funded by universities, colleges, and academic researchers located inside the United States was added, while a question on R&D funded by foreign governments was removed.
- A question on whether utility patent sales and licensing revenues were received from companies or organizations outside the United States was added to Form BRDI-1.
- A question on whether utility patent purchases and licensing payments were made to companies or organizations outside the United States was added to Form BRDI-1.
- A question on whether the company filed for the tax credit for increasing research activities (IRS Form 6765) in tax year 2016 was added to Form BRDI-1.
- Questions on the importance of intellectual property protections were removed from the form.

## Differences between the 2014 and 2015 BRDIS Questionnaires

The following changes were made to the 2015 BRDIS from the 2014 BRDIS:

- A question on phase IV clinical trials was added to Form BRDI-1.
- A question on R&D performed by others that was paid for by U.S. federal government agencies or laboratories was added to Form BRDI-1.
- Questions on the type of foreign R&D paid for and performed by the company were added to Form BRDI-1.
- Questions on the type of foreign R&D performed by the company but paid for by others were added to Form BRDI-1.
- A question on nonprovisional utility patents was added to Form BRDI-1.
- Questions related to R&D in photonics and optics application areas were removed from Form BRDI-1.

## Differences between the 2013 and 2014 BRDIS Questionnaires

The following changes were made to the 2014 BRDIS from the 2013 BRDIS:

- A question on monetary gifts to universities or colleges restricted to supporting R&D was added to Form BRDI-1.
- A question on revenue received from patent licensing was added to Form BRDI-1.
- A question on purchasing patents from others was added to Form BRDI-1.
- A question on licensing patents from others was added to Form BRDI-1.
- One business code was added to the list of business codes collected on the survey: 33333, Digital cameras manufacturing. In prior years, this line of business was included in the business code 33412, Computers and peripheral equipment manufacturing and magnetic and optical media.
- Questions related to patenting were removed from Form BRDI-1(S).
- Questions related to innovation were added to Form BRDI-1(S).

## Differences between the 2012 and 2013 BRDIS Questionnaires

The following changes were made to the 2013 BRDIS from the 2012 BRDIS:

- The list of countries for which foreign R&D performance data were collected was expanded by three: Hungary, Luxembourg, and Norway.
- A question was restored asking the amount of R&D that the company plans to recoup through indirect charges on U.S. federal government contracts (independent R&D). This question was last asked on the 2010 BRDIS.
- Questions on R&D for software products and R&D for embedded software were combined.
- A question on R&D for software products and embedded software paid for by the federal government was added.
- A question was restored related to the educational attainment of scientists and engineers. This question was last asked on the 2010 BRDIS.
- Two business codes were added to the list of business codes collected on the survey: 32542, Biotechnology-based pharmaceutical and biological products (except diagnostics), and 51801, Cloud computing applications and Internet-based software services.
- Delinquent companies in the known positive R&D stratum for the past two survey cycles were sent Form BRD-1(S) to see if they report at least the high-level numbers.

## Differences between the 2011 and 2012 BRDIS Questionnaires

For 2012, a much shorter (8-page) version of the short form, BRD-1(S), was implemented. The form included 19 high-level detail items on worldwide sales; domestic sales; R&D expenses funded both by the company and by others; employment both worldwide and domestic, including R&D employment; and patents applied for and issued. Companies that reported \$1 million or more of domestic R&D performance were then sent the long form (BRDI-1) for additional details. The BRD-1(S) form was sent to companies in the unknown and known zero R&D strata. In section 2, the questionnaire collected the additional detail categories for capital expenditures. In section 3, four agencies were added to the type of agency question so as to reduce the amount reported in the All other category. In section 4, the percentage of R&D that was directed toward business areas or product lines new to the respondent's company and also the percentages that pertain to defense applications, health or medical applications, or agricultural applications were added for R&D funded by the company and R&D funded by others.



## Differences between the 2010 and 2011 BRDIS Questionnaires

For the 2011 data collection, the innovation questions and instructions in section 1 were changed based on the results of the 2010 experiment. Cycling continued for data items that were not needed every year. The survey was expanded in several ways to address data gaps: the list of countries in which companies could report foreign R&D performance was expanded, a question was added to collect intracompany R&D transactions, and questions were added about companies' second-largest R&D location. In addition, questions pertaining to full-time equivalent (FTE) R&D scientists and engineers were revised to improve respondent understanding of survey concepts.

## Differences between the 2009 and 2010 BRDIS Questionnaires

For the 2010 data collection, the most notable changes made to the questionnaire were the inclusion of a one-time section (section 7) on R&D time frame and R&D product life, the inclusion of an experiment testing the impact of different innovation questions and instructions, and the addition of a survey supplement to collect detailed information from companies reporting R&D paid for by others. In addition, questions and instructions about company ownership were expanded to clarify, especially for foreign-owned companies, the information that should be reported on the survey. Cycling began for data items that were not needed every year from every company. These items will be returned to the questionnaire cyclically, depending on the demand for and quality of the collected data. Finally, data items that were poorly reported during the first two cycles of BRDIS were deleted.

The section titled "R&D Time Frame and R&D Product Life" was added to the questionnaire for the 2010 cycle to aid in estimating the depreciation of R&D when it is treated as an investment in the U.S. System of National Accounts.

