



Business Research and Development: 2018

Detailed Statistical Tables | NSF 21-312 | December 16, 2020

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General Notes

The Business Research and Development Survey (BRDS) 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 U.S. 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 co-sponsored 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 co-sponsored with the U.S. Census Bureau, and the business R&D data collection reported here was renamed the Business Research and Development Survey. The BRDS **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, the BRDS statistics 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 U.S. 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 BRDS, data are collected from a probability sample of for-profit companies, which are classified in select manufacturing and nonmanufacturing industries. BRDS 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 BRDS 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 U.S. Census Bureau's Business Register (BR) contains information on more than 6.8 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 BRDS or have fewer than 10 employees, based on their prior year aggregated annual payroll and employment data.

In addition to single-year tables for 2018, 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 U.S. 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 67** through **table 74**) were prepared using the 2018 BRDS statistical file and revised BRDIS statistical files for 2008–17.

Beginning with the tables for the 2017 survey year, 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.**"

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Domestic R&D paid for by the company and performed by others

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Domestic R&D paid for by the company and others and performed by the company and others

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

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TABLE 1

Business Research and Development Survey aggregate estimates, by questionnaire reference: 2018

(Financial information, employees, patents)

Question	Survey item	Aggregate amount
Company and financial information (US\$millions)		
1.12	Worldwide net sales and operating revenues	14,458,452
1.13	Net sales and operating revenues from domestic operations	10,698,764
	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	565,066
2.3	Worldwide R&D paid for by the company (expense), adjustments	43,455
2.4/2.7c	Worldwide R&D paid for by the company and performed by the company and others	521,611
2.7a	Domestic R&D paid for by the company and performed by the company and others	420,474
2.7b	Foreign R&D paid for by the company and performed by the company and others	101,137
2.5	Indirect R&D charges to be recouped from the U.S. federal government (IR&D or independent R&D) ^a	6,941
2.8m(1)	Domestic R&D paid for by the company and performed by the company and others	420,474
2.8a(1)	Salaries, wages, and fringe benefits	211,925
2.8b(1)	Stock-based compensation	28,203
2.8c(1)	Leased or temporary staffing, including on-site contractors, working on R&D	16,489
2.8d(1)	Expensed equipment (not capitalized)	6,871
2.8e(1)	Materials and supplies	24,609
2.8f(1)	Leased facilities and equipment	6,812
2.8g(1)	Depreciation and amortization on R&D property, plant, equipment, and intangible assets	14,772
2.8h(1)	Royalties and licensing fees	2,674
2.8i(1)	Collaborative R&D payments	8,636
2.8j(1)	Contract R&D	34,032
2.8k(1)	Other purchased services	11,922
2.8l(1)	All other costs	53,529
2.9(3)	Worldwide R&D paid for by the company and performed by others	53,377
2.9(1)	Domestic R&D paid for by the company and performed by others	42,668
2.9(2)	Foreign R&D paid for by the company and performed by others	10,708
2.10(3)	Worldwide R&D paid for and performed by the company	468,235
2.10(1)	Domestic R&D paid for and performed by the company	377,806
2.10(2)	Foreign R&D paid for and performed by the company	90,429
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	605,627
2.10(3) + 3.5(3)	Worldwide R&D paid for by the company and others and performed by the company	541,412
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	493,583
2.10(1) + 3.5(1)	Domestic R&D paid for by the company and others and performed by the company	441,036
	Domestic R&D paid for and performed by the company	
2.14	Performed at largest domestic location	225,548
2.16	Performed at second-largest domestic location	36,385
2.18	Domestic R&D paid for by foreign operations or subsidiaries and performed by the company ^a	23,515
2.19	Foreign R&D paid for by domestic operations or subsidiaries and performed by the company ^a	16,375
2.20i/2.9(1)	Domestic R&D paid for by the company and performed by others	42,668
2.20a	Companies in the United States	36,524
2.20b	Your company's foreign parent or owner	1,297 i
2.20c	Companies outside the United States	3,761
2.20d	U.S. federal government agencies or laboratories	102
2.20e	U.S. state and local government agencies or laboratories	8
2.20f	U.S. universities, colleges, and academic researchers	340
2.20g	All other organizations in the United States	482
2.20h	All other organizations outside the United States	155
2.22	Monetary gifts made by the company to U.S. universities and colleges ^a	90
	Projected worldwide R&D expense paid for and performed by the company in 2019	

TABLE 1

Business Research and Development Survey aggregate estimates, by questionnaire reference: 2018

(Financial information, employees, patents)

Question	Survey item	Aggregate amount
2.23(3)	Worldwide R&D to be paid for and performed by the company	558,974
2.23(1)	Domestic R&D to be paid for and performed by the company	452,151
2.23(2)	Foreign R&D to be paid for and performed by the company	106,823
2.24	Projected R&D services and projected payments for collaborative R&D	43,137
3.1j/3.2c	Worldwide R&D paid for by others and performed by the company and others	84,016
3.1a	R&D reimbursed by the company's foreign parent or owner	17,998
3.1b	Collaborative R&D reimbursed by business partners	7,725
3.1c	R&D paid for by grants (government or private foundation)	9,746
3.1d	Defense R&D goods or services provided as a prime or as a sub to the federal government and/or government contractors	17,032
3.1e	Medical clinical trial Phase I–III services provided to others not owned by the company	20,721
3.1f	Medical R&D services, other than clinical trials, provided to others not owned by the company	745
3.1g	Nondefense custom software development or computer systems designed for others not owned by the company	433
3.1h	Prototype development, production, and testing for customer's products	1,767
3.1i	All other R&D services provided to the federal government or to others not owned by the company	7,850 i
3.2c/3.1j	Worldwide R&D paid for by others and performed by the company and others	84,016
3.2a	Domestic R&D paid for by others and performed by the company and others	73,109
3.2b	Foreign R&D paid for by others and performed by the company and others	10,907
3.3m(1)	Domestic R&D paid for by others and performed by the company and others	73,109
3.3a(1)	Salaries, wages, and fringe benefits	36,004
3.3b(1)	Stock-based compensation	556
3.3c(1)	Leased or temporary staffing, including on-site contractors	2,051
3.3d(1)	Expensed equipment (not capitalized)	389
3.3e(1)	Materials and supplies	5,410
3.3f(1)	Leased facilities and equipment rental payments	990
3.3g(1)	Depreciation and amortization on R&D property, plant, equipment, and intangible assets	1,638
3.3h(1)	Royalties and licensing fees	217
3.3i(1)	Collaborative R&D payments	1,786
3.3j(1)	Contract R&D	8,093
3.3k(1)	Other purchased services	4,239 i
3.3l(1)	All other costs	11,737
3.4(3)	Worldwide R&D paid for and performed by others	10,838
3.4(1)	Domestic R&D paid for and performed by others	9,878
3.4(2)	Foreign R&D paid for and performed by others	960
3.5(3)	Worldwide R&D paid for by others and performed by the company	73,178
3.5(2)	Foreign R&D paid for by others and performed by the company	9,947
3.5(1)/3.8k	Domestic R&D paid for by others and performed by the company	63,230
3.8a	Other companies in the United States	19,087
3.8b	Your company's foreign parent or owner	15,775
3.8c	Other companies outside the United States	2,558
3.8d/3.11j/3.12c	U.S. federal government agencies or laboratories	24,685
3.8e	U.S. state and local government agencies or laboratories	103
3.8f	Foreign government agencies or laboratories	248
3.8g	U.S. universities, colleges, and academic researchers	66
3.8h	Universities, colleges, and academic researchers outside the United States	5
3.8i	All other organizations in the United States	366
3.8j	All other organizations outside the United States	337 i
3.11j/3.8d/3.12c	Federally funded R&D performed by the company	24,685
3.11a	Department of Defense	15,182
3.11b	Department of Energy	589

TABLE 1

Business Research and Development Survey aggregate estimates, by questionnaire reference: 2018

(Financial information, employees, patents)

Question	Survey item	Aggregate amount	
3.11c	National Aeronautics and Space Administration	4,724	i
3.11d	National Institutes of Health	385	
3.11e	Department of Homeland Security	77	
3.11f	Department of Transportation	37	
3.11g	Environmental Protection Agency	1	
3.11h	National Science Foundation	11	
3.11i	Other U.S. federal agencies	3,680	
3.12c/3.8d/3.11j	Federally funded R&D performed by the company by type of agreement	24,685	
3.12a	Contracts	24,106	
3.12b	Grants and all other agreements	579	
	Domestic R&D paid for by others and performed by the company		
3.16	Performed at largest domestic location	29,344	
3.18	Performed at second-largest domestic location	6,872	
3.19	Domestic R&D paid for by U.S. federal government agencies or laboratories and performed by others	4,614	
	Projected R&D to be paid for by others and performed by the company in 2018		
3.20	Worldwide R&D to be paid for by others and performed by the company	88,631	
3.21	Domestic R&D to be paid for by others and performed by the company	71,163	
3.22	Domestic R&D to be paid for by U.S. federal government and performed by the company	28,899	
4.1	Total domestic capital expenditures	665,199	
4.2/4.3f	Domestic capital expenditures for R&D	34,743	
4.3a	Land acquisition	659	
4.3b	Buildings and land improvement	4,063	
4.3c	Equipment	16,393	
4.3d	Capitalized software	9,659	
4.3e	All other capital expenditures for R&D	3,969	
5.1	Worldwide R&D paid for and performed by the company and others directed toward business areas or product lines new to company	64,994	
5.2/2.10(1)	Domestic R&D paid for and performed by the company	377,806	
	Type of R&D (character of work)		
5.4b	Basic research	22,312	
5.4a	Applied research	53,229	
5.3b	Development	302,264	
	Application areas		
5.5	Energy applications	23,275	i
5.6	Environmental protection applications	7,994	i
5.7	Defense applications	12,721	
5.8	Health or medical applications	89,550	
5.9	Agricultural applications	7,273	
	Technology focus areas		
5.10	Software products and software embedded in other projects or products	155,935	
5.11	Biotechnology	48,915	
5.12	Nanotechnology	14,820	i
5.13	Artificial intelligence	7,112	
5.15c	Foreign R&D paid for and performed by the company	90,429	
5.15a	Research	17,520	
5.15b	Development	72,909	
5.16/3.5(1)	Domestic R&D paid for by others and performed by the company	63,230	
	Type of R&D (character of work)		
5.18b	Basic research	6,668	
5.18a	Applied research	11,993	
5.17b	Development	44,570	

TABLE 1

Business Research and Development Survey aggregate estimates, by questionnaire reference: 2018

(Financial information, employees, patents)

Question	Survey item	Aggregate amount	
	Application areas		
5.19	Energy applications	1,949	
5.20	Environmental protection applications	1,763	
5.21	Defense applications	22,088	
5.22	Health or medical applications	24,947	
5.23	Agricultural applications	617	
	Technology focus areas		
5.24	Software products and software embedded in other projects or products	9,641	
5.25	Biotechnology	13,947	i
5.26	Nanotechnology	1,979	i
5.27	Artificial intelligence	2,096	i
	Federally funded R&D performed by the company		
	Type of R&D (character of work)		
5.30b	Basic research	2,510	i
5.30a	Applied research	5,097	i
5.29b	Development	17,078	
	Technology focus areas		
5.31	Software products and software embedded in other projects or products	5,365	
5.33c	Foreign R&D paid for by others and performed by the company	9,947	
5.33a	Research	2,268	
5.33b	Development	7,680	
Employees (thousands)			
	Worldwide		
1.8/1.9(3)	Total employees	31,345	
6.1b(3)	Non-R&D employees	28,781	
6.1a(3)	R&D employees	2,564	
6.4a(3)	Female	717	
6.4b(3)	Male	1,846	
6.5a(3)	Researchers	1,770	
6.5b(3)	Technicians	562	
6.5c(3)	Support staff	231	
	Domestic		
1.9(1)	Total employees	20,645	
6.1b(1)	Non-R&D employees	18,878	
6.1a(1)	R&D employees	1,766	
6.4a(1)	Female	468	
6.4b(1)	Male	1,298	
6.5a(1)	Researchers	1,212	
6.5b(1)	Technicians	394	
6.5c(1)	Support staff	161	
	Foreign		
1.9(2)	Total employees	10,700	
6.1b(2)	Non-R&D employees	9,903	
6.1a(2)	R&D employees	797	
6.4a(2)	Female	249	
6.4b(2)	Male	548	
6.5a(2)	Researchers	558	
6.5b(2)	Technicians	169	
6.5c(2)	Support staff	70	
	Researchers with PhD		
6.6(3)	Worldwide	158	

TABLE 1

Business Research and Development Survey aggregate estimates, by questionnaire reference: 2018

(Financial information, employees, patents)

Question	Survey item	Aggregate amount
6.6(1)	Domestic	129
6.6(2)	Foreign	29
	Full-time equivalent	
6.7d	R&D employees	1,619
6.7a	Full-time R&D employees	1,367
6.7b	Full-time employees not solely working on R&D	236
6.7c	Part-time employees working on R&D	16
6.8d	Researchers	1,127
6.8a	Full-time R&D employees	987
6.8b	Full-time employees not solely working on R&D	131
6.8c	Part-time employees working on R&D	9
6.9	Non-U.S. citizens employed as researchers under temporary visa ^a	57
6.10d(1)	Total leased and temporary employees working on R&D	238 i
6.10a(1)	Researchers	162 i
6.5b(1)	Technicians	52 i
6.5c(1)	Support staff	23 i
U.S. patents (number) ^b		
7.1	Patents applied for, total	163,866
7.2	Nonprovisional utility patents applied for	117,393
7.3	Applications filed or planned in foreign jurisdictions	53,969
7.4	Applications originated from organized R&D activities	86,635
7.6	Utility patents issued	105,854
U.S. patents (US\$millions) ^a		
	Revenue received	
7.7	From sale of utility patents	932
7.8	From licensing utility patents	21,472
	Amount paid	
7.10	To purchase patents	812
7.11	To license patents	8,961

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

IR&D = independent research and development.

^a 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.^b 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.**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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018

(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 company	Paid for by others	Total	Paid for by company	Paid for by others	Total	Paid for by company	Paid for by others
All industries	21-23, 31-33, 42-81	541,412	468,235	73,178	441,036	377,806	63,230	100,376	90,429	9,947
Manufacturing industries	31-33	338,953	298,082	40,871	274,075	234,682	39,393	64,878	63,400	1,478
Food	311	5,518	5,273	245	4,654	4,412	242	864	862	3
Beverage and tobacco products	312	1,629	1,520	109	1,113	1,004	109	516	516	0
Textile, apparel, and leather products	313-16	1,205	1,202	4	989	986	4	216	216	* i
Wood products	321	206	202	4	203	199	4	3	3	0
Paper	322	1,014	1,012	2	934	932	2	80	80	* i
Printing and related support activities	323	246	242	4	242	238	4	4	4	0
Petroleum and coal products	324	1,460 - 1,463	1,438	22 - 25	1,269	1,246	23	192 - 194	192	0 - 2 i
Chemicals	325	100,886	90,043	10,842	84,137	73,584	10,553	16,749	16,459	289
Basic chemicals	3251	3,046	2,853	194	2,443	2,251	192	603	601	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	2,427 - 2,445	2,343	84 - 102	1,653	1,568	85	774 - 792	775	0 - 16
Pesticide, fertilizer, and other agricultural chemicals	3253	1,788 - 1,797	1,457 i	332 - 340	1,460	1,135 i	326	328 - 337 i	322 i	6 - 14
Pharmaceuticals and medicines	3254	88,537	78,480	10,057	74,592	64,800	9,792	13,945	13,679	265
Soap, cleaning compound, and toilet preparation	3256	3,557	3,420	137	2,710	2,573	137	847	847	0
Paint, coating, adhesive, and other chemicals	3255, 3259	1,512 - 1,531	1,492	21 - 38	1,278	1,257	21	235 - 252	235	0 - 17 i
Plastics and rubber products	326	3,179	3,090	89	2,751	2,667	83	428	423	5
Nonmetallic mineral products	327	1,567 i	1,542 i	24	1,385	1,361	24	181 i	181 i	0
Primary metals	331	990	967	23 i	839	817	22 i	151	150	1
Fabricated metal products	332	2,544	2,426	118	2,327	2,222	105	216	204	12
Machinery	333	19,319	18,197	1,122	14,799	13,765	1,034	4,521	4,432	89
Agricultural implement	33311	2,730	2,717	13	1,872	1,862	10	858	855	3
Semiconductor machinery	333242	5,077	4,521	556	4,166	3,623	543	911	898	13
Engine, turbine, and power transmission equipment	3336	3,418 - 3,440	3,246	172 - 194	2,483	2,310	173	935 - 958	936	0 - 21
Other machinery	other 333	8,071 - 8,095	7,713	358 - 382	6,278	5,970	307	1,793 - 1,817	1,743	51 - 74
Computer and electronic products	334	112,020	101,666	10,353	83,697	73,922	9,775	28,322	27,744	578
Communications equipment	3342	16,483	15,191	1,292 i	13,107	11,822	1,285 i	3,376	3,369	7
Semiconductor and other electronic components	3344	45,540	42,905	2,634	31,052	28,642	2,410	14,487	14,263	224

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: 2018

(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 company	Paid for by others	Total	Paid for by company	Paid for by others	Total	Paid for by company	Paid for by others
Navigational, measuring, electromedical, and control instruments	3345	20,898	14,707	6,192	16,727	10,864	5,863	4,172	3,843	329
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,378	4,212	166	3,208	3,046	163	1,169	1,166	3
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,997	4,246	5,751	8,843	3,388	5,455	1,154	858	296
Other measuring and controlling device	other 3345	6,524	6,249	275	4,675	4,430	245	1,849	1,819	30
Other computer and electronic products	other 334	29,099	28,863	235	22,811	22,594	217	6,287	6,269	18
Electrical equipment, appliances, and components	335	6,180	5,909	272	4,487	4,222	266	1,693	1,687	6
Transportation equipment	336	60,075	42,884	17,191	52,629	35,894	16,735	7,446	6,990	457
Motor vehicles, bodies, trailers, and parts	3361-63	32,125	29,286	2,839	25,586	23,080	2,506	6,540	6,206	334
Aerospace products and parts	3364	24,977 - 25,002	11,759	13,218 - 13,242	24,291	11,160	13,131	686 - 711	599	87 - 111
Aircraft, aircraft engine, and aircraft parts	336411-13	23,654 - 23,679	11,345	12,309 - 12,333	22,968	10,746	12,222	685 - 710	599	87 - 111
Guided missile, space vehicle, and related parts	336414-15, 336419	1,323	414	909	1,323	414	909	1	1	0
Military armored vehicle, tank, and tank component	336992	11	6	6	11	6	6	0	0	0
Other transportation	other 336	2,936 - 2,961	1,833	1,104 - 1,128	2,741	1,649	1,092	195 - 221	184	11 - 36
Furniture and related products	337	435	428	7	410	404	5	25	23	2
Miscellaneous	339	20,478 - 20,483	20,040	438 - 443	17,209	16,807	402	3,270 - 3,274	3,234	36 - 40
Medical equipment and supplies	3391	17,415	17,114	301	14,531	14,267	264	2,884	2,847	37
Other miscellaneous manufacturing	3399	3,063 - 3,068	2,926	137 - 142	2,678	2,540	138	386 - 390	386	0 - 4
Nonmanufacturing industries	21-23, 42-81	202,460	170,153	32,307	166,961	143,123	23,838	35,498	27,029	8,469
Mining, quarrying, oil and gas extraction, and support activities	21	2,068	1,936	131	1,905	1,775	130	163	161	1
Utilities	22	283	232	51	275	224	51	8	8	0
Wholesale trade	42	938	913	25	906	881	25	32	32	0
Electronic shopping and electronic auctions	454111-12	11,715 - 15,516	11,620 - 15,422	94	11,652	11,557	94	63 - 3,864	63 - 3,864	0
Transportation and warehousing	48-49	956	949	7	942	935	7	14	14	0
Information	51	111,505	110,612	893	94,349	93,487	862	17,156	17,125	31
Publishing	511	39,965	39,462	503	32,770	32,281	489	7,195	7,182	13

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2018

[illegible]

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: 2018

(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 company	Paid for by others	Total	Paid for by company	Paid for by others	Total	Paid for by company	Paid for by others
50–99	–	13,013	11,103	1,910	12,321	10,446	1,875	692	657	35
100–249	–	20,420	16,324	4,096	18,547	14,626	3,921	1,872	1,698	174
Large companies										
250–499	–	21,824	18,739	3,085	19,645	16,604	3,041	2,179	2,135	44
500–999	–	20,214	17,710	2,504	17,657	15,561	2,096	2,557	2,149	408
1,000–4,999	–	83,761	73,402	10,359	68,578	58,509	10,068	15,184	14,893	291
5,000–9,999	–	60,875	46,307	14,568	45,337	36,274	9,063	15,538	10,033	5,505
10,000–24,999	–	106,777	95,269	11,508	84,420	74,423	9,997	22,356	20,846	1,511
25,000 or more	–	198,190	175,805	22,385	158,889	138,465	20,423	39,301	37,339	1,961

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018
(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	541,412	4,914	29,667	40,651	28,642	437,538
Manufacturing industries	31–33	338,953	2,912	14,106	22,975	18,748	280,212
Food	311	5,518	202	579	670	381	3,686 i
Beverage and tobacco products	312	1,629	31	84	67	356	1,090
Textile, apparel, and leather products	313–16	1,205	40	242	264	385	274
Wood products	321	206	50	59	98	0	0
Paper	322	1,014	30	129	159	68	628
Printing and related support activities	323	246	31	97	118	0	0
Petroleum and coal products	324	1,460 - 1,463	15 - 22	86	127	197	1,033
Chemicals	325	100,886	464	2,680	7,600	6,787	83,355
Basic chemicals	3251	3,046	56	361	627	707	1,294
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	2,427 - 2,445	55	144	118	50 - 603	1,506 - 2,080
Pesticide, fertilizer, and other agricultural chemicals	3253	1,788 - 1,797	7 - 18	94	107	0	1,579 i
Pharmaceuticals and medicines	3254	88,537	161	1,649	6,336	5,379	75,011
Soap, cleaning compound, and toilet preparation	3256	3,557	0 - 93	194	246	50 - 143	2,976
Paint, coating, adhesive, and other chemicals	3255, 3259	1,512 - 1,531	79 - 187	239	166	50 - 603	413 - 992
Plastics and rubber products	326	3,179	191	720	1,007	606	655
Nonmetallic mineral products	327	1,567 i	53	146	223	75	1,070 i
Primary metals	331	990	49	237	265	186	253
Fabricated metal products	332	2,544	348	805	666	467	258
Machinery	333	19,319	378	2,108	2,178	1,294	13,361
Agricultural implement	33311	2,730	40	171	152	193 i	2,175
Semiconductor machinery	333242	5,077	9	53	171	224	4,621
Engine, turbine, and power transmission equipment	3336	3,418 - 3,440	17 i	83	198	132 - 158	2,986
Other machinery	other 333	8,071 - 8,095	313	1,802	1,658	718 - 746	3,578
Computer and electronic products	334	112,020	388	2,484	4,333	3,391	101,423
Communications equipment	3342	16,483	41	362	823	583	14,675
Semiconductor and other electronic components	3344	45,540	82	710	1,855	1,349	41,543
Navigational, measuring, electromedical, and control instruments	3345	20,898	227	1,168	1,165	961	17,377
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,378 i	52	301	378	519	3,128 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,997	15	140	286	0	9,556

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: 2018
(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
Other measuring and controlling device	other 3345	6,524	160	727	501	442	4,694
Other computer and electronic products	other 334	29,099	38	244	490	498	27,829
Electrical equipment, appliances, and components	335	6,180	173	723	960	702	3,622
Transportation equipment	336	60,075	166	1,432	2,021	2,540	53,917
Motor vehicles, bodies, trailers, and parts	3361–63	32,125	102	781	1,345	1,160	28,738
Aerospace products and parts	3364	24,977 - 25,002	29 - 57	421	548	1,012	22,965
Aircraft, aircraft engine, and aircraft parts	336411–13	23,654 - 23,679	26 - 55	331	424	941	21,930
Guided missile, space vehicle, and related parts	336414–15, 336419	1,323	3	90	124	72	1,035
Military armored vehicle, tank, and tank component	336992	11	0 - 11 i	1 - 12	0	0	0
Other transportation	other 336	2,936 - 2,961	0 - 36	217 - 231	129	367	2,214
Furniture and related products	337	435	53	113	269	0	0
Miscellaneous	339	20,478 - 20,483	245 - 253	1,382	1,951	1,313	15,586
Medical equipment and supplies	3391	17,415	140	840	1,347	1,148	13,940
Other miscellaneous manufacturing	3399	3,063 - 3,068	105 - 114	542	604	164 i	1,646 i
Nonmanufacturing industries	21–23, 42–81	202,460	2,003	15,561	17,676	9,894	157,326
Mining, quarrying, oil and gas extraction, and support activities	21	2,068	22	234	193	0	1,618
Utilities	22	283	5	67	132	78	0
Wholesale trade	42	938	i 187	606 i	145 i	0	0
Electronic shopping and electronic auctions	454111–12	11,715 - 15,516	i 12	45	81	93	11,482 - 15,287 i
Transportation and warehousing	48–49	956	9	77	218	256	396
Information	51	111,505	358	4,449	7,306	5,487	93,905
Publishing	511	39,965	170	1,428	2,133	1,835	34,399
Newspaper, periodical, book, and directory publishers	5111	150	3	22	126 i	0	0
Software publishers	5112	39,815	167	1,407	2,007	1,835	34,399
Telecommunications	517	3,827 - 3,833	18 - 28	238	537	167	2,865
Data processing, hosting, and related services	518	28,045	118	2,168	4,121	3,022	18,616
Other information	other 51	39,662 - 39,668	43 - 53	615	514	463	38,025

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: 2018
(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
Finance and insurance	52	8,356	42	262	836	471	6,745
Real estate and rental and leasing	53	1,073	6	32	125	0	911
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	*	6	0	0	0
Other real estate and rental and leasing	other 53	1,067	6	26	125	0	911
Professional, scientific, and technical services	54	58,168	1,229	8,747	7,612	3,102	37,477
Architectural, engineering, and related services	5413	4,017 - 4,027	274 - 287	1,474	873	373	1,022
Computer systems design and related services	5415	20,287	477	3,589	2,195	706	13,320
Scientific research and development services	5417	28,555 - 28,564	312 - 324	i 2,476	2,810	1,468	21,488
Research and development in biotechnology	541711	8,447	0 - 39	504	65 - 617	142	7,146 - 7,698
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	19,435	286	i 1,949	2,184	1,325	13,691
Research and development in the social sciences and humanities	541720	672 - 683	0 - 39	i 23	10 - 560	0	100 - 650
Other professional, scientific, and technical services	other 54	5,298	152	1,208	1,734	556	1,648
Health care services	621–23	1,498	44	211	508	i 345	i 390
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,102 - 5,904	88	830	519	62	601 - 4,406
All companies (number of domestic employees)	–	541,412	4,914	29,667	40,651	28,642	437,538
Small companies							
10–19 ^a	–	4,518	994	2,812	469	0	243
20–49	–	11,821	1,543	7,416	2,540	170	151
Medium companies							
50–99	–	13,013	839	5,642	5,231	1,002	300
100–249	–	20,420	1,093	6,121	7,980	3,755	1,470
Large companies							
250–499	–	21,824	253	3,440	6,680	4,880	6,571
500–999	–	20,214	117	2,083	5,237	4,931	7,846
1,000–4,999	–	83,761	68	1,757	8,639	9,311	63,986
5,000–9,999	–	60,875	3	188	2,178	2,475	56,031
10,000–24,999	–	106,777	5	121	1,106	1,483	104,061

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: 2018
(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
25,000 or more	–	198,190	0	86	591	635	196,878

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018

(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 company	Paid for by others	Total	Paid for by company	Paid for by others	Total	Paid for by company	Paid for by others
All industries	21–23, 31–33, 42–81	26,411	24,797	3,921	26,313	24,698	3,876	2,771	2,656	265
Manufacturing industries	31–33	15,219	14,742	1,797	15,205	14,727	1,764	1,470	1,418	176
Food	311	808	802	36	808	802	36	44	43	3
Chemicals	325	2,713	2,631	384	2,713	2,631	377	296	291	35
Pharmaceuticals and medicines	3254	1,334	1,285	246	1,334	1,285	241	168	164	25
Other chemicals	other 325	1,379	1,346	138	1,379	1,346	136	128	128	10
Plastics and rubber products	326	912	899	92	912	899	90	78	74	7
Nonmetallic mineral products	327	229	228	19	228	227	19	12	12	0
Fabricated metal products	332	1,485	1,427	110	1,485	1,427	110	44	42	4
Machinery	333	2,073	2,021	218	2,072	2,020	212	170	167	16
Computer and electronic products	334	2,343	2,220	394	2,340	2,218	382	332	327	44
Electrical equipment, appliances, and components	335	763	752	92	761	750	91	90	90	3
Transportation equipment	336	1,105	1,065	188	1,105	1,065	187	107	101	29
Miscellaneous	339	D	1,222	D	1,251	1,220	126	D	174	D
Other manufacturing	312–16, 321–324, 331, 337	D	1,494	D	1,546	1,487	136	D	106	D
Nonmanufacturing industries	21–23, 42–81	11,200	10,063	2,126	11,116	9,978	2,114	1,304	1,240	90 i
Wholesale trade	42	781	771	40	778	768	40	19 i	19 i	0
Information	51	2,666	2,632	153	2,660	2,626	150	632	631	D
Telecommunications	517	D	177	D	183	177	12	D	35	D
Data processing, hosting, and related services	518	1,202	1,193	42	1,201	1,192	42	321	321	D
Other information	other 51	D	1,263	D	1,277	1,259	96	D	275	D
Professional, scientific, and technical services	54	6,294	5,274	1,774	6,224	5,204	1,766	552	489	78 i
Architectural, engineering, and related services	5413	D	1,169	D	1,283	1,150	348	D	51 i	D
Scientific research and development services	5417	D	795	D	1,469	785	1,010	D	44	D
Research and development in biotechnology	541711	278	208	143	272	202	143	25	16	10 i
Other scientific research and development	other 5417	D	587	D	1,197	583	866	D	28	D
Other professional, scientific, and technical services	other 54	3,515	3,310	414	3,472	3,269	408	421	394	33 i
Other nonmanufacturing	21–23, 44–45, 48–49, 52–53, 55–56, 621–24, 71–72, 81	1,462	1,390	159	1,456	1,384	158	101	101	D
All companies (number of domestic employees)	–	26,411	24,797	3,921	26,313	24,698	3,876	2,771	2,656	265
Small companies										
10–19 ^a	–	4,323	3,977	941	4,294	3,948	939	222 i	194 i	31 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: 2018