The experiment testing the impact of different innovation questions and instructions used two versions of the BRDIS short form. The innovation questions on the 2010 Form BRDI-1A were identical to questions used on the 2009 Form BRDI-1A, and the 2010 Form BRDI-1B altered the questions and instructions to replicate innovation questions on the European Union's Community Innovation Survey. The experiment did not produce statistically significant differences in measured rates of innovation.

## Differences between the 2008 and 2009 BRDIS Questionnaires

Several changes were made to the 2009 BRDIS questionnaire—in part, to address reporting errors observed during the 2008 survey cycle. Briefly, these changes included the following:

- A screening question at the beginning of the form asking companies whether they had R&D activity during the reporting period was removed.
- Exclusion instructions in the main R&D expense question were replaced with a series of targeted questions. This approach was based on the premise that the economic concepts requested by BRDIS do not always conform to the R&D measures tracked by companies. Rather than directly ask for concepts that may diverge from respondent preconceptions about R&D, the approach in 2009 guided respondents to derive amounts that conformed to the BRDIS definition of R&D.
- Inclusion instructions in the question about main R&D paid for by others were replaced with a series of targeted questions.
- Data for R&D performed by others were derived rather than collected directly. For the 2009 cycle of BRDIS, R&D performed by others was the sum of two R&D costs known to be tracked by companies: payments to business partners for collaborative R&D and purchased R&D services.
- The order of the "Management and Strategy of R&D" and the "Financial Schedule B" (R&D paid for by others) sections was switched.

## Definitions

**Capital expenditure.** Capital expenditures are payments by a business for assets that usually have a useful life of more than 1 year, like buildings, equipment, or software. The value of assets acquired or improved through capital expenditures is recorded on a company's balance sheet. Expenditures for long-lived assets used in a company's R&D operations are not included in its R&D expense, but any depreciation recorded for those assets would be included in its R&D expense. Data are collected in the BERD Survey for capital expenditures for R&D operations for land acquisition, structures, equipment, capitalized software, and other items.

**Core-based statistical area (CBSA).** A CBSA is a U.S. geographic area that consists of one or more counties (or equivalents) anchored by an urban center of at least 10,000 people plus adjacent counties that are socioeconomically tied to the urban center by commuting. CBSAs are defined by OMB in the Executive Office of the President.

**Employment, total and R&D.** Involves the number of people employed by R&D-performing or R&D-funding companies in all locations, both foreign and domestic, during the pay period that included 12 March of the survey year. (The date 12 March is what most employers use when paying first-quarter employment taxes to IRS.) R&D employees are those who provide direct support to R&D, such as researchers, R&D managers, technicians, clerical staff, and others assigned to R&D groups. Those not included are employees who provide indirect support to R&D, such as corporate personnel, security guards, and cafeteria workers. In addition to providing head counts of total and R&D employees, the BERD Survey also produces estimates of FTE domestic R&D employment. This is 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.

**Employment, leased and temporary.** The number of people who work for R&D-performing or R&D-funding companies, but who are not considered employees of the reporting company. These workers perform tasks similar to the reporting companies' own employees but are technically employed by another company (such as a temp or staffing agency or a consulting firm) or are independent on-site consultants.

**Expense and R&D expense.** Involves money spent or costs incurred in an organization's efforts to generate revenue, representing the cost of doing business. Expenses may be in the form of actual cash payments (such as wages and salaries), a computed expired portion (depreciation) of an asset, or an amount taken out of earnings (such as bad debts). Expenses are summarized and charged in the income statement as deductions from the income before assessing income tax. Whereas all expenses are costs, not all costs are expenses (e.g., costs incurred in acquisition of income-generating assets—see the definition of *capital expenditure* above). R&D expense is the cost of R&D funded by the company itself and performed within the respondent company's facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

**R&D and business R&D.** R&D is planned, creative work aimed at discovering new knowledge or devising 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 use of research and practical experience and resulting in additional knowledge, which is directed to producing new or improved goods, services, or processes (*development*). R&D includes both direct costs, such as salaries of researchers, and administrative and overhead costs clearly associated with the company's R&D. However, R&D does not include expenditures for routine product testing, quality control, and technical services unless they are an integral part of an R&D project. R&D also does not include market research; efficiency surveys or management studies; literary, artistic, or historical projects, such as films, music, or books and other publications; and prospecting or exploration for natural resources.

**R&D, artificial intelligence (AI).** AI is a branch of computer science and engineering devoted to making machines intelligent. Intelligence is that quality that enables an entity to perceive, analyze, determine response, and act appropriately in its environment.



Systems with AI perform functions including, but not limited to, speech recognition, machine vision, or machine learning:

- Speech recognition transforms human speech into a format useful for computer applications (e.g., a digital assistant).
- Machine vision uses sensors and software that allow images to be used as an input for computer applications (e.g., systems that sort or inspect objects or support navigation in mobile equipment).
- Machine learning uses statistical software and data to “learn” and make better predictions without reprogramming (e.g., recommender systems for websites, or sales and demand forecasting).

AI technologies also include virtual agents, deep learning platforms, decision management systems, biometrics, text analytics, and natural language generation and processing.

**R&D, biotechnology.** Biotechnology is the application of science and technology to living organisms, as well as parts, products, and models thereof, to alter living or nonliving materials for the production of knowledge, goods, and services. The following list provides examples of areas of biotechnology in which R&D may be performed.