(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 company	Paid for by others	Total	Paid for by company	Paid for by others	Total	Paid for by company	Paid for by others
20–49	–	7,422	6,987	1,063	7,386	6,950	1,059	391	386	16
Medium companies										
50–99	–	4,606	4,420	486	4,591	4,406	484	356	324	38 i
100–249	–	5,008	4,567	736 i	5,004	4,562	726 i	414	395	32
Large companies										
250–499	–	2,067	1,976	236	2,060	1,967	233	337	329	18
500–999	–	1,155	1,101	128	1,152	1,098	123	262	257	15 i
1,000–4,999	–	1,264	1,222	186	1,263	1,221	173	493	481	55
5,000–9,999	–	242	232	49	241	231	47	118	113	18
10,000–24,999	–	207	201	59	207	201	57	117	116	23
25,000 or more	–	116	116	36	114	114	36	62	60	19

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.

^a Business 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. 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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 5

Worldwide R&D paid for by the company and performed by the company and others, by industry and company size: 2018

(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	521,611	468,235	53,377
Manufacturing industries	31–33	347,224	298,082	49,142
Food	311	5,569	5,273	296
Beverage and tobacco products	312	1,858	1,520	338
Textile, apparel, and leather products	313–16	1,220	1,202	18
Wood products	321	214	202	13
Paper	322	1,032	1,012	20
Printing and related support activities	323	245	242	3
Petroleum and coal products	324	1,734	1,438	296
Chemicals	325	129,242	90,043	39,198
Basic chemicals	3251	2,963	2,853	111
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	2,349 - 2,379	2,343	6 - 36
Pesticide, fertilizer, and other agricultural chemicals	3253	1,620	1,457	164
Pharmaceuticals and medicines	3254	116,951	78,480	38,471
Soap, cleaning compound, and toilet preparation	3256	3,805	3,420	385
Paint, coating, adhesive, and other chemicals	3255, 3259	1,525 - 1,555	1,492	33 - 63
Plastics and rubber products	326	3,176	3,090	86
Nonmetallic mineral products	327	1,613	1,542	70
Primary metals	331	1,012	967	45
Fabricated metal products	332	2,515	2,426	89
Machinery	333	18,796	18,197	599
Agricultural implement	33311	2,996	2,717	279
Semiconductor machinery	333242	4,522 - 4,591	4,521	1 - 69
Engine, turbine, and power transmission equipment	3336	3,316	3,246	70
Other machinery	other 333	7,895 - 7,964	7,713	182 - 250
Computer and electronic products	334	104,263	101,666	2,597
Communications equipment	3342	16,034	15,191	843
Semiconductor and other electronic components	3344	43,760	42,905	855
Navigational, measuring, electromedical, and control instruments	3345	15,274	14,707	568
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,298	4,212	86
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,581	4,246	335
Other measuring and controlling device	other 3345	6,395	6,249	146
Other computer and electronic products	other 334	29,195	28,863	332
Electrical equipment, appliances, and components	335	6,041	5,909	132
Transportation equipment	336	46,942	42,884	4,058
Motor vehicles, bodies, trailers, and parts	3361–63	32,651	29,286	3,365
Aerospace products and parts	3364	12,392	11,759	633
Aircraft, aircraft engine, and aircraft parts	336411–13	11,846	11,345	501
Guided missile, space vehicle, and related parts	336414–15, 336419	547	414	133
Military armored vehicle, tank, and tank component	336992	6	6	0
Other transportation	other 336	1,893	1,833	60
Furniture and related products	337	448	428	20
Miscellaneous	339	21,304	20,040	1,263
Medical equipment and supplies	3391	18,168	17,114	1,054
Other miscellaneous manufacturing	3399	3,136	2,926	210
Nonmanufacturing industries	21–23, 42–81	174,387	170,153	4,234

TABLE 5

Worldwide R&D paid for by the company and performed by the company and others, by industry and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Performed by the company	Performed by others
Mining, quarrying, oil and gas extraction, and support activities	21	2,127	1,936	191
Utilities	22	444	232	212
Wholesale trade	42	954	913	41
Electronic shopping and electronic auctions	454111-12	11,620 - 15,552	11,620 - 15,422	0 - 131
Transportation and warehousing	48-49	980	949	31
Information	51	113,020	110,612	2,408
Publishing	511	40,879	39,462	1,416
Newspaper, periodical, book, and directory publishers	5111	155	150	5
Software publishers	5112	40,724	39,313	1,411
Telecommunications	517	4,116	3,763	352
Data processing, hosting, and related services	518	28,083	27,840	243
Other information	other 51	39,942	39,546	397
Finance and insurance	52	8,779	8,311	468
Real estate and rental and leasing	53	1,073	1,073	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	6	*
Other real estate and rental and leasing	other 53	1,067	1,067	*
Professional, scientific, and technical services	54	27,916	27,247	669
Architectural, engineering, and related services	5413	2,406	2,303	103
Computer systems design and related services	5415	18,078	17,934	145
Scientific research and development services	5417	2,806	2,487	319
Research and development in biotechnology	541711	968	855	114
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	1,810	1,605	205
Research and development in the social sciences and humanities	541720	28	28	* i
Other professional, scientific, and technical services	other 54	4,625	4,523	102
Health care services	621-23	1,501	1,421	80
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,043 - 5,978	2,040 - 5,842	3 - 139
All companies (number of domestic employees)	-	521,611	468,235	53,377
Small companies				
10-19 ^a	-	3,949	3,462	487
20-49	-	11,899	10,114	1,785
Medium companies				
50-99	-	13,245	11,103	2,142
100-249	-	18,673	16,324	2,349
Large companies				
250-499	-	21,486	18,739	2,747
500-999	-	19,124	17,710	1,413
1,000-4,999	-	80,422	73,402	7,020
5,000-9,999	-	53,735	46,307	7,428
10,000-24,999	-	114,116	95,269	18,847
25,000 or more	-	184,963	175,805	9,158

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 6

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2018

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	Amount
All business activities	21100–81000	521,611
Oil and gas extraction	21100	964
Mining	21200	114
Support activities for mining, including oil and gas	21300	951 i
Utilities	22100	443
Construction	23000	656
Food manufacturing	31100	5,864
Beverage manufacturing	31210	762
Tobacco manufacturing	31220	722
Textile, apparel, and leather products manufacturing	31990	1,137
Wood products manufacturing	32100	297
Paper manufacturing	32200	1,594
Printing and related support activities	32300	359
Petroleum refineries	32401	640
Asphalt paving, roofing, and saturated materials manufacturing	32402	134
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	258
Basic chemicals manufacturing	32510	3,588
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,745
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	3,196 i
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	77,646
In vitro diagnostic substances manufacturing	32542	1,381
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	35,688
Soap, cleaning compound, and toilet preparations manufacturing	32591	3,370
Paint, adhesive, and other chemical manufacturing	32592	1,668
Plastics and rubber products manufacturing	32600	3,653
Clay and glass products manufacturing	32710	1,521
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	446
Primary metal manufacturing	33100	808
Fabricated metal products manufacturing	33200	2,809
Agricultural machinery and equipment manufacturing	33311	2,440
Construction machinery manufacturing	33312	1,880 i
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,739
Semiconductor machinery manufacturing	33321	4,465
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,124
Photographic and photocopying equipment manufacturing	33331	58
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	2,262
Digital cameras manufacturing	33333	274
Engine, turbine, and power transmission equipment manufacturing	33360	2,757
Metalworking and other general purpose machinery manufacturing	33390	3,009
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	27,805
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	11,487
Radio, television, and wireless communication equipment manufacturing	33422	2,609
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	2,151
Audio and video equipment manufacturing	33430	1,461
Semiconductor and other electronic components manufacturing	33440	43,956
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	4,827
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	3,052
Measuring and control instruments manufacturing (not listed elsewhere)	33459	5,473
Electrical equipment, appliances, and components manufacturing	33500	5,456
Motor vehicles manufacturing	33610	23,882
Motor vehicle body and trailer manufacturing	33620	99

TABLE 6

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2018

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	Amount
Motor vehicle parts manufacturing	33630	8,841
Aircraft manufacturing	33641	6,458
Aircraft engine and engine parts manufacturing	33642	1,760
Other aircraft parts and auxiliary equipment manufacturing	33643	2,037
Guided missiles, space vehicles, and related parts manufacturing	33644	1,211
Railroad rolling stock manufacturing	33651	213
Ship and boat building	33660	144
Motorcycle, bicycle, and parts manufacturing	33691	429
Military armored vehicle, tank, and tank components manufacturing	33692	491 i
All other transportation equipment manufacturing	33699	521
Furniture and related products manufacturing	33700	467
Medical equipment and supplies manufacturing	33910	16,801
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	3,409
Merchant wholesalers, durable goods	42300	826 i
Merchant wholesalers, nondurable goods	42400	322
Wholesale electronic markets and agents and brokers (business to business)	42500	89 i
Retail trade (except electronic shopping and electronic auctions)	44000	264
Electronic shopping and electronic auctions	45411	0 - 13,324 i
Transportation	48000	473
Couriers, messengers, and express delivery services	49200	452
Warehousing and storage	49300	79
Newspaper, periodical, book, and directory publishers (except Internet)	51110	175
Software publishers (except Internet)	51120	32,921
Motion picture and sound recording (except Internet)	51200	155
Broadcasting (except Internet)	51500	424
Wired telecommunications carriers	51710	476
Wireless telecommunications carriers (except satellite)	51720	2,439
Satellite telecommunications	51740	474
Other telecommunications (not listed elsewhere)	51790	741
Data processing, hosting, and related services	51800	7,709
Cloud computing applications and Internet-based software services	51801	24,408
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	43,243
Finance: banking and credit intermediation	52200	4,975
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,445
Insurance carriers and related activities	52400	2,147
Real estate	53100	380
Rental and leasing services	53200	699
Lessors of nonfinancial intangible assets, including patent licensing	53300	24 i
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	1,440
Architectural, engineering, and related services	54130	2,551
Specialized design services	54140	285
Computer systems design and related services	54150	18,118
Management, scientific, and technical consulting services	54160	2,425
Research and development services in social sciences and humanities	54172	27
Research and development services in biotechnology	54173	1,123
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	2,319
Advertising and related services	54180	1,164 i
Professional, scientific, and technical services (not listed elsewhere)	54190	870
Management of companies and enterprises	55100	0 - 13,324
Administrative and support services	56100	2,673
Waste management and remediation services	56200	0 - 3,913

TABLE 6

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2018

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	Amount
Offices of physicians	62110	113
Medical and diagnostic laboratories	62150	1,739 i
Other ambulatory health care services (ambulance, dental, home health care)	62199	48
Hospitals and nursing care facilities	62200	0 - 13,324
Social assistance services	62400	13
Arts, entertainment, and recreation	71000	45
Accommodation and food services	72000	126
Other services (not listed elsewhere)	81000	458 - 4,352
Undistributed	–	0

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

^a 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.

^b 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 7

Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2018

(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	84,016	73,178	10,838
Manufacturing industries	31–33	50,008	40,871	9,137
Food	311	258	245	13
Beverage and tobacco products	312	109	109	1
Textile, apparel, and leather products	313–16	5	4	1 i
Wood products	321	4	4	* i
Paper	322	4	2	2
Printing and related support activities	323	4	4	*
Petroleum and coal products	324	24	22 - 25	0 - 2 i
Chemicals	325	15,642	10,842	4,799
Basic chemicals	3251	194	194	1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	90 - 182	84 - 102	6 - 86
Pesticide, fertilizer, and other agricultural chemicals	3253	339	332 - 340	0 - 7
Pharmaceuticals and medicines	3254	14,771	10,057	4,714
Soap, cleaning compound, and toilet preparation	3256	136 - 216	137	0 - 79
Paint, coating, adhesive, and other chemicals	3255, 3259	21 - 112	21 - 38	0 - 79
Plastics and rubber products	326	149	89	60
Nonmetallic mineral products	327	24	24	0
Primary metals	331	23	23 i	1
Fabricated metal products	332	118	118	1
Machinery	333	1,180	1,122	57
Agricultural implement	33311	15	13	2
Semiconductor machinery	333242	588 - 599	556	32 - 42
Engine, turbine, and power transmission equipment	3336	193	172 - 194	0 - 21
Other machinery	other 333	372 - 385	358 - 382	0 - 24
Computer and electronic products	334	10,792	10,353	438
Communications equipment	3342	1,356 i	1,292 i	64 i
Semiconductor and other electronic components	3344	2,655	2,634	20
Navigational, measuring, electromedical, and control instruments	3345	6,536	6,192	344
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	166	166	*
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6,081	5,751	330
Other measuring and controlling device	other 3345	289	275	14
Other computer and electronic products	other 334	245	235	9
Electrical equipment, appliances, and components	335	323	272	51
Transportation equipment	336	20,860	17,191	3,669
Motor vehicles, bodies, trailers, and parts	3361–63	3,032	2,839	193
Aerospace products and parts	3364	16,696 i	13,218 - 13,242 i	3,454 - 3,477 i
Aircraft, aircraft engine, and aircraft parts	336411–13	15,787 i	12,309 - 12,333 i	3,454 - 3,477 i
Guided missile, space vehicle, and related parts	336414–15, 336419	909	909	0
Military armored vehicle, tank, and tank component	336992	6	6	0
Other transportation	other 336	1,127	1,104 - 1,128	0 - 23
Furniture and related products	337	7	7	* i
Miscellaneous	339	483	438 - 443	40 - 46
Medical equipment and supplies	3391	328	301	27
Other miscellaneous manufacturing	3399	155	137 - 142 i	14 - 18 i

TABLE 7

Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2018

(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	34,008	32,307	1,701
Mining, quarrying, oil and gas extraction, and support activities	21	131	131	*
Utilities	22	62	51	12
Wholesale trade	42	29	25	4
Electronic shopping and electronic auctions	454111–12	94	94	0
Transportation and warehousing	48–49	7	7	0
Information	51	979	893	86
Publishing	511	585	503	82
Newspaper, periodical, book, and directory publishers	5111	1	*	1
Software publishers	5112	584	502	82
Telecommunications	517	66 - 72	64 - 70	2
Data processing, hosting, and related services	518	207	205	2
Other information	other 51	117 - 122	117 - 122	*
Finance and insurance	52	47	45	2 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	32,439	30,921	1,518
Architectural, engineering, and related services	5413	2,038	1,714 - 1,723	315 - 323
Computer systems design and related services	5415	2,386	2,353	32
Scientific research and development services	5417	27,165	26,068 - 26,077	1,088 - 1,096
Research and development in biotechnology	541711	7,592 - 7,749	7,593	0 - 156
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	18,771	17,830	941
Research and development in the social sciences and humanities	541720	645 - 803	645 - 655	0 - 150
Other professional, scientific, and technical services	other 54	851	775	75
Health care services	621–23	133	77	56 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	86	62	23
All companies (number of domestic employees)	–	84,016	73,178	10,838
Small companies				
10–19 ^a	–	1,177	1,056	121
20–49	–	2,121	1,707	414
Medium companies				
50–99	–	2,094	1,910	184
100–249	–	4,780	4,096	684
Large companies				
250–499	–	3,769	3,085	684
500–999	–	2,773	2,504	268
1,000–4,999	–	12,020	10,359	1,661
5,000–9,999	–	15,352	14,568	784
10,000–24,999	–	13,430	11,508	1,922 i
25,000 or more	–	26,501	22,385	4,116

* = 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.