- DNA or RNA: genomics; pharmacogenomics; gene probes; genetic engineering; DNA or RNA sequencing, synthesis, or amplification; gene expression profiling; and use of antisense technology, large-scale DNA synthesis, genome editing and gene editing, and gene drive
- Proteins and other molecules: sequencing, synthesis, or engineering of proteins and peptides (including large-molecule hormones); improved delivery methods for large molecule drugs; proteomics; protein isolation and purification; signaling; and identification of cell receptors
- Cell and tissue culture and engineering: cell or tissue culture, tissue engineering (including tissue scaffolds and biomedical engineering), cellular fusion, vaccine or immune stimulants, embryo manipulation, marker-assisted breeding technologies, and metabolic engineering
- Process biotechnology techniques: fermentation using bioreactors, biorefining, bioprocessing, bioleaching, biopulping, biobleaching, biodesulfurization, bioremediation, biosensing, biofiltration and phytoremediation, and molecular aquaculture
- Gene and RNA vectors: gene therapy and viral vectors
- Bioinformatics: construction of databases on genomes, protein sequences, and modeling complex biological processes, including systems biology
- Nanobiotechnology: application of the tools and processes of nano- or microfabrication to build devices for studying biosystems and applications in, for example, drug delivery or diagnostics

**R&D, domestic.** R&D performed in the 50 U.S. states and the District of Columbia. *Adjusted* domestic R&D is calculated in tables designed to enable comparisons between U.S. BERD Survey statistics and those of other nations ([table 74](#) through [table 76](#)). There are three tables corresponding to the three principal measures of domestic R&D in the U.S. BERD Survey—that is, R&D paid for by the respondent company and others outside of the company and performed by the respondent company, R&D paid for and performed by the respondent company, and R&D paid for by others and performed by the company. In each table, an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is *included* in U.S. BERD Survey domestic R&D, and adding capital expenditures relating to R&D operations, which is *excluded* from U.S. BERD Survey domestic R&D. Also shown in each table are the differences between the U.S. BERD Survey estimates in this report and the adjusted internationally comparable estimates for domestic R&D.

**R&D intensity, or R&D-to-sales ratio.** R&D intensity is a ratio, expressed as a percentage, calculated by dividing the cost of R&D by sales. The ratio serves as an indicator of the relative incidence of R&D among groups of companies, primarily among industries and company size classifications. In this report, R&D intensity ratios are calculated in various ways, depending on the measure of R&D (R&D paid for by the respondent company, paid for by others outside of the company, or both) and whether the respondent company performs and funds or only performs R&D.

**R&D, nanotechnology.** The understanding of processes and phenomena and the application of science and technology to organisms and to organic and inorganic materials—as well as parts, products, and models thereof—at the nanometer scale (but not exclusively below 100 nanometers) in one or more dimensions, where the onset of size-dependent phenomena usually enables novel applications. These applications utilize the properties of nanoscale material that differ from the properties of individual atoms, molecules, and bulk matter for the production of knowledge, goods, and services, like improved materials, devices, and systems that exploit these new properties. The following list provides examples of areas of nanotechnology in which R&D may be performed.

- **Nanomaterial:** material with any external dimension in the nanoscale or having internal structure or surface structure in the nanoscale
- **Nanoelectronics:** field of science and technology concerned with the development and production of functional electronic devices with nanoscale components
- **Nanophotonics:** branch of photonics concerned with interaction of photons with nanomaterials aiming to design optical or optoelectronic components
- **Nanomedicine:** medical application of nanotechnology (e.g., medical application of nanomaterials and biological devices, nanoelectronics biosensors, and possible future applications of molecular nanotechnology, such as biological machines)
- **Nanomagnetics:** the study of the magnetic response of nanomaterials to an applied magnetic field and their applications
- **Nanomechanics:** a branch of nanoscience studying fundamental mechanical (elastic, thermal, and kinetic) properties of physical systems at the nanometer scale
- **Nanofiltration:** a membrane filtration process used for the softening of water and the removal of organic matter; includes nanomembranes
- **Nanotools:** multicomponent tools and devices used for manipulation, nanolithography, and nanofabrication
- **Nanoinstruments or nanodevices:** multicomponent instruments or devices used for observation, analysis, or control of matter at the nanometer scale
- **Nanomanufacturing:** intentional synthesis generation of control of nanomaterials, or fabrication steps in the nanoscale, for commercial purposes

**R&D paid for by others, worldwide and domestic.** The cost of R&D funded by others outside of the company, including the U.S. federal government, and performed within the respondent company's facilities, both foreign and domestic.

**R&D paid for by the company and others, worldwide and domestic.** The cost of R&D funded by the company or by others outside of the company and performed within the respondent company's facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

**R&D performed by the company, worldwide and domestic.** The cost of R&D performed within the respondent company's facilities, both foreign and domestic, funded by the company itself or by others outside of the company.

**R&D performed by the company and others, worldwide and domestic.** The cost of R&D performed within the respondent company's facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

**R&D performed by others, worldwide and domestic.** The cost of R&D funded by the company or by others outside of the company and performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

**R&D, software and Internet.** R&D activity in software and Internet applications refers only to activities that have an element of uncertainty and that are intended to close knowledge gaps and meet scientific and technological needs. This item is reported in this survey regardless of the eventual user (internal or external). R&D activity in software includes software development or improvement activities that expand scientific or technological knowledge and construction of new theories and algorithms in the field of computer science. R&D activity in software excludes software development that does not depend on a scientific or technological advance, such as supporting or adapting existing systems, adding functionality to existing application programs, routine debugging of existing systems and software, creating new software based on known methods and applications, converting or translating existing software and software languages, and adapting a product to a specific client, unless knowledge that significantly improved the base program was added in that process.