^a Business 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. 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018
(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders ^a			Domestic R&D performers ^b		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
All industries	21–23, 31–33, 42–81	14,458,452	10,698,764	3,759,688	13,822,080	10,150,522	3,671,558
Manufacturing industries	31–33	8,585,796	5,951,870	2,633,926	8,455,985	5,855,633	2,600,352
Food	311	746,333	538,730	207,603	743,967	536,385	207,581
Beverage and tobacco products	312	249,530	152,592	96,938	218,197	152,572	65,625
Textile, apparel, and leather products	313–16	103,275	72,942	30,333	102,591	72,258	30,333
Wood products	321	31,707	29,379	2,328	30,017	27,689	2,328
Paper	322	116,876	89,619	27,258	116,876	89,619	27,258
Printing and related support activities	323	33,608	30,257	3,351	33,565	30,214	3,351
Petroleum and coal products	324	668,173	401,832	266,341	668,173	401,832	266,341
Chemicals	325	1,626,314	1,165,161	461,153	1,615,898	1,154,745	461,153
Basic chemicals	3251	236,851	174,123	62,728	236,726	173,998	62,728
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	117,191	62,452	54,739	117,191	62,452	54,739
Pesticide, fertilizer, and other agricultural chemicals	3253	116,286	99,083	17,203	116,227	99,024	17,203
Pharmaceuticals and medicines	3254	846,187	653,729	192,459	836,121	643,663	192,459
Soap, cleaning compound, and toilet preparation	3256	204,916	112,019	92,897	204,907	112,010	92,897
Paint, coating, adhesive, and other chemicals	3255, 3259	104,883	63,756	41,128	104,726	63,598	41,128
Plastics and rubber products	326	212,176	172,644	39,532	210,661	171,349	39,313
Nonmetallic mineral products	327	76,091	56,896	19,196	58,325	40,885	17,439
Primary metals	331	170,601	132,195	38,406	169,657	131,251	38,406
Fabricated metal products	332	165,973	131,214	34,759	165,260	130,501	34,759
Machinery	333	619,588	372,991	246,597	618,851	372,371	246,480
Agricultural implement	33311	80,729	44,417	36,312	80,729	44,417	36,312
Semiconductor machinery	333242	45,586	21,754	23,832	45,586	21,754	23,832
Engine, turbine, and power transmission equipment	3336	112,797	52,155	60,641	112,797	52,155	60,641
Other machinery	other 333	380,476	254,665	125,811	379,739	254,044	125,695
Computer and electronic products	334	1,455,027	821,622	633,406	1,454,472	821,171	633,301
Communications equipment	3342	129,583	84,629	44,954	129,583	84,629	44,954
Semiconductor and other electronic components	3344	509,575	302,091	207,483	509,139	301,760	207,379
Navigational, measuring, electromedical, and control instruments	3345	268,195	180,130	88,064	268,074	180,010	88,064
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	47,582	27,781	19,801	47,582	27,781	19,801
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	110,565	78,873	31,692	110,565	78,873	31,692
Other measuring and controlling device	other 3345	110,047	73,476	36,571	109,927	73,356	36,571
Other computer and electronic products	other 334	547,675	254,771	292,904	547,675	254,771	292,904
Electrical equipment, appliances, and components	335	211,615	131,419	80,196	211,342	131,162	80,180

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: 2018
(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders ^a			Domestic R&D performers ^b		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Transportation equipment	336	1,592,282	1,310,128	282,154	1,532,353	1,250,199	282,154
Motor vehicles, bodies, trailers, and parts	3361-63	1,071,646	871,129	200,517	1,011,717	811,201	200,517
Aerospace products and parts	3364	433,748	369,214	64,534	433,748	369,214	64,534
Aircraft, aircraft engine, and aircraft parts	336411-13	408,554	352,038	56,516	408,554	352,038	56,516
Guided missile, space vehicle, and related parts	336414-15, 336419	25,194	17,176	8,018	25,194	17,176	8,018
Military armored vehicle, tank, and tank component	336992	406	406	0	406	406	0
Other transportation	other 336	86,482	69,379	17,103	86,482	69,379	17,103
Furniture and related products	337	44,786	41,001	3,786	44,215	40,456	3,759
Miscellaneous	339	461,840	301,250	160,591	461,565	300,974	160,591
Medical equipment and supplies	3391	310,045	204,749	105,296	309,844	204,548	105,296
Other miscellaneous manufacturing	3399	151,795	96,501	55,295	151,720	96,426	55,295
Nonmanufacturing industries	21-23, 42-81	5,872,656	4,746,894	1,125,762	5,366,095	4,294,889	1,071,206
Mining, quarrying, oil and gas extraction, and support activities	21	372,844	198,666	174,178	365,711	191,532	174,178
Utilities	22	349,586	343,289	6,297	274,599	268,302	6,297
Wholesale trade	42	181,680 i	151,009 i	30,671 i	176,495 i	146,302 i	30,193 i
Electronic shopping and electronic auctions	454111-12	179,392 - 325,998	179,393	0 - 146,605	176,809 - 323,414	176,810	0 - 146,605
Transportation and warehousing	48-49	306,596	234,630	71,967	306,596	234,630	71,967
Information	51	1,667,576	1,310,041	357,535	1,648,942	1,296,193	352,749
Publishing	511	330,176	224,147	106,029	329,657	223,631	106,026
Newspaper, periodical, book, and directory publishers	5111	4,262	3,759	502 i	4,262	3,759	502 i
Software publishers	5112	325,915	220,388	105,527	325,395	219,872	105,523
Telecommunications	517	493,873	480,548	13,325	492,404	479,111	13,293
Data processing, hosting, and related services	518	456,222	353,941	102,281	455,890	353,615	102,276
Other information	other 51	387,305	251,405	135,900	370,991	239,837	131,154
Finance and insurance	52	1,050,112	954,685	95,427	1,049,493	954,066	95,427
Real estate and rental and leasing	53	9,170	6,147	3,022	9,165	6,142	3,022
Lessors of nonfinancial intangible assets (except copyrighted works)	533	243	243	0	238	238	0
Other real estate and rental and leasing	other 53	8,926	5,904	3,022	8,926	5,904	3,022
Professional, scientific, and technical services	54	615,885	424,784	191,101	613,215	422,944	190,271
Architectural, engineering, and related services	5413	126,497	102,179	24,318	125,962	101,645	24,318
Computer systems design and related services	5415	253,518	156,026	97,492	252,891	155,586	97,306
Scientific research and development services	5417	91,330	71,852	19,479 i	91,187	71,708	19,479 i
Research and development in biotechnology	541711	32,783	28,304	4,479	32,658	28,179	4,479

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: 2018
(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders ^a			Domestic R&D performers ^b		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	57,608	42,616	14,992	57,605	42,613	14,992
Research and development in the social sciences and humanities	541720	939	932	7	923	916	7
Other professional, scientific, and technical services	other 54	144,540	94,727	49,812	143,175	94,005	49,170
Health care services	621–23	100,593	100,091	502	100,484	99,983	501
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	892,615 - 1,039,226	844,159	48,456 - 195,066	497,985 - 644,590	497,986	0 - 146,605
All companies (number of domestic employees)	–	14,458,452	10,698,764	3,759,688	13,822,080	10,150,522	3,671,558
Small companies							
10–19 ^c	–	21,096	20,349	747	20,187	19,439	747
20–49	–	73,675	69,771	3,904	71,295	67,754	3,541
Medium companies							
50–99	–	136,900	126,982	9,918	133,180	123,747	9,433
100–249	–	353,330	300,151	53,179	319,231	297,374	21,857
Large companies							
250–499	–	325,558	279,802	45,757	320,412	274,801	45,611
500–999	–	509,883	408,482	101,401	495,272	394,070	101,202
1,000–4,999	–	1,967,720	1,450,957	516,763	1,947,769	1,431,658	516,110
5,000–9,999	–	1,373,162	1,001,344	371,818	1,323,912	958,596	365,316
10,000–24,999	–	3,287,271	2,262,566	1,024,705	3,254,697	2,229,992	1,024,705
25,000 or more	–	6,409,856	4,778,360	1,631,496	5,936,125	4,353,090	1,583,035

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

NAICS = 2012 North American Industry Classification System.

^a Statistics are representative of companies located in the United States that performed or funded R&D.

^b Statistics are representative of companies located in the United States that performed R&D.

^c Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 9

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2018

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	Sales		
		Worldwide	Domestic	Foreign
All business activities	21100–81000	14,458,452	10,698,764	3,759,688
Oil and gas extraction	21100	178,064	91,319	86,746
Mining	21200	44,894	25,850	19,044
Support activities for mining, including oil and gas	21300	84,371	54,537	29,834
Utilities	22100	333,570	328,791	4,779
Construction	23000	88,086	80,353	7,733
Food manufacturing	31100	718,232	527,388	190,844
Beverage manufacturing	31210	138,526	92,213	46,313
Tobacco manufacturing	31220	67,551	35,613	31,938
Textile, apparel, and leather products manufacturing	31990	84,253	58,770	25,483
Wood products manufacturing	32100	41,022	34,873	6,148
Paper manufacturing	32200	155,504	118,476	37,028
Printing and related support activities	32300	36,023	31,028	4,995
Petroleum refineries	32401	586,677	332,549	254,128
Asphalt paving, roofing, and saturated materials manufacturing	32402	17,795	11,426	6,369
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	16,008	13,238	2,770
Basic chemicals manufacturing	32510	262,008	181,047	80,961
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	128,125	76,867	51,258
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	83,309	53,085	30,224
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	681,423	521,549	159,874
In vitro diagnostic substances manufacturing	32542	17,051	8,120	8,931 i
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	102,259	89,145	13,114
Soap, cleaning compound, and toilet preparations manufacturing	32591	192,097	107,730	84,367
Paint, adhesive, and other chemical manufacturing	32592	131,775	86,085	45,690
Plastics and rubber products manufacturing	32600	228,046	172,355	55,691
Clay and glass products manufacturing	32710	48,541	29,703	18,837
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	41,567	36,062	5,505
Primary metal manufacturing	33100	158,601	124,786	33,815
Fabricated metal products manufacturing	33200	204,748	151,435	53,313
Agricultural machinery and equipment manufacturing	33311	67,226	37,210	30,016
Construction machinery manufacturing	33312	74,103	44,659	29,444
Mining, oil, and gas field machinery and equipment manufacturing	33319	86,490	46,295	40,195
Semiconductor machinery manufacturing	33321	47,009	21,686	25,323
Industrial machinery manufacturing (except semiconductor machinery)	33322	44,608	31,875	12,733
Photographic and photocopying equipment manufacturing	33331	9,492	7,883	1,609
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	115,891	77,434	38,457
Digital cameras manufacturing	33333	2,086	1,658	427 i
Engine, turbine, and power transmission equipment manufacturing	33360	95,174	49,461	45,713
Metalworking and other general purpose machinery manufacturing	33390	124,837	86,415	38,422
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	479,862	214,870	264,991
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	80,805	44,162	36,643
Radio, television, and wireless communication equipment manufacturing	33422	34,720	28,199	6,520
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	16,542	14,860	1,683
Audio and video equipment manufacturing	33430	11,671	6,362	5,308