**Sales, worldwide and domestic.** Dollar values for goods sold or services rendered by R&D-performing or R&D-funding companies located in the 50 U.S. states and the District of Columbia to customers outside 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 companies are included. Excluded are intracompany transfers, returns, allowances, freight charges, and excise, sales, and other revenue-based taxes.

## Data Availability

### Publications

The data from the BERD Survey can be found online at <https://www.nsf.gov/statistics/industry/>. Detailed historical statistics from the predecessor survey, SIRD, can be obtained from NCSES's Industrial Research and Development Information System at <https://www.nsf.gov/statistics/iris/>. Information from the BERD Survey is also included in *Science and Engineering Indicators* and in *National Patterns of R&D Resources*.

### Electronic Access

BRDS contains confidential data that are protected under Title 13 and Title 26 of the United States Code. Two types of data are currently available: public-use tabular statistics, and restricted microdata. Detailed tabular statistics can be obtained by contacting the BRDS project officer. Microdata for the SIRD, BRDIS, BRDS, and BERD Survey can only be accessed at the Census Bureau's secure Research Data Centers (RDCs). To learn more about RDCs and for instructions on how to apply for data use, please visit the Center for Economic Studies page on research opportunities (<https://www.census.gov/programs-surveys/ces/research.html>).

## Disclosure Avoidance

Disclosure is the release of data that reveals information or permits deduction of information about a particular survey unit through the release of either tables or microdata. Disclosure avoidance is the process used to protect each survey unit's identity and data from disclosure. Using disclosure avoidance procedures, the Census Bureau modifies or removes the characteristics that put information at risk of disclosure. Although it may appear that a table shows information about a specific survey unit, the Census Bureau has taken steps to disguise or suppress a unit's data that may be "at risk" of disclosure while making sure the results are still useful.

The BERD Survey uses cell suppression and rounding to avoid disclosing information about a particular company.

Cell suppression is a disclosure avoidance technique that protects the confidentiality of individual survey units by withholding cell values from release and replacing the cell value with a symbol, usually a "D" or an estimate range. If the suppressed cell value were known, it would allow one to estimate an individual survey unit's value too closely.

The cells that must be protected are called *primary suppressions*.

To make sure the cell values of the primary suppressions cannot be closely estimated by using other published cell values, additional cells may also be suppressed. These additional suppressed cells are called *complementary suppressions*.

The process of suppression does not usually change the higher-level totals. Values for cells that are not suppressed remain unchanged. Before the Census Bureau releases data, computer programs and analysts ensure that primary and complementary suppressions have been correctly applied.

The Census Bureau has reviewed the data product for unauthorized disclosure of confidential information and has approved the disclosure avoidance practices applied. For the 2019 tabular statistics, the approval IDs are the following:

- CBDRB-FY21-110, approved on 8 February 2021
- CBDRB-FY21-132, approved on 8 March 2021
- CBDRB-FY21-214, approved on 27 May 2021
- CBDRB-FY21-ESMD006-012, approved on 10 June 2021
- CBDRB-FY21-236, approved on 21 June 2021

## Technical Tables

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Table	Title
<a href="#">A-1</a>	Target population counts, by frame partition: 2008–19
<a href="#">A-2</a>	Companies in the target population and selected for the sample, by industry and company size: 2019
<a href="#">A-3</a>	Sample size, by frame partition: 2008–19
<a href="#">A-4</a>	Companies sampled, by sampling stratum: 2019
<a href="#">A-5</a>	Companies included in the survey that were not in the original sampling frame: 2008–19
<a href="#">A-6</a>	Survey letters mailed, by sampling stratum: 2019
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<a href="#">A-10</a>	Companies that required an analyst action, by sampling stratum: 2019

TABLE A-1

**Target population counts, by frame partition: 2008–19**

(Number of companies)

Year	Total <sup>a</sup>	Known positive R&D	Known zero R&D	Unknown R&D
2008	1,926,012	16,059	75,923	1,834,030
2009	2,090,181	22,181	79,031	1,988,969
2010	2,013,399	24,723	67,281	1,921,395
2011	1,964,757	27,049	73,930	1,863,778
2012	1,971,731	29,512	73,004	1,869,215
2013	1,971,959	34,482	70,032	1,867,445
2014	1,998,858	35,532	79,343	1,883,983
2015	2,029,436	35,839	71,386	1,922,211
2016	1,485,151	34,958	11,355	1,438,838
2017	1,097,510	32,206	27,679	1,037,625
2018	1,115,834	33,215	34,158	1,048,461
2019	1,124,000	32,000	37,500	1,055,000

<sup>a</sup> For each year, the estimate of the number of companies in the total target population is based on the original sampling frame that was created to select the sample. The target population estimates in this table do not include R&D performers from the previous year's sample, which were not on the original sampling frame but were found during the survey's annual contact update procedures. See [table A-5](#) for the counts of companies that were added to each year's sample.

**Note(s):**

Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. For survey years 2008–15, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 5 survey years and no positive R&D in any of the 5 years. Beginning in survey year 2016, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available. For survey year 2016, the target population did not include companies in the Other nonmanufacturing industry with fewer than 10 domestic employees. Starting in survey year 2017, the target population no longer includes companies with fewer than 10 domestic employees.