TABLE 9

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2018

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	Sales		
		Worldwide	Domestic	Foreign
Semiconductor and other electronic components manufacturing	33440	399,809	210,206	189,603
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	54,121 i	31,296	22,825 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	71,425	62,360	9,066
Measuring and control instruments manufacturing (not listed elsewhere)	33459	80,672	52,493	28,179
Electrical equipment, appliances, and components manufacturing	33500	189,130	115,089	74,041
Motor vehicles manufacturing	33610	706,303	584,674	121,629
Motor vehicle body and trailer manufacturing	33620	26,379	25,775	604
Motor vehicle parts manufacturing	33630	285,825	202,295	83,530
Aircraft manufacturing	33641	190,552	181,676	8,876
Aircraft engine and engine parts manufacturing	33642	60,580	35,596	24,984
Other aircraft parts and auxiliary equipment manufacturing	33643	67,859	56,031	11,828
Guided missiles, space vehicles, and related parts manufacturing	33644	51,007	46,742	4,265
Railroad rolling stock manufacturing	33651	14,083	8,576	5,507
Ship and boat building	33660	16,294	14,316	1,979
Motorcycle, bicycle, and parts manufacturing	33691	11,412	7,159	4,254
Military armored vehicle, tank, and tank components manufacturing	33692	18,531 i	15,853 i	2,678
All other transportation equipment manufacturing	33699	21,079	17,787	3,292
Furniture and related products manufacturing	33700	49,009	44,571	4,438
Medical equipment and supplies manufacturing	33910	271,160	184,756	86,404
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	170,861	104,915	65,945 i
Merchant wholesalers, durable goods	42300	248,170	225,622	22,549
Merchant wholesalers, nondurable goods	42400	634,620	455,596	179,024
Wholesale electronic markets and agents and brokers (business to business)	42500	5,490	5,054	436
Retail trade (except electronic shopping and electronic auctions)	44000	538,965	482,991	55,973
Electronic shopping and electronic auctions	45411	191,588 - 272,515 i	191,589 i	0 - 80,926 i
Transportation	48000	264,546	210,354	54,192
Couriers, messengers, and express delivery services	49200	91,333	69,200	22,133
Warehousing and storage	49300	11,361	6,057	5,305
Newspaper, periodical, book, and directory publishers (except Internet)	51110	9,489	7,423	2,066
Software publishers (except Internet)	51120	245,769	149,358	96,411
Motion picture and sound recording (except Internet)	51200	37,342	32,886	4,456
Broadcasting (except Internet)	51500	151,282	126,166	25,116
Wired telecommunications carriers	51710	129,766	127,438	2,328
Wireless telecommunications carriers (except satellite)	51720	264,219	264,216	3 i
Satellite telecommunications	51740	53,289	53,217	72
Other telecommunications (not listed elsewhere)	51790	16,300	12,512	3,788
Data processing, hosting, and related services	51800	141,375	114,517	26,858
Cloud computing applications and Internet-based software services	51801	166,306	130,568	35,738
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	190,606	113,585	77,022
Finance: banking and credit intermediation	52200	536,596	480,076	56,520
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	119,259	98,369	20,890
Insurance carriers and related activities	52400	467,238	443,129	24,109 i
Real estate	53100	11,565	10,982	583
Rental and leasing services	53200	13,487	9,879	3,608
Lessors of nonfinancial intangible assets, including patent licensing	53300	1,900 - 82,827	1,901	0 - 80,926 i

TABLE 9

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2018

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	Sales		
		Worldwide	Domestic	Foreign
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	24,693	21,735	2,959
Architectural, engineering, and related services	54130	101,367	83,802	17,565
Specialized design services	54140	26,260	7,649	18,610
Computer systems design and related services	54150	250,286	154,122	96,164
Management, scientific, and technical consulting services	54160	68,839	49,138	19,701
Research and development services in social sciences and humanities	54172	941	934	7
Research and development services in biotechnology	54173	13,423	9,647	3,776
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	41,792	31,645	10,147 i
Advertising and related services	54180	140,299	72,990	67,309
Professional, scientific, and technical services (not listed elsewhere)	54190	21,508	16,673	4,835
Management of companies and enterprises	55100	13,915	12,189	1,726
Administrative and support services	56100	67,113	38,604	28,509
Waste management and remediation services	56200	88,601	84,236	4,365
Offices of physicians	62110	50,988	50,988	0
Medical and diagnostic laboratories	62150	39,529 i	35,208	4,322 i
Other ambulatory health care services (ambulance, dental, home health care)	62199	10,100	9,923	177
Hospitals and nursing care facilities	62200	35,131	35,130	1 i
Social assistance services	62400	1,826	1,826	0
Arts, entertainment, and recreation	71000	34,740	26,599	8,141
Accommodation and food services	72000	54,778	33,862	20,916
Other services (not listed elsewhere)	81000	95,526	69,952	25,574
Less: intersegment eliminations	–	262,685	160,370	102,316
Undistributed	–	8 i	8 i	0

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

^a 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.^b 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. 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018

(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	441,036	247,929	28,759	18,540	7,261	30,019	7,802	16,409	2,891	16,161	65,266
Manufacturing industries	31-33	274,075	146,749	10,875	10,019	3,974	25,547	4,440	11,337	2,581	11,435	47,118
Food	311	4,654	2,822	42	87	36	510	55	212	3	210	678
Beverage and tobacco products	312	1,113	593	10	54	4	92	13	55	*	62	229
Textile, apparel, and leather products	313-16	989	639	13	22	70	95	5	15	3	19	108
Wood products	321	203	145	*	5	3	33	2	3	0	4	8
Paper	322	934	445	*	34	20	381	3	6	0	5	40
Printing and related support activities	323	242	157	16	13	1	16	2	13	*	3	20
Petroleum and coal products	324	1,269	738	0	19	18	34	5	36	*	306	114
Chemicals	325	84,137	38,125	4,698	4,734	597	6,868	1,487	3,913	1,321	4,710	17,684
Basic chemicals	3251	2,443	1,494	6	50	33	224	38	142	4	161	292
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,653	1,049	1	69	1	105	16	111	9	0 - 208	80 - 297
Pesticide, fertilizer, and other agricultural chemicals	3253	1,460	809	1	159	6	112	29	115	18	39	172
Pharmaceuticals and medicines	3254	74,592	32,309	4,678	4,347	525	6,198	1,367	3,398	1,285	4,283	16,202
Soap, cleaning compound, and toilet preparation	3256	2,710	1,630	12	91	16	132	26	103	*	22	678
Paint, coating, adhesive, and other chemicals	3255, 3259	1,278	834	1	17	16	96	12	43	4	0 - 208	43 - 260
Plastics and rubber products	326	2,751	1,603	18	45	51	475	26	80	14	40	398
Nonmetallic mineral products	327	1,385	725	5	34	27	137	36	74	0	76	271
Primary metals	331	839	436	9	8	3	167	3	43	1	16	153
Fabricated metal products	332	2,327	1,422	24	70	28	364	16	33	9	31	328
Machinery	333	14,799	8,719	237	555	119	2,015	255	634	35	249	1,980
Agricultural implement	33311	1,872	1,028	0	137	7	266	7	41	2	56	328
Semiconductor machinery	333242	4,166	2,199	186	31	29	504	71	317	0	24	804
Engine, turbine, and power transmission equipment	3336	2,483	1,523	1	262	10	310	11	97	0 - 34	3	228 - 270
Other machinery	other 333	6,278	3,968	50	125	73	935	165	179	0 - 34	167	578 - 620

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: 2018

(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
Computer and electronic products	334	83,697	47,316	5,339	1,659	1,684	5,550	1,933	4,613	693	3,824	11,086
Communications equipment	3342	13,107	7,966	748	452	189	497	890	622	46	155	1,541
Semiconductor and other electronic components	3344	31,052	17,319	1,335	477	330	1,869	377	2,408	366	1,915	4,656
Navigational, measuring, electromedical, and control instruments	3345	16,727	10,598	349	529	175	1,894	131	337	6	413	2,295
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,208	1,783	178	113	33	226	56	74	2	207	535
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	8,843	5,806	56	305	61	1,229	38	153	2	110	1,085
Other measuring and controlling device	other 3345	4,675	3,009	115	111	80	439	38	110	2	96	675
Other computer and electronic products	other 334	22,811	11,432	2,907	201	991	1,290	534	1,247	275	1,341	2,593
Electrical equipment, appliances, and components	335	4,487	2,982	53	159	34	338	94	113	5	165	544
Transportation equipment	336	52,629	29,584	13	1,845	1,007	7,011	386	929	374	865	10,614
Motor vehicles, bodies, trailers, and parts	3361-63	25,586	15,156	5	1,451	945	4,168	326	761	352	232	2,190
Aerospace products and parts	3364	24,291	12,755	3	321	33	2,410	41	133	4	589	8,002
Aircraft, aircraft engine, and aircraft parts	336411-13	22,968	12,067	2	246	32	2,156	39	132	4	576	7,714
Guided missile, space vehicle, and related parts	336414-15, 336419	1,323	688	2	75	1	254	2	1	*	13	288
Military armored vehicle, tank, and tank component	336992	11	5	0	0 - 5	0 - 5	1	*	0 - 5	*	*	0 - 7
Other transportation	other 336	2,741	1,669	5	66 - 74	22 - 31	433	19	28 - 37	19	43	414 - 424
Furniture and related products	337	410	291	1	9	1	50	2	3	2	5	45
Miscellaneous	339	17,209	10,006	395	667	271	1,411	118	561	117	846	2,816
Medical equipment and supplies	3391	14,531	8,061	367	617	251	1,183	104	523	106	806	2,513

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: 2018

(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 miscellaneous manufacturing	3399	2,678	1,945	28	49	20	229	14	38	i	11	41	303
Nonmanufacturing industries	21-23, 42-81	166,961	101,180	17,884	8,521	3,286	4,472	3,362	5,072		311	4,726	18,148
Mining, quarrying, oil and gas extraction, and support activities	21	1,905	1,220	46	142	18	149	24	51		2	36	218
Utilities	22	275	130	1	11	2	7	2	5		4	29	84
Wholesale trade	42	906	627	0	14	3	92	4	3	i	1	20	141
Electronic shopping and electronic auctions	454111-12	11,652	6,106	1,509 - 1,865	0 - 279	102 - 116	0 - 106	0 - 125	287 - 645		3	0 - 54	2,384 - 2,742
Transportation and warehousing	48-49	942	670	9	84	16	103	8	25		*	15	12
Information	51	94,349	57,163	14,778	4,249	2,437	1,195	2,436	2,721		183	1,380	7,806
Publishing	511	32,770	21,417	3,549	1,290	273	412	307	444		79	1,054	3,946
Newspaper, periodical, book, and directory publishers	5111	131	90	0	8	1	*	1	14	i	*	5	11
Software publishers	5112	32,639	21,327	3,549	1,282	272	411	306	429		79	1,048	3,935
Telecommunications	517	3,696	2,539	156	172	19	559	142	29		1	41	37
Data processing, hosting, and related services	518	23,306	15,950	2,845	538	282	146	523	451		87	179	2,304
Other information	other 51	34,576	17,257	8,228	2,249	1,863	78	1,464	1,797		16	106	1,519
Finance and insurance	52	7,471	4,436	217	1,788	74	63	46	290		8	120	430
Real estate and rental and leasing	53	1,022	608	84	27	23	4	5	44		*	9	218
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	*	0	0	0	0	0	0		0	6	*
Other real estate and rental and leasing	other 53	1,016	607	84	27	23	4	5	44		*	4	218
Professional, scientific, and technical services	54	44,860	27,750	837	1,823	594	2,624	613	1,246		103	3,047	6,224
Architectural, engineering, and related services	5413	3,961	2,989	11	158	11	276	32	64	i	1	72	347
Computer systems design and related services	5415	15,923	11,005	565	667	411	513	127	501		14	131	1,990
Scientific research and development services	5417	20,185	10,463	132	695	133	1,461	376	621		68	2,734	3,502

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: 2018

(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 biotechnology	541711	5,857	2,791	60	235	12	389	86	86 - 166	49	1,077	i 987 - 1,069
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	13,657	7,162	55	439	107	1,069	269	456	19	1,649	i 2,434
Research and development in the social sciences and humanities	541720	671	511	17	21	14	3	21	0 - 79	*	8	0 - 80
Other professional, scientific, and technical services	other 54	4,791	3,293	129	304	39	373	78	60	i 20	i 111	385
Health care services	621-23	1,476	722	51	i 109	4	i 134	i 104	i 47	i 5	i 21	278 i
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,103	1,750	0 - 348	0 - 279	4 - 10	0 - 106	0 - 125	0 - 348	2	0 - 54	0 - 348
All companies (number of domestic employees)	-	441,036	247,929	28,759	18,540	7,261	30,019	7,802	16,409	2,891	16,161	65,266
Small companies												
10-19 ^a	-	4,390	2,658	74	178	40	287	92	72	25	252	713
20-49	-	11,252	6,963	200	535	252	929	245	169	68	540	1,350
Medium companies												
50-99	-	12,321	7,344	343	477	142	1,227	326	218	134	621	1,488
100-249	-	18,547	11,532	622	812	166	1,614	351	459	119	769	2,103
Large companies												
250-499	-	19,645	11,354	1,084	1,027	346	1,395	523	466	122	646	2,682
500-999	-	17,657	10,241	969	800	218	1,385	331	494	331	650	2,237
1,000-4,999	-	68,578	41,397	5,313	2,312	872	4,190	992	2,438	463	1,600	9,003
5,000-9,999	-	45,337	24,963	2,589	2,125	399	3,010	663	1,920	96	i 1,974	i 7,597
10,000-24,999	-	84,420	45,727	5,028	3,575	1,348	5,590	1,325	i 4,173	465	4,650	12,539
25,000 or more	-	158,889	85,750	12,537	6,698	3,478	10,392	2,954	5,999	1,069	4,457	25,553

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 11

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19 ^a	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	441,036	4,390	11,252	12,321	18,547	19,645	17,657	68,578	45,337	84,420	158,889
Manufacturing industries	31–33	274,075	1,686	5,369	6,852	10,153	11,500	11,223	42,270	28,990	59,556	96,476
Food	311	4,654	4	87	68	285	270	194	472	182	2,196 i	895 i
Beverage and tobacco products	312	1,113	3	42	12	16	108	34	10	208	173	507
Textile, apparel, and leather products	313–16	989	10	5	12	29	50	48	271	294	79	190
Wood products	321	203	*	15	22	14	4	31	19	59	40	0
Paper	322	934	0	2	12	34	23	4	140	189	308 i	223
Printing and related support activities	323	242	0	8	13	30	71	31	42 i	28	19	0
Petroleum and coal products	324	1,269	3	12	23	25	42	60	26	24	131	924
Chemicals	325	84,137	816	2,629	3,509	4,380	4,980	3,436	13,596	7,905	31,683	11,203
Basic chemicals	3251	2,443	16	90	53	156	174	105	1,317	193	339	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,653	0 - 64	0 - 80	0 - 112	44	46	58	157	0	1,091 - 1,351	0
Pesticide, fertilizer, and other agricultural chemicals	3253	1,460	6	31	10	26	15	3	510	166	694 i	0
Pharmaceuticals and medicines	3254	74,592	732	2,387	3,318	3,984	4,552	3,113	10,595	7,332	27,608	10,972
Soap, cleaning compound, and toilet preparation	3256	2,710	0 - 64	44	19	94	83	50	543 i	214	1,363 - 1,667	0 - 232 i
Paint, coating, adhesive, and other chemicals	3255, 3259	1,278	0 - 64	0 - 80	0 - 112	77	110	107	474	0	23 - 512	0 - 232
Plastics and rubber products	326	2,751	5	94	126	199	277	302	857	538	354	0
Nonmetallic mineral products	327	1,385	4	18	20	48	14	73	99	164	946	0
Primary metals	331	839	0	17	22	92	48	50	188	123	290	9
Fabricated metal products	332	2,327	35	140	156	463	226	450	483	163	211	0
Machinery	333	14,799	163	405	621	909	650	709	3,109	3,062	2,033	3,137
Agricultural implement	33311	1,872	4	52	31	69	19	79	366	14	0	1,237
Semiconductor machinery	333242	4,166	6	6	29 i	61	116	67 - 569	1,131	2,245 - 2,747	0	0
Engine, turbine, and power transmission equipment	3336	2,483	6	11	17	44	45	63	300	0 - 502	0 - 2,001	0 - 1,901
Other machinery	other 333	6,278	147	336	543	735	470	0 - 502	1,312	303	32 - 2,034	0 - 1,901
Computer and electronic products	334	83,697	338	1,010	1,175	1,980	2,827	3,662	13,706	9,891 i	10,220	38,888
Communications equipment	3342	13,107	19	101	218	399	461	774	2,935	993 i	2,035 i	5,171

TABLE 11

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19 ^a	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
Semiconductor and other electronic components	3344	31,052	58	400	372	745	1,895	1,621	5,537	5,311	i 4,465	10,648
Navigational, measuring, electromedical, and control instruments	3345	16,727	61 - 263	439	468	694	219 - 473	729	3,868	580	2,920	6,290 - 6,751
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,208	49	156	154	236	178	405	1,178	0	852	i 0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	8,843	13	60	79	131	37	0 - 265	821	137 - 580	998 - 1,714	5,855
Other measuring and controlling device	other 3345	4,675	0 - 202	222	235	327	5 - 259	59 - 325	1,869	0 - 444	353 - 1,071	i 435 - 897
Other computer and electronic products	other 334	22,811	0 - 202	69	117	141	0 - 253	538	1,367	3,006	800	16,316 - 16,777
Electrical equipment, appliances, and components	335	4,487	48	253	319	244	237	430	1,344	502	625	485
Transportation equipment	336	52,629	175	181	191	566	1,000	1,071	4,448	3,558	6,131	35,309
Motor vehicles, bodies, trailers, and parts	3361–63	25,586	0 - 12	65	88	377	769	563 - 677	3,348	1,314	4,573	14,360 - 14,492
Aerospace products and parts	3364	24,291	164	51	84	145	158	286	931	1,718	1,558	19,196
Aircraft, aircraft engine, and aircraft parts	336411–13	22,968	135	35	52	134	139	286	654	778	1,558	19,196
Guided missile, space vehicle, and related parts	336414–15, 336419	1,323	28	16	32	10	19	0	278	940	0	0
Military armored vehicle, tank, and tank component	336992	11	0	0 - 6	1 - 12	0 - 6	0 - 11	0	0	0	0	0
Other transportation	other 336	2,741	0 - 12	57 - 67	6 - 19	37 - 45	62 - 75	109 - 223	169	527	0	1,620 - 1,754
Furniture and related products	337	410	0	17	24	38	24	9	79	205	14	0
Miscellaneous	339	17,209	81	438	527	800	648	628	3,384	1,895	4,103	4,705
Medical equipment and supplies	3391	14,531	74	387	288	564	318	517	2,346	1,484	3,982	4,569
Other miscellaneous manufacturing	3399	2,678	7	51	239	236	330	112	1,037	411	i 121	i 136
Nonmanufacturing industries	21–23, 42–81	166,961	2,704	5,882	5,469	8,395	8,145	6,435	26,307	16,347	24,864	62,413
Mining, quarrying, oil and gas extraction, and support activities	21	1,905	9	17	42	51	68	44	i 65	i 277	1,332	0
Utilities	22	275	5	12	*	8	0	0 - 94	48	0 - 94	67	41 - 137
Wholesale trade	42	906	i 35	143	118	i 273	i 118	i 172	i 47	0	*	0
Electronic shopping and electronic auctions	454111–12	11,652	i 1 - 39	0 - 83	3	i 113	0 - 219	0 - 231	0 - 485	0 - 1,076	i 0	9,418 - 10,738

TABLE 11

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19 ^a	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
Transportation and warehousing	48–49	942	2 i	11	7	39	2	268	157	18	20	419
Information	51	94,349	704	1,197	1,531	3,067	3,818	3,585	17,847	6,758	15,494	40,347
Publishing	511	32,770	206	499	478	984	815	778	7,898	4,892	1,854	14,367
Newspaper, periodical, book, and directory publishers	5111	131	0	7	7	*	52 i	15 i	0	0	50 i	0
Software publishers	5112	32,639	206	492	471	984	762	763	7,898	4,892	1,804	14,367
Telecommunications	517	3,696	9 - 488	31 - 698	22 - 204	0 - 421	265	0 - 535	0 - 2,676	0 - 444	0 - 3,367	0 - 3,367
Data processing, hosting, and related services	518	23,306	0 - 490	1 - 668	851	1,565	2,133	2,273	7,272	1,423	1,767 - 2,931	4,861
Other information	other 51	34,576	0 - 490	0 - 665	0 - 181	98 - 520	606	0 - 536	2 - 2,678	0 - 444	7,341 - 11,874	17,751 - 21,120
Finance and insurance	52	7,471	249	11	33	150	461	182	1,133 i	1,086	1,753	2,413
Real estate and rental and leasing	53	1,022	0	2	8	14	2	57	938	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	0	0	*	6	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	1,016	0	2	8	9	2	57	938	0	0	0
Professional, scientific, and technical services	54	44,860	1,648	4,359	3,436	4,414	2,783	1,622	5,504	7,120	5,648	8,327
Architectural, engineering, and related services	5413	3,961	283	512	388	568	394	378 i	298	398	271	471
Computer systems design and related services	5415	15,923	407	1,700	1,232	1,002	642	624	2,767	479	3,143	3,927
Scientific research and development services	5417	20,185	844	1,424	1,353	2,181	1,288	379	1,891	6,178	1,992	2,656
Research and development in biotechnology	541711	5,857	236	240	353	66 - 161	132 - 142	71	210 - 314	0	1,791	2,656
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	13,657	603	1,166	1,000	2,021	1,135	308	1,045	6,178	201	0
Research and development in the social sciences and humanities	541720	671	5	18	*	0 - 95	12 - 20	0	533 - 635	0	0	0
Other professional, scientific, and technical services	other 54	4,791	114	722	463	663	459	241	549	66 i	242	1,273
Health care services	621–23	1,476	15	46	180 i	87	678	278	62	3	0	128 i

TABLE 11

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)																							
		All companies		10–19 ^a		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	2,103		0 - 39		5 - 89		111		178		0 - 219		0 - 231		26 - 511		12 - 1,088		i		549		0 - 1,221	

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018

(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	441,036	28,980	65,222	346,834
Manufacturing industries	31–33	274,075	20,873	44,027	209,175
Food	311	4,654	442 i	1,457 i	2,755
Beverage and tobacco products	312	1,113	121	254	738
Textile, apparel, and leather products	313–16	989	55	82	853
Wood products	321	203	13	38	153
Printing and related support activities	323	242	18	37	187
Chemicals	325	84,137	11,972	18,531	53,635
Pharmaceuticals and medicines	3254	74,592	10,957	16,177	47,458
Other chemicals	other 325	9,545	1,015	2,353	6,177
Plastics and rubber products	326	2,751	168	457	2,126
Nonmetallic mineral products	327	1,385	200 i	301 i	884 i
Primary metals	331	839	39	122	678
Fabricated metal products	332	2,327	128	465	1,734
Machinery	333	14,799	939	1,697	12,162
Computer and electronic products	334	83,697	2,445	9,947	71,305
Semiconductor and other electronic components	3344	31,052	631 i	3,287 i	27,135 i
Navigational, measuring, electromedical, and control instruments	3345	16,727	905 i	2,327	13,494
Other computer and electronic products	other 334	35,918	910	4,333	30,676
Electrical equipment, appliances, and components	335	4,487	286	576	3,626
Transportation equipment	336	52,629	3,062 i	7,440	42,128
Aerospace products and parts	3364	24,291	1,978 i	3,409 i	18,904
Other transportation	other 336	28,338	1,084	4,031	23,224
Furniture and related products	337	410	26	61	323
Miscellaneous manufacturing	322, 324, 339	19,412	960	2,562	15,890
Nonmanufacturing industries	21–23, 42–81	166,961	8,108	21,195	137,658
Information	51	94,349	3,250	8,979	82,120
Publishing	511	32,770	1,530	3,188	28,053
Telecommunications	517	3,696	253	1,565	1,878
Data processing, hosting, and related services	518	23,306	1,038	2,329	19,939
Other information	other 51	34,576	429	1,897	32,250
Professional, scientific, and technical services	54	44,860	3,482	9,384	31,994
Architectural, engineering, and related services	5413	3,961	273	1,413	2,275
Computer systems design and related services	5415	15,923	1,239	2,684	12,000 i
Scientific research and development services	5417	20,185	1,790	4,704	13,691
Research and development in biotechnology	541711	5,857	773	344	4,740 i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	13,657	613	4,169	8,874
Research and development in the social sciences and humanities	541720	671	403	191 i	77 i
Other professional, scientific, and technical services	other 54	4,791	180	583	4,028
Other nonmanufacturing	21–23, 42–49, 52, 53, 55–81	27,752 i	1,376 i	2,832	23,544 i
All companies (number of domestic employees)	–	441,036	28,980	65,222	346,834
Small companies					
10–19 ^a	–	4,390	372	1,015	3,003
20–49	–	11,252	947	2,543	7,761
Medium companies					
50–99	–	12,321	1,082	2,126	9,113
100–249	–	18,547	1,651	3,552	13,345

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: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Large companies					
250–499	–	19,645	1,216	3,538	14,891
500–999	–	17,657	1,205	2,799	13,653
1,000–4,999	–	68,578	6,749	11,559	50,270
5,000–9,999	–	45,337	2,146	7,860	35,330
10,000–24,999	–	84,420	5,107	13,169	66,145
25,000 or more	–	158,889	8,505	17,061	133,323

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

NAICS = 2012 North American Industry Classification System.

^a Business 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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 13

Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2018

(Millions of U.S. dollars)

State	Total	Paid for by the company	Paid for by others		
			Total	Federal	Nonfederal
All states	441,036	377,806	63,230	24,685	38,545
Alabama	2,236	1,284	952	851	101
Alaska	25 e	20 e	5	1 e	4
Arizona	6,203	4,673	1,530	815	715 i
Arkansas	471	423	48	19	28
California	144,524	129,656	14,868	7,177	7,691
Colorado	5,032	4,286	746	514	232
Connecticut	7,488	6,193	1,295	939	356
Delaware	2,375 i	1,432 i	942 i	9	933 i
District of Columbia	400	278	122	105	17
Florida	6,489	4,498	1,991 i	1,282 i	709 i
Georgia	5,067	4,094	973 i	105 i	868 i
Hawaii	146	89	57	20	37
Idaho	2,556	2,376	180	4 i	177
Illinois	13,182	12,239	943	84	859
Indiana	6,976	6,004	972	110	861
Iowa	3,315	2,556	759	434 - 665	94 - 325
Kansas	2,593	1,645	948	8	940
Kentucky	1,435	1,178	257	199	58
Louisiana	415	359	56	20 i	37
Maine	285	266	19	6	14
Maryland	6,016	4,227	1,789	1,326	463
Massachusetts	27,282	22,581	4,702	665	4,037
Michigan	22,412	20,323	2,089	260	1,829
Minnesota	7,405	7,021	384	138	246
Mississippi	276	250	26	11	15
Missouri	7,171 i	3,976	3,195 i	3,000 i	195 i
Montana	180	157	23	10	13
Nebraska	570	513	57	17	40
Nevada	960	638	322 i	25	296 i
New Hampshire	2,566	992	1,573	1,281	292
New Jersey	20,251	16,843	3,408	186 i	3,222
New Mexico	699	374	325 i	294 i	31 i
New York	17,515	15,370	2,144	860 i	1,285
North Carolina	11,716	7,790	3,926	167	3,760
North Dakota	312	284	28	2	26
Ohio	9,646	6,820	2,825	744 i	2,081
Oklahoma	868	822	47	13	34
Oregon	8,751	8,446	304	79	225
Pennsylvania	12,104	10,633	1,471	141	1,330
Rhode Island	703	663	39	29	10
South Carolina	1,670	1,462	208	68	140
South Dakota	201	179	22	1	21
Tennessee	1,440	1,184	255	52	203
Texas	20,929	18,267	2,662	599 i	2,063
Utah	3,025	2,642	383	194	189
Vermont	300	233	67	19	49
Virginia	5,725	4,092	1,633	1,307	325
Washington	30,305	29,498	807	173 i	634
West Virginia	238 i	209 i	29 i	20	10

TABLE 13

Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2018

(Millions of U.S. dollars)

State	Total	Paid for by the company	Paid for by others		
			Total	Federal	Nonfederal
Wisconsin	5,966	5,334	632	92 i	539
Wyoming	39	34	5	2 i	3
Undistributed ^a	2,584	2,399	186	0 - 186	0 - 186

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.