**Source(s):**

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

TABLE A-2

**Companies in the target population and selected for the sample, by industry and company size: 2019**

(Number of companies)

Industry and company size	NAICS code	Companies in target population <sup>a</sup>	Companies selected for the sample		
			All companies	Noncertainties	Certainties
All industries	21–23, 31–33, 42–81	1,124,000	45,500	23,000	22,500
Manufacturing industries	31–33	97,000	18,500	8,800	9,600
Food	311	9,300	1,100	750	400
Beverages and tobacco products	312	3,300	350	250	150
Textile, apparel, and leather products	313–16	3,900	550	350	200
Wood products	321	5,000	600	400	200
Paper	322	1,500	350	150	150
Printing and related support activities	323	6,000	1,100	700	400
Petroleum and coal products <sup>b</sup>	324	350	150	20	150
Chemicals	325	5,100	2,000	450	1,600
Basic chemicals	3251	700	300	90	200
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	550	200	40	150
Pesticides, fertilizers, and other agricultural chemicals	3253	300	100	20	100
Pharmaceuticals and medicines	3254	1,500	850	100	750
Soap, cleaning compounds, and toilet preparations	3256	800	200	80	150
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,200	350	150	200
Plastics and rubber products	326	4,800	1,000	500	500
Nonmetallic mineral products	327	4,000	500	300	200
Primary metals	331	1,700	450	200	250
Fabricated metal products	332	20,000	2,300	1,400	900
Machinery	333	9,300	2,100	950	1,200
Agricultural implement	33311	500	150	40	100
Semiconductor machinery	333242	90	70	<i>N</i> < 15	70
Engine, turbine, and power transmission equipment	3336	400	150	40	100
Other machinery	other 333	8,300	1,700	850	850
Computer and electronic products	334	4,800	1,800	500	1,300
Communications equipment	3342	550	250	30	200
Semiconductor and other electronic components	3344	1,800	500	200	300
Navigational, measuring, electromedical, and control instruments	3345	1,800	800	250	550
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	300	200	40	150
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	250	150	<i>N</i> < 15	150
Other measuring and controlling devices	other 3345	1,300	450	200	250
Other computer and electronic products	other 334	600	250	40	200
Electrical equipment, appliances, and components	335	2,300	650	350	300
Transportation equipment	336	4,700	1,100	350	750
Motor vehicles, bodies, trailers, and parts	3361–63	3,000	600	200	400
Aerospace products and parts	3364	800	250	50	200
Aircraft, aircraft engine, and aircraft parts	336411–13	800	200	50	150
Guided missiles, space vehicles, and related parts	336414, 336415, 336419	50	40	0	40
Military armored vehicles, tanks, and tank components	336992	30	20	0	20
Other transportation equipment	other 336	900	200	90	100

TABLE A-2

**Companies in the target population and selected for the sample, by industry and company size: 2019**

(Number of companies)

Industry and company size	NAICS code	Companies in target population <sup>a</sup>	Companies selected for the sample		
			All companies	Noncertainties	Certainties
Furniture and related products	337	4,500	900	500	400
Miscellaneous manufacturing	339	6,500	1,300	650	650
Medical equipment and supplies	3391	2,300	600	200	350
Other miscellaneous	3399	4,200	700	400	300
Unclassified	–	50	50	0	50
Nonmanufacturing industries	21–23, 42–81	1,027,000	27,000	14,500	13,000
Mining, extraction, and support activities <sup>b</sup>	21	5,100	600	300	300
Utilities	22	800	200	40	150
Wholesale trade	42	68,000	5,800	4,200	1,600
Electronic shopping and electronic auctions	454111–12	3,500	350	250	100
Transportation and warehousing	48–49	34,500	550	200	350
Information	51	15,500	3,100	1,200	1,900
Publishing	511	5,000	1,200	500	700
Newspaper, periodical, book, and directory publishers	5111	2,600	450	250	150
Software publishers	5112	2,400	750	250	500
Telecommunications	517	2,500	500	300	200
Data processing, hosting, and related services	518	3,100	950	250	750
Other information	other 51	4,900	500	250	250
Finance and insurance	52	26,000	850	200	650
Real estate and rental and leasing	53	26,000	450	150	300
Lessors of nonfinancial intangible assets (except copyrighted works)	533	450	90	<i>N</i> < 15	90
Other real estate and rental and leasing	other 53	25,500	350	150	250
Professional, scientific, and technical services	54	103,000	9,800	4,200	5,500
Architectural, engineering, and related services	5413	17,500	2,700	1,700	1,000
Computer systems design and related services	5415	16,500	3,100	1,800	1,200
Scientific research and development services	5417	2,400	2,400	0	2,400
Biotechnology research and development	541711	600	600	0	600
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,600	1,600	0	1,600
Social sciences and humanities research and development	541720	150	150	0	150
Other professional, scientific, and technical services <sup>c</sup>	other 54	66,500	1,600	700	950
Health care services	621–23	112,000	1,400	550	850
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	633,000	4,000	2,900	1,100
Unclassified	–	350	150	<i>N</i> < 15	150
Company size (number of domestic employees)					
All companies	–	1,124,000	45,500	23,000	22,500
< 10 <sup>d</sup>	–	8,000	450	150	300
10–19	–	557,000	10,000	7,800	2,200
20–49	–	360,000	10,500	7,300	3,300
50–99	–	108,000	7,000	3,800	3,100
100–249	–	58,000	7,400	2,800	4,600
250–499	–	17,000	3,900	750	3,100



TABLE A-2

**Companies in the target population and selected for the sample, by industry and company size: 2019**

(Number of companies)

Industry and company size	NAICS code	Companies in target population <sup>a</sup>	Companies selected for the sample		
			All companies	Noncertainties	Certainties
500–999	–	7,900	2,500	250	2,200
1,000–4,999	–	6,400	2,700	150	2,500
5,000–9,999	–	900	550	20	500
10,000–24,999	–	550	400	<i>N</i> < 15	400
25,000 or more	–	350	250	<i>N</i> < 15	250

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Estimates of the number of companies in the target population are based on the original sampling frame that was created to select the 2019 Business Enterprise Research and Development (BERD) Survey sample. These estimates do not include 150 R&D performers from the previous year's sample, which were not on the original sampling frame but were found during the survey's annual contact update procedures. These companies were added to the 2019 sample with certainty but are not reflected in the number of certainties selected for the sample.

<sup>b</sup> Because of the widespread practice of the larger petroleum extraction and refining companies vertically integrating their activities, petroleum refineries (NAICS 32411) and oil and gas extraction (NAICS 211) were combined during sampling.

<sup>c</sup> Contains companies classified in scientific research and development services (NAICS 5417) that, as of sampling, were not fully classified to the level of detail in biotechnology research and development (NAICS 541711), physical, engineering, and life sciences research and development (NAICS 541712), or social sciences and humanities research and development (NAICS 541720).

<sup>d</sup> This category includes companies that are represented on the sampling frame as having missing data, but these companies are in scope to the BERD Survey because they have at least \$500,000 in annual payroll.

**Note(s):**

Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Certainties are companies whose probability of selection is 1 based on prior year R&D expenditures equal to or greater than \$3 million as well as others included in the sample for analytical purposes (analytical certainties). Noncertainties are companies whose probability of selection is less than 1. Companies that were missing or had an incomplete NAICS code at the time of sampling were assigned to an "unclassified" industry category temporarily. If an unclassified company reported R&D expenditures, its primary industrial activity was investigated, and a NAICS code was assigned during statistical processing.

**Source(s):**

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

TABLE A-3

**Sample size, by frame partition: 2008–19**

(Number of companies)

Year	Total	Known positive R&D	Known zero R&D	Unknown R&D
2008	39,553	11,103	3,156	25,294
2009	43,002	14,343	3,443	25,216
2010	42,965	14,399	3,150	25,416
2011	43,108	14,941	3,385	24,782
2012	43,655	16,188	3,527	23,940
2013	45,089	17,690	3,531	23,868
2014	44,162	16,959	3,861	23,342
2015	44,824	17,602	3,484	23,738
2016	44,861	18,184	1,058	25,619
2017	44,978	17,737	2,112	25,129
2018	45,690	20,115	2,265	23,310
2019	45,500	20,000	2,300	23,500

**Note(s):**

Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. For survey years 2008–15, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 5 survey years and no positive R&D in any of the 5 years. Beginning in survey year 2016, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available.

**Source(s):**

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

TABLE A-4

**Companies sampled, by sampling stratum: 2019**

(Number of companies)

Stratum	Total
Total	45,500
Known positive R&D	20,000
Certainties	15,500
Noncertainties	4,600
Known zero R&D	2,300
Certainties	1,600
Noncertainties	750
Unknown R&D	23,500
Certainties	5,700
Noncertainties	18,000

**Note(s):**

Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available.

**Source(s):**

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

TABLE A-5

**Companies included in the survey that were not in the original sampling frame: 2008–19**

(Number of companies)

Year	Known positive R&D
2008	336
2009	18
2010	49
2011	42
2012	54
2013	44
2014	37
2015	52
2016	90
2017	93
2018	111
2019	150

**Note(s):**

Beginning in survey year 2019, counts reflect a change in rounding methodology. This table shows the counts of companies that were found during the update procedures, were added to each year's sample, and were mailed a survey letter. These company counts are not in [table A-2](#).

**Source(s):**

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

TABLE A-6

**Survey letters mailed, by sampling stratum: 2019**

(Number)

Stratum	Total
Total	45,500
Known positive R&D	19,500
Certainties	15,000
Noncertainties	4,600
Known zero R&D	2,300
Certainties	1,600
Noncertainties	750
Unknown R&D	23,500
Certainties	5,500
Noncertainties	17,500
Cases not in the frame	150

**Note(s):**

Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Beginning in survey year 2017, an initial letter was mailed to all companies instructing them to report online using the unique authentication code printed on the letter. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available.

**Source(s):**

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

TABLE A-7

**Survey letters mailed for companies with subcompany reporting units, by sampling stratum: 2019**

(Number of companies)

Stratum	Sent one form	Sent multiple forms <sup>a</sup>
Total	45,500	150
Known positive R&D	19,500	150
Certainties	15,000	150
Noncertainties	4,600	0
Known zero R&D	2,300	0
Certainties	1,600	0
Noncertainties	750	0
Unknown R&D	23,500	0
Certainties	5,500	0
Noncertainties	17,500	0
Cases not in the frame	150	0

<sup>a</sup> Under special arrangement with the Census Bureau, and to facilitate reporting, the Business Enterprise Research and Development Survey separately surveyed portions of some companies using multiple survey forms. This special arrangement extends to holding companies to facilitate reporting among the operating units. The number of companies does not include companies that made special reporting arrangements with the Census Bureau after the initial mailout.