^a 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. 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018

(Millions of U.S. dollars)

Core-based statistical area	CBSA code	Total		Paid for by the company		Paid for by others	
All locations		441,036		377,806		63,230	
San Jose-Sunnyvale-Santa Clara, CA	41940	67,394		62,670		4,725	
San Francisco-Oakland-Berkeley, CA	41860	40,364		39,010		1,355	
New York-Newark-Jersey City, NY-NJ-PA	35620	29,782		26,436		3,346	
Seattle-Tacoma-Bellevue, WA	42660	29,321		28,605		716	
Boston-Cambridge-Newton, MA-NH	14460	25,458		20,888		4,570	
Detroit-Warren-Dearborn, MI	19820	17,943		16,753		1,190	
Los Angeles-Long Beach-Anaheim, CA	31080	16,565		11,380		5,186	i
San Diego-Chula Vista-Carlsbad, CA	41740	12,445	i	10,400	i	2,046	i
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	37980	11,780		9,483		2,297	
Chicago-Naperville-Elgin, IL-IN-WI	16980	10,678		9,867		812	
Portland-Vancouver-Hillsboro, OR-WA	38900	8,451		8,226		226	
Austin-Round Rock-Georgetown, TX	12420	7,812	i	7,066	i	745	
Dallas-Fort Worth-Arlington, TX	19100	7,180		5,926		1,253	i
Washington-Arlington-Alexandria, DC-VA-MD-WV	47900	7,092		4,799		2,293	
Minneapolis-St. Paul-Bloomington, MN-WI	33460	6,757		6,365		391	
St. Louis, MO-IL	41180	5,918		2,823		3,095	i
Indianapolis-Carmel-Anderson, IN	26900	4,750		3,937		814	
Houston-The Woodlands-Sugar Land, TX	26420	4,540		4,023		516	
Phoenix-Mesa-Chandler, AZ	38060	4,437	i	3,606	i	830	i
Durham-Chapel Hill, NC	20500	4,430		2,498		1,933	
Atlanta-Sandy Springs-Alpharetta, GA	12060	4,172		3,265		906	
Norwich-New London, CT	35980	3,914		2,154 - 3,915		0 - 1,760	
Cincinnati, OH-KY-IN	17140	3,643		2,764		879	
Raleigh-Cary, NC	39580	3,465		2,131		1,334	
Baltimore-Columbia-Towson, MD	12580	2,674		1,929		745	
Kansas City, MO-KS	28140	2,530		1,578		953	
Sacramento-Roseville-Folsom, CA	40900	2,444	i	1,733	i	711	
Boise City, ID	14260	2,393		2,234		159	
Denver-Aurora-Lakewood, CO	19740	2,213		2,045		168	
Oxnard-Thousand Oaks-Ventura, CA	37100	2,195		1,838		357	
Milwaukee-Waukesha, WI	33340	2,170		2,113		57	
Trenton-Princeton, NJ	45940	2,045		1,068		977	
Manchester-Nashua, NH	31700	1,957		555		1,401	
Columbus, OH	18140	1,813		830	i	983	
Madison, WI	31540	1,742		1,317		425	i
Miami-Fort Lauderdale-Pompano Beach, FL	33100	1,642		1,427		215	i
Bridgeport-Stamford-Norwalk, CT	14860	1,632		1,409		223	
Cleveland-Elyria, OH	17460	1,625		1,485		140	
Pittsburgh, PA	38300	1,523		1,420		103	
Salt Lake City, UT	41620	1,516	i	1,319		197	i
Boulder, CO	14500	1,507		1,398		109	
Tampa-St. Petersburg-Clearwater, FL	45300	1,506		988		518	i
Providence-Warwick, RI-MA	39300	1,505		1,451		54	
Huntsville, AL	26620	1,457		575	i	882	
Tucson, AZ	46060	1,425	i	750	i	675	i
Charlotte-Concord-Gastonia, NC-SC	16740	1,361	i	1,307	i	54	i
Worcester, MA-CT	49340	1,172		1,019		153	i
Albany-Schenectady-Troy, NY	10580	1,169		920		249	i
Cedar Rapids, IA	16300	1,080		0 - 1,081		0 - 1,081	

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: 2018

(Millions of U.S. dollars)

Core-based statistical area	CBSA code	Total		Paid for by the company		Paid for by others	
Palm Bay-Melbourne-Titusville, FL	37340	1,065	i	230	i	834	i
New Haven-Milford, CT	35300	1,021		967		54	
Orlando-Kissimmee-Sanford, FL	36740	978	i	708		270	i
Rochester, NY	40380	956		905		51	
Kalamazoo-Portage, MI	28020	947		589		359	
Corning, NY	18500	827	i	826	i	*	e
Peoria, IL	37900	819	i	0 - 820	i	0 - 820	i
Des Moines-West Des Moines, IA	19780	806	i	0 - 807	i	0 - 807	i
Hartford-East Hartford-Middletown, CT	25540	802		751		51	
Santa Maria-Santa Barbara, CA	42200	789		572		217	i
Greensboro-High Point, NC	24660	786	i	712	i	73	i
Provo-Orem, UT	39340	766		699		67	
Ann Arbor, MI	11460	759		557		202	
Grand Rapids-Kentwood, MI	24340	740		564		176	
Richmond, VA	40060	728		700		28	i
Riverside-San Bernardino-Ontario, CA	40140	710		650		60	i
Akron, OH	10420	700		490		210	i
Syracuse, NY	45060	675	i	482		193	i
Buffalo-Cheektowaga, NY	15380	674		501		173	i
Las Vegas-Henderson-Paradise, NV	29820	647		514		132	i
Jacksonville, FL	27260	634		597		37	i
Dayton-Kettering, OH	19430	624		295		329	
Albuquerque, NM	10740	618		314		304	i
Ogden-Clearfield, UT	36260	598	i	493	i	105	i
Columbus, IN	18020	580	i	502	i	79	
San Antonio-New Braunfels, TX	41700	579		505		73	i
Bloomington, IL	14010	577		561		16	i
Wichita, KS	48620	555		547		7	
Charleston-North Charleston, SC	16700	541		407		135	i
Allentown-Bethlehem-Easton, PA-NJ	10900	536		510		26	
Greenville-Anderson, SC	24860	491		460		31	i
Santa Rosa-Petaluma, CA	42220	485	i	469	i	16	i
Virginia Beach-Norfolk-Newport News, VA-NC	47260	471		294		177	
Elizabethtown-Fort Knox, KY	21060	443		443		*	e
Colorado Springs, CO	17820	428	i	349	i	79	
Oshkosh-Neenah, WI	36780	427		425		2	
Winston-Salem, NC	49180	413		356		57	
Fort Collins, CO	22660	411		359		52	
Omaha-Council Bluffs, NE-IA	36540	387		342		45	
Davenport-Moline-Rock Island, IA-IL	19340	385		383		1	e
Niles, MI	35660	375		375		*	e
Memphis, TN-MS-AR	32820	359		341		18	
Burlington, NC	15500	358	i	34	i	324	i
Binghamton, NY	13780	353	i	115	i	238	i
Waterloo-Cedar Falls, IA	47940	348		347		*	e
Pueblo, CO	39380	346		22	i	324	
Oklahoma City, OK	36420	324		294		30	
Bakersfield, CA	12540	301	i	186	i	116	i
Midland, MI	33220	0 - 384		0 - 383		1	i
Savannah, GA	42340	303 - 687		304		0 - 383	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: 2018

(Millions of U.S. dollars)

Core-based statistical area	CBSA code	Total		Paid for by the company		Paid for by others	
Spokane-Spokane Valley, WA	44060	302 - 686	i	303	i	0 - 383	i
All other CBSAs		23,542		20,206		3,336	
Locations outside a CBSA		2,235		1,984		251	i
Undistributed ^a		2,584		2,399		186	

* = 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.

CBSA = core-based statistical area.

^a 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. 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. 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018

(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	441,036	4,951	29,394	39,071	27,283	340,337
Manufacturing industries	31–33	274,075	2,924	14,250	22,603	17,888	216,410
Food	311	4,654	201	558	614	572	2,708 i
Beverage and tobacco products	312	1,113	31	84	67	354	577
Textile, apparel, and leather products	313–16	989	41	211	270	278	190
Wood products	321	203	50	57	97	0	0
Paper	322	934	32	101	148	68	585
Printing and related support activities	323	242	31	97	114	0	0
Petroleum and coal products	324	1,269	19	84	115	127	924
Chemicals	325	84,137	462	2,709	7,739	6,242	66,986
Basic chemicals	3251	2,443	56	385	720	530	751
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,653	0 - 184	143	113	57 - 75	1,138 - 1,326
Pesticide, fertilizer, and other agricultural chemicals	3253	1,460	13	82	66	0	1,301
Pharmaceuticals and medicines	3254	74,592	161	1,691	6,324	5,309	61,106
Soap, cleaning compound, and toilet preparation	3256	2,710	51	190	231	146	2,091
Paint, coating, adhesive, and other chemicals	3255, 3259	1,278	0 - 184	218	284	180 - 202	409 - 598
Plastics and rubber products	326	2,751	195	739	1,016	212	589
Nonmetallic mineral products	327	1,385	53	146	165	75	946
Primary metals	331	839	50	232	218	179	160
Fabricated metal products	332	2,327	349	803	606	311	258
Machinery	333	14,799	378	2,097	1,966	1,406	8,953
Agricultural implement	33311	1,872	40	170	123	302	1,237
Semiconductor machinery	333242	4,166	9	44	203	228	3,683
Engine, turbine, and power transmission equipment	3336	2,483	0 - 120 i	81	174	50 - 170	2,060
Other machinery	other 333	6,278	207 - 331	1,801	1,467	704 - 828	1,973
Computer and electronic products	334	83,697	389	2,656	4,123	3,486	73,043
Communications equipment	3342	13,107	42	385	755	782	11,142
Semiconductor and other electronic components	3344	31,052	82	889	1,557	1,104	27,421
Navigational, measuring, electromedical, and control instruments	3345	16,727	227	1,150	1,268	1,039	13,043
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,208	52	288	421	544	1,903 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	8,843	0 - 64	146	271	50 - 113	8,314

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: 2018

(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 measuring and controlling device	other 3345	4,675	110 - 176	715	576	381 - 446	2,826
Other computer and electronic products	other 334	22,811	38	233	543	560	21,438
Electrical equipment, appliances, and components	335	4,487	171	723	992	704	1,899
Transportation equipment	336	52,629	166	1,462	2,014	2,755	46,233
Motor vehicles, bodies, trailers, and parts	3361–63	25,586	102	825	1,261	1,635	21,763
Aerospace products and parts	3364	24,291	36	417	577	893	22,368
Aircraft, aircraft engine, and aircraft parts	336411–13	22,968	34	326	454	821	21,333
Guided missile, space vehicle, and related parts	336414–15, 336419	1,323	3	90	123	72	1,035
Military armored vehicle, tank, and tank component	336992	11	*	11	0	0	0
Other transportation	other 336	2,741	28	209	175	227	2,102
Furniture and related products	337	410	52	110	247	0	0
Miscellaneous	339	17,209	255	1,382	2,093	1,120	12,360
Medical equipment and supplies	3391	14,531	149	820	1,560	961	11,041
Other miscellaneous manufacturing	3399	2,678	106	561	533	159 i	1,319 i
Nonmanufacturing industries	21–23, 42–81	166,961	2,027	15,144	16,468	9,394	123,927
Mining, quarrying, oil and gas extraction, and support activities	21	1,905	21	221	177	0	1,485
Utilities	22	275	6	59	132	78	0
Wholesale trade	42	906 i	186	595 i	125 i	0	0
Electronic shopping and electronic auctions	454111–12	11,652 i	12	1 - 817	10 - 535	93	10,197 - 11,536 i
Transportation and warehousing	48–49	942	11	82	202	251	396
Information	51	94,349	383	4,387	6,697	5,259	77,623
Publishing	511	32,770	172	1,387	1,944	1,503	27,764
Newspaper, periodical, book, and directory publishers	5111	131	3	31	97 i	0	0
Software publishers	5112	32,639	169	1,356	1,847	1,503	27,764
Telecommunications	517	3,696	24	217	527	172	2,755
Data processing, hosting, and related services	518	23,306	141	2,172	3,653	3,261	14,080
Other information	other 51	34,576	47	611	573	323	33,024
Finance and insurance	52	7,471	44	264	807	347	6,010
Real estate and rental and leasing	53	1,022	6	27	112	0	877
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	*	6	0	0	0
Other real estate and rental and leasing	other 53	1,016	6	22	112	0	877
Professional, scientific, and technical services	54	44,860	1,226	8,448	7,166	2,879	25,141

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: 2018

(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
Architectural, engineering, and related services	5413	3,961	280	1,463	855	372	990
Computer systems design and related services	5415	15,923	485	3,299	2,025	570	9,545
Scientific research and development services	5417	20,185	315 i	2,486	2,703	1,578	13,102
Research and development in biotechnology	541711	5,857	6 - 30	512	235 - 551	142	4,621 - 4,939
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	13,657	286 i	1,951	2,143	1,436	7,841
Research and development in the social sciences and humanities	541720	671	0 - 23	23	10 - 325	0	323 - 639
Other professional, scientific, and technical services	other 54	4,791	146	1,199	1,583	358	1,505
Health care services	621–23	1,476	44	205	503 i	345 i	379 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,103	88	43 - 860	15 - 541	142 i	476 - 1,815
All companies (number of domestic employees)	–	441,036	4,951	29,394	39,071	27,283	340,337
Small companies							
10–19 ^a	–	4,390	996	2,743	408	0	243
20–49	–	11,252	1,557	7,162	2,267	113	151 i
Medium companies							
50–99	–	12,321	856	5,386	5,064	719	296
100–249	–	18,547	1,093	6,148	7,184	3,297	826
Large companies							
250–499	–	19,645	254	3,565	6,213	4,399	5,215
500–999	–	17,657	115	2,184	4,939	4,370	6,049
1,000–4,999	–	68,578	71	1,799	9,003	9,585	48,120
5,000–9,999	–	45,337	3	208	2,266	2,187	40,672
10,000–24,999	–	84,420	6	108	1,117	2,046	81,144
25,000 or more	–	158,889	0	91	610	566	157,621

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 16

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2018

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	Total	Paid for by the company	Paid for by others
All business activities	21100–81000	441,036	377,806	63,230
Oil and gas extraction	21100	770	674	96
Mining	21200	92	92	*
Support activities for mining, including oil and gas	21300	836	810	26
Utilities	22100	272	221	51
Construction	23000	659	624	35
Food manufacturing	31100	4,737	4,525	212
Beverage manufacturing	31210	702	598	103
Tobacco manufacturing	31220	196	191	5
Textile, apparel, and leather products manufacturing	31990	918	914	4
Wood products manufacturing	32100	261	257	4
Paper manufacturing	32200	1,303	1,298	4
Printing and related support activities	32300	321	318	3
Petroleum refineries	32401	491	473	18
Asphalt paving, roofing, and saturated materials manufacturing	32402	107	107	0
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	133	128	5
Basic chemicals manufacturing	32510	2,945	2,759	186
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,264	1,174	90
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	2,384	2,038	347
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	48,462	40,982	7,480
In vitro diagnostic substances manufacturing	32542	1,151	1,098	52
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	23,411	21,262	2,149
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,524	2,358	166
Paint, adhesive, and other chemical manufacturing	32592	1,363	1,332	31
Plastics and rubber products manufacturing	32600	3,136	3,053	84
Clay and glass products manufacturing	32710	1,333	1,325	8
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	331	312	19
Primary metal manufacturing	33100	707	680	27
Fabricated metal products manufacturing	33200	2,468 - 3,872	2,469	0 - 1,402
Agricultural machinery and equipment manufacturing	33311	1,529	1,520	9
Construction machinery manufacturing	33312	1,316	1,313	3
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,324	1,248	75
Semiconductor machinery manufacturing	33321	4,131	3,589	542
Industrial machinery manufacturing (except semiconductor machinery)	33322	976	869	106
Photographic and photocopying equipment manufacturing	33331	50	43	7
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	1,665	1,577	87
Digital cameras manufacturing	33333	230	230	0
Engine, turbine, and power transmission equipment manufacturing	33360	2,275	1,933	342
Metalworking and other general purpose machinery manufacturing	33390	2,481	2,371	109
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	21,768	21,615	152
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	8,550	8,540	10
Radio, television, and wireless communication equipment manufacturing	33422	3,218	1,885	1,333
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	1,749	1,502	247
Audio and video equipment manufacturing	33430	1,084	1,070	14
Semiconductor and other electronic components manufacturing	33440	30,982	28,636	2,345