**Note(s):**

Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Beginning in survey year 2017, an initial letter was mailed to all companies instructing them to report online using the unique authentication code printed on the letter. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available.

**Source(s):**

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

TABLE A-8

**Response measures: 2008–19**

(Percent)

Measure	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Check-in rate <sup>a</sup>	79.5	74.9	75.1	73.7	78.6	74.3	73.3	80.1	80.5	75.6	74.0	72.0
Response rate (unweighted) <sup>b</sup>	74.2	73.1	71.4	71.1	77.1	73.6	72.5	79.6	80.2	74.5	72.8	69.0
Coverage rate for known positive sampling strata (using weighted R&D) <sup>c</sup>	91.4	91.5	87.7	86.0	91.4	90.4	91.0	93.0	92.6	92.4	90.5	92.0
Coverage rate for unknown sampling strata (using weighted payroll) <sup>c</sup>	79.9	75.0	76.2	76.7	84.2	77.7	78.1	84.3	73.4	73.6	71.6	68.0
Coverage rate for known zero sampling strata (using unweighted counts) <sup>c</sup>	77.2	78.7	74.5	76.0	82.7	80.7	80.4	83.4	88.0	80.0	80.3	79.0

<sup>a</sup> The number of survey responses from in-scope companies divided by the total number of in-scope companies in the sample.

<sup>b</sup> The number of responding companies with worldwide R&D expenses or costs funded by others or the number of responding companies with worldwide or domestic sales or worldwide or domestic employees (if R&D was zero) divided by the total number of in-scope companies in the sample.

<sup>c</sup> Based on the same numerator and denominator as the response rate, but each company's measure of size at the time of sample selection is taken into account.

**Note(s):**

Beginning in survey year 2019, these percentages reflect a change in rounding methodology.

**Source(s):**

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

TABLE A-9

## Unit response rates, by industry and company size: 2019

(Number and percent)

Industry and company size	NAICS code	Active reporting units <sup>a</sup>	Reporting units that met the response criteria <sup>b</sup>		Reporting units that met the response criteria and reported domestic R&D paid for by the company and others and performed by the company of \$1 million or more	
			Number	Percent	Number	Percent
All industries	21–23, 31–33, 42–81	42,500	29,500	69	7,400	17
Manufacturing industries	31–33	17,500	12,500	71	4,100	23
Food	311	1,100	750	68	200	18
Beverage and tobacco products	312	350	250	71	30	9
Textile, apparel, and leather products	313–16	500	350	70	50	10
Wood products	321	600	450	75	20	3
Paper	322	350	250	71	40	11
Printing and related support activities	323	1,000	700	70	30	3
Petroleum and coal products	324	150	90	60	30	20
Chemicals	325	2,100	1,500	71	950	45
Basic chemicals	3251	300	200	67	100	33
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	200	150	75	50	25
Pesticide, fertilizer, and other agricultural chemicals	3253	100	70	70	30	30
Pharmaceuticals and medicines	3254	950	750	79	650	68
Soap, cleaning compound, and toilet preparation	3256	200	150	75	60	30
Paint, coating, adhesive, and other chemicals	3255, 3259	350	250	71	80	23
Plastics and rubber products	326	1,000	750	75	200	20
Nonmetallic mineral products	327	500	350	70	50	10
Primary metals	331	400	300	75	70	18
Fabricated metal products	332	2,200	1,600	73	300	14
Machinery	333	2,000	1,500	75	550	28
Agricultural implement	33311	150	100	67	40	27
Semiconductor machinery	333242	70	60	86	30	43
Engine, turbine, and power transmission equipment	3336	150	90	60	40	27
Other machinery	other 333	1,700	1,200	71	400	24
Computer and electronic products	334	1,700	1,100	65	650	38
Communications equipment	3342	200	150	75	90	45
Semiconductor and other electronic components	3344	500	350	70	200	40
Navigational, measuring, electromedical, and control instruments	3345	750	550	73	300	40
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	200	100	50	70	35
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	150	90	60	50	33
Other measuring and controlling devices	other 3345	450	300	67	150	33
Other computer and electronic products	other 334	200	100	50	70	35
Electrical equipment, appliances, and components	335	600	450	75	200	33
Transportation equipment	336	1,000	750	75	350	35
Motor vehicles, bodies, trailers, and parts	3361–63	600	400	67	200	33
Aerospace products and parts	3364	250	200	80	100	40
Aircraft, aircraft engine, and aircraft parts	336411–13	200	150	75	90	45



TABLE A-9

## Unit response rates, by industry and company size: 2019

(Number and percent)

Industry and company size	NAICS code	Active reporting units <sup>a</sup>	Reporting units that met the response criteria <sup>b</sup>		Reporting units that met the response criteria and reported domestic R&D paid for by the company and others and performed by the company of \$1 million or more	
			Number	Percent	Number	Percent
Guided missile, space vehicle, and related parts	336414–15, 336419	40	30	75	20	50
Military armored vehicle, tank, and tank component	336992	20	20	100	<i>N</i> < 15	<i>N</i> < 15
Other transportation equipment	other 336	200	150	75	50	25
Furniture and related products	337	850	600	71	50	6
Miscellaneous manufacturing	339	1,300	900	69	400	31
Medical equipment and supplies	3391	550	400	73	250	45
Other miscellaneous	3399	700	500	71	150	21
Nonmanufacturing industries	21–23, 42–81	25,000	17,000	68	3,300	13
Mining, extraction, and support activities	21	600	400	67	40	7
Utilities	22	150	100	67	20	13
Wholesale trade	42	5,200	3,600	69	80	2
Electronic shopping and electronic auctions	454111–12	300	200	67	20	7
Transportation and warehousing	48–49	550	350	64	30	5
Information	51	3,100	2,100	68	1,100	35
Publishing	511	1,100	650	59	300	27
Newspaper, periodical, book, and directory publishers	5111	400	250	63	<i>N</i> < 15	<i>N</i> < 15
Software publishers	5112	700	450	64	250	36
Telecommunications	517	450	300	67	60	13
Data processing, hosting, and related services	518	1,100	850	77	600	55
Other information	other 51	450	300	67	90	20
Finance and insurance	52	800	600	75	100	13
Real estate and rental and leasing	53	400	250	63	<i>N</i> < 15	<i>N</i> < 15
Lessors of nonfinancial intangible assets (except copyrighted works)	533	80	50	63	<i>N</i> < 15	<i>N</i> < 15
Other real estate and rental and leasing	other 53	350	200	57	<i>N</i> < 15	<i>N</i> < 15
Professional, scientific, and technical services	54	8,600	6,000	70	1,600	19
Architectural, engineering, and related services	5413	2,600	2,000	77	300	12
Computer systems design and related services	5415	2,700	1,700	63	450	17
Scientific research and development services	5417	1,900	1,200	63	650	34
Biotechnology research and development	541711	450	250	56	150	33
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,300	850	65	450	35
Social sciences and humanities research and development	541720	150	100	67	20	13
Other professional, scientific, and technical services	other 54	1,500	1,000	67	250	17
Health care services	621–23	1,300	900	69	70	5
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3,800	2,600	68	250	7
All companies (number of domestic employees)	–	42,500	29,500	69	7,400	17
Small companies						
10–19 <sup>c</sup>	–	7,800	5,400	69	500	6

TABLE A-9

**Unit response rates, by industry and company size: 2019**

(Number and percent)

Industry and company size	NAICS code	Active reporting units <sup>a</sup>	Reporting units that met the response criteria <sup>b</sup>		Reporting units that met the response criteria and reported domestic R&D paid for by the company and others and performed by the company of \$1 million or more	
			Number	Percent	Number	Percent
20–49	–	10,500	7,500	71	1,200	11
Medium companies						
50–99	–	6,800	4,900	72	1,100	16
100–249	–	7,400	5,100	69	1,600	22
Large companies						
250–499	–	3,700	2,500	68	1,000	27
500–999	–	2,400	1,600	67	700	29
1,000–4,999	–	2,600	1,800	69	900	35
5,000–9,999	–	500	400	80	200	40
10,000–24,999	–	400	300	75	150	38
25,000 or more	–	250	200	80	100	40

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Active reporting units are defined as reporting units of active companies that are in the scope of the survey (for-profit companies with locations in the United States, 10 or more employees, business activities in the survey year, and primary business activities in the NAICS codes listed above) after all of the data have been processed. Because of special handling requests made by company respondents, some sampled companies were mailed more than one form. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

<sup>b</sup> Reporting units were considered to have fulfilled the response criteria if they reported that they performed or funded R&D. If not, a reporting unit fulfilled the response criteria if it reported a value for worldwide sales or domestic sales, or if it reported a positive value for paid worldwide employees or paid domestic employees.

<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**

Beginning in survey year 2019, these counts and percentages reflect a change in rounding methodology. Detail may not add to total because of rounding.

**Source(s):**

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

TABLE A-10

**Companies that required an analyst action, by sampling stratum: 2019**

(Number)

Stratum	Total	Companies deleted <sup>a</sup>	Companies requiring action due to merger or acquisition <sup>b</sup>	Companies requiring action due to analyst review <sup>c</sup>
Total	3,100	3,000	100	<i>N</i> < 15
Known positive R&D	900	800	60	<i>N</i> < 15
Certainties	650	600	50	<i>N</i> < 15
Noncertainties	250	250	<i>N</i> < 15	<i>N</i> < 15
Known zero R&D	100	100	<i>N</i> < 15	0
Certainties	60	60	<i>N</i> < 15	0
Noncertainties	40	40	<i>N</i> < 15	0
Unknown R&D	2,100	2,000	50	<i>N</i> < 15
Certainties	500	450	20	<i>N</i> < 15
Noncertainties	1,600	1,600	30	<i>N</i> < 15
Cases not in the frame	30	20	<i>N</i> < 15	<i>N</i> < 15

<sup>a</sup> Companies are deleted when they are found to be out of business or out of scope for the survey during the reporting period.

<sup>b</sup> Information regarding mergers and acquisitions comes from several sources. The information is collected on the form, and there is a presurvey phone call that requests the information from top R&D-performing companies. Information may also come from the company profiles that are maintained by survey staff.

<sup>c</sup> These companies are added based on a review of historic R&D and reported to the Business Enterprise Research and Development Survey and public information available on the companies' R&D expenses.

**Note(s):**

Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available.

**Source(s):**

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

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