TABLE 16

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2018

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	Total	Paid for by the company	Paid for by others
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	4,087	3,935	152
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	7,714	2,852	4,862
Measuring and control instruments manufacturing (not listed elsewhere)	33459	3,892	3,679	213
Electrical equipment, appliances, and components manufacturing	33500	4,362	4,103	259
Motor vehicles manufacturing	33610	17,587	16,197	1,390
Motor vehicle body and trailer manufacturing	33620	94	93	*
Motor vehicle parts manufacturing	33630	7,777	6,729	1,048
Aircraft manufacturing	33641	14,483	6,326	8,156
Aircraft engine and engine parts manufacturing	33642	2,227	1,370	858
Other aircraft parts and auxiliary equipment manufacturing	33643	1,881	1,510	372
Guided missiles, space vehicles, and related parts manufacturing	33644	3,405	985	2,420
Railroad rolling stock manufacturing	33651	148	148	* i
Ship and boat building	33660	135 - 1,539	136	0 - 1,402
Motorcycle, bicycle, and parts manufacturing	33691	372	359	14
Military armored vehicle, tank, and tank components manufacturing	33692	664	344	320
All other transportation equipment manufacturing	33699	465	458	7
Furniture and related products manufacturing	33700	429	419	10
Medical equipment and supplies manufacturing	33910	13,182	12,948	235
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,854	2,713	140
Merchant wholesalers, durable goods	42300	785	764	21
Merchant wholesalers, nondurable goods	42400	272	260	12
Wholesale electronic markets and agents and brokers (business to business)	42500	94	86	8
Retail trade (except electronic shopping and electronic auctions)	44000	191	191	0
Electronic shopping and electronic auctions	45411	93 - 9,629	0 - 9,535	94
Transportation	48000	438	433	4
Couriers, messengers, and express delivery services	49200	447	447	0
Warehousing and storage	49300	76	72	4
Newspaper, periodical, book, and directory publishers (except Internet)	51110	151	151	*
Software publishers (except Internet)	51120	25,785	25,212	573
Motion picture and sound recording (except Internet)	51200	148	148	0
Broadcasting (except Internet)	51500	186	183	3
Wired telecommunications carriers	51710	469	464	5
Wireless telecommunications carriers (except satellite)	51720	2,147	2,110	38
Satellite telecommunications	51740	449	440	9
Other telecommunications (not listed elsewhere)	51790	687	630	56
Data processing, hosting, and related services	51800	6,817	6,668	150
Cloud computing applications and Internet-based software services	51801	20,427	20,203	224
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	37,393	37,274	119
Finance: banking and credit intermediation	52200	4,309	4,264	45
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,248	1,248	0
Insurance carriers and related activities	52400	1,720	1,720	0
Real estate	53100	377	377	0
Rental and leasing services	53200	640	640	*
Lessors of nonfinancial intangible assets, including patent licensing	53300	23	23	*
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	1,159	1,158	2

TABLE 16

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2018

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	Total	Paid for by the company	Paid for by others
Architectural, engineering, and related services	54130	4,256	2,413	1,843
Specialized design services	54140	276	191 i	85
Computer systems design and related services	54150	15,681	13,554	2,127
Management, scientific, and technical consulting services	54160	2,778	2,326	452
Research and development services in social sciences and humanities	54172	674	27	647
Research and development services in biotechnology	54173	5,391	944	4,447
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	14,852	2,052	12,800
Advertising and related services	54180	1,035 i	1,032 i	3
Professional, scientific, and technical services (not listed elsewhere)	54190	1,162	722	440
Management of companies and enterprises	55100	3 - 9,539	0 - 9,535	4
Administrative and support services	56100	2,305	2,292	14
Waste management and remediation services	56200	20	0 - 21	0 - 21
Offices of physicians	62110	156	112	44
Medical and diagnostic laboratories	62150	2,050	1,500 i	549
Other ambulatory health care services (ambulance, dental, home health care)	62199	46	45	1
Hospitals and nursing care facilities	62200	0 - 10,879	0 - 9,535	0 - 1,402 i
Social assistance services	62400	0 - 14	0 - 14	0
Arts, entertainment, and recreation	71000	44	44	0
Accommodation and food services	72000	120	120	0
Other services (not listed elsewhere)	81000	458 - 1,862	459	0 - 1,402
Undistributed	-	0	0	0

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

^a 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.

^b 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
All industries	21–23, 31–33, 42–81	441,036	4.1	4.3
Manufacturing industries	31–33	274,075	4.6	4.7
Food	311	4,654	0.9	0.9
Beverage and tobacco products	312	1,113	0.7	0.7
Textile, apparel, and leather products	313–16	989	1.4	1.4
Wood products	321	203	0.7	0.7
Paper	322	934	1.0	1.0
Printing and related support activities	323	242	0.8	0.8
Petroleum and coal products	324	1,269	0.3	0.3
Chemicals	325	84,137	7.2	7.3
Basic chemicals	3251	2,443	1.4	1.4
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,653	2.6	2.6
Pesticide, fertilizer, and other agricultural chemicals	3253	1,460	1.5	1.5
Pharmaceuticals and medicines	3254	74,592	11.4	11.6
Soap, cleaning compound, and toilet preparation	3256	2,710	2.4	2.4
Paint, coating, adhesive, and other chemicals	3255, 3259	1,278	2.0	2.0
Plastics and rubber products	326	2,751	1.6	1.6
Nonmetallic mineral products	327	1,385	2.4	3.4
Primary metals	331	839	0.6	0.6
Fabricated metal products	332	2,327	1.8	1.8
Machinery	333	14,799	4.0	4.0
Agricultural implement	33311	1,872	4.2	4.2
Semiconductor machinery	333242	4,166	19.2	19.2
Engine, turbine, and power transmission equipment	3336	2,483	4.8	4.8
Other machinery	other 333	6,278	2.5	2.5
Computer and electronic products	334	83,697	10.2	10.2
Communications equipment	3342	13,107	15.5	15.5
Semiconductor and other electronic components	3344	31,052	10.3	10.3
Navigational, measuring, electromedical, and control instruments	3345	16,727	9.3	9.3
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,208	11.5	11.5
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	8,843	11.2	11.2
Other measuring and controlling device	other 3345	4,675	6.4	6.4

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: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
Other computer and electronic products	other 334	22,811	9.0	9.0
Electrical equipment, appliances, and components	335	4,487	3.4	3.4
Transportation equipment	336	52,629	4.0	4.2
Motor vehicles, bodies, trailers, and parts	3361-63	25,586	2.9	3.2
Aerospace products and parts	3364	24,291	6.6	6.6
Aircraft, aircraft engine, and aircraft parts	336411-13	22,968	6.5	6.5
Guided missile, space vehicle, and related parts	336414-15, 336419	1,323	7.7	7.7
Military armored vehicle, tank, and tank component	336992	11	2.8	2.8
Other transportation	other 336	2,741	4.0	4.0
Furniture and related products	337	410	1.0	1.0
Miscellaneous	339	17,209	5.7	5.7
Medical equipment and supplies	3391	14,531	7.1	7.1
Other miscellaneous manufacturing	3399	2,678	2.8	2.8
Nonmanufacturing industries	21-23, 42-81	166,961	3.5	3.9
Mining, quarrying, oil and gas extraction, and support activities	21	1,905	1.0	1.0
Utilities	22	275	0.1	0.1
Wholesale trade	42	906	0.6	0.6
Electronic shopping and electronic auctions	454111-12	11,652	6.5	6.6
Transportation and warehousing	48-49	942	0.4	0.4
Information	51	94,349	7.2	7.3
Publishing	511	32,770	14.6	14.7
Newspaper, periodical, book, and directory publishers	5111	131	3.5	3.5
Software publishers	5112	32,639	14.8	14.8
Telecommunications	517	3,696	0.8	0.8
Data processing, hosting, and related services	518	23,306	6.6	6.6
Other information	other 51	34,576	13.8	14.4
Finance and insurance	52	7,471	0.8	0.8
Real estate and rental and leasing	53	1,022	16.6	16.6
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	2.5	2.5
Other real estate and rental and leasing	other 53	1,016	17.2	17.2
Professional, scientific, and technical services	54	44,860	10.6	10.6
Architectural, engineering, and related services	5413	3,961	3.9	3.9

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: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
Computer systems design and related services	5415	15,923	10.2	10.2
Scientific research and development services	5417	20,185	28.1	28.1
Research and development in biotechnology	541711	5,857	20.7	20.8
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	13,657	32.0	32.0
Research and development in the social sciences and humanities	541720	671	72.0	73.2
Other professional, scientific, and technical services	other 54	4,791	5.1	5.1
Health care services	621–23	1,476	1.5	1.5
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,103	0.2	0.4
All companies (number of domestic employees)	–	441,036	4.1	4.3
Small companies				
10–19 ^c	–	4,390	21.6	22.6
20–49	–	11,252	16.1	16.6
Medium companies				
50–99	–	12,321	9.7	10.0
100–249	–	18,547	6.2	6.2
Large companies				
250–499	–	19,645	7.0	7.1
500–999	–	17,657	4.3	4.5
1,000–4,999	–	68,578	4.7	4.8
5,000–9,999	–	45,337	4.5	4.7
10,000–24,999	–	84,420	3.7	3.8
25,000 or more	–	158,889	3.3	3.7

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

NAICS = 2012 North American Industry Classification System.

^a 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.^b 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.^c Business 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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018

(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 ^a	Percent of domestic sales of R&D performers only ^b
All industries	21–23, 31–33, 42–81	493,583	4.6	4.9
Manufacturing industries	31–33	321,395	5.4	5.5
Food	311	4,888	0.9	0.9
Beverage and tobacco products	312	1,347	0.9	0.9
Textile, apparel, and leather products	313–16	1,008	1.4	1.4
Wood products	321	216	0.7	0.8
Paper	322	949	1.1	1.1
Printing and related support activities	323	244	0.8	0.8
Petroleum and coal products	324	1,499	0.4	0.4
Chemicals	325	119,689	10.3	10.3
Basic chemicals	3251	2,515	1.4	1.4
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,659 - 1,750	D	D
Pesticide, fertilizer, and other agricultural chemicals	3253	1,560 - 1,567	D	1.6
Pharmaceuticals and medicines	3254	109,573	16.8	17.0
Soap, cleaning compound, and toilet preparation	3256	2,980 - 3,060	D	D
Paint, coating, adhesive, and other chemicals	3255, 3259	1,311 - 1,402	D	D
Plastics and rubber products	326	2,866	1.7	1.7
Nonmetallic mineral products	327	1,400	2.5	3.4
Primary metals	331	877	0.7	0.7
Fabricated metal products	332	2,413	1.8	1.8
Machinery	333	15,282	4.1	4.1
Agricultural implement	33311	2,060	4.6	4.6
Semiconductor machinery	333242	4,209	19.3	19.3
Engine, turbine, and power transmission equipment	3336	2,532 - 2,554	D	D
Other machinery	other 333	6,460 - 6,482	D	D
Computer and electronic products	334	85,911	10.5	10.5
Communications equipment	3342	13,951	16.5	16.5
Semiconductor and other electronic components	3344	31,450	10.4	10.4
Navigational, measuring, electromedical, and control instruments	3345	17,428	9.7	9.7
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,288	11.8	11.8
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,347 - 9,358	D	D

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: 2018

(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 ^a	Percent of domestic sales of R&D performers only ^b
Other measuring and controlling device	other 3345	4,782 - 4,792	D	D
Other computer and electronic products	other 334	23,082	9.1	9.1
Electrical equipment, appliances, and components	335	4,645	3.5	3.5
Transportation equipment	336	59,478	4.5	4.7
Motor vehicles, bodies, trailers, and parts	3361-63	28,347 - 28,372	D	D
Aerospace products and parts	3364	28,300	7.7	7.7
Aircraft, aircraft engine, and aircraft parts	336411-13	26,845	7.6	7.6
Guided missile, space vehicle, and related parts	336414-15, 336419	1,455	8.5	8.5
Military armored vehicle, tank, and tank component	336992	11	2.8	2.8
Other transportation	other 336	2,795 - 2,820	D	D
Furniture and related products	337	428 - 430	D	1.0
Miscellaneous	339	18,252 - 18,257	D	6.1
Medical equipment and supplies	3391	15,397	7.5	7.5
Other miscellaneous manufacturing	3399	2,855 - 2,859	D	3.0
Nonmanufacturing industries	21-23, 42-81	172,187	3.6	4.0
Mining, quarrying, oil and gas extraction, and support activities	21	2,046	1.0	1.1
Utilities	22	498	0.1	0.2
Wholesale trade	42	945	0.6	0.6
Electronic shopping and electronic auctions	454111-12	11,651 - 11,783	D	D
Transportation and warehousing	48-49	973	0.4	0.4
Information	51	96,490	7.4	7.4
Publishing	511	33,954	15.1	15.2
Newspaper, periodical, book, and directory publishers	5111	137	3.6	3.6
Software publishers	5112	33,817	15.3	15.4
Telecommunications	517	4,049	0.8	0.8
Data processing, hosting, and related services	518	23,515	6.6	6.6
Other information	other 51	34,972	13.9	14.5
Finance and insurance	52	7,819	0.8	0.8
Real estate and rental and leasing	53	1,022	16.6	16.6
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	2.5	2.5
Other real estate and rental and leasing	other 53	1,016	17.2	17.2

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: 2018

(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 ^a	Percent of domestic sales of R&D performers only ^b
Professional, scientific, and technical services	54	46,881	11.0	11.1
Architectural, engineering, and related services	5413	4,380	4.3	4.3
Computer systems design and related services	5415	16,063	10.3	10.3
Scientific research and development services	5417	21,472	29.9	29.9
Research and development in biotechnology	541711	5,927 - 6,078	D	D
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	14,724	34.5	34.5
Research and development in the social sciences and humanities	541720	670 - 822	D	D
Other professional, scientific, and technical services	other 54	4,966	5.2	5.3
Health care services	621-23	1,605	1.6	1.6
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,129 - 2,261	D	D
All companies (number of domestic employees)	-	493,583	4.6	4.9
Small companies				
10-19 ^c	-	4,918	24.2	25.1
20-49	-	13,210	18.9	19.1
Medium companies				
50-99	-	14,332	11.3	11.5
100-249	-	21,271	7.1	7.1
Large companies				
250-499	-	22,629	8.1	8.2
500-999	-	19,134	4.7	4.8
1,000-4,999	-	75,752	5.2	5.3
5,000-9,999	-	51,991	5.2	5.4
10,000-24,999	-	100,924	4.5	4.5
25,000 or more	-	169,423	3.5	3.9

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.

^a 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.

^b 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.

^c Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Software products and embedded software R&D									
				Total		Paid for by company				Paid for by others			
										Total		Federally funded	
		Companies ^a (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount
All industries	21–23, 31–33, 42–81	26,313	441,036	11,034	i 165,576	10,185	i 155,935	1,372	i 9,641	790	i 5,365		
Manufacturing industries	31–33	15,205	274,075	4,004	i 40,507	3,878	i 35,634	324	i 4,873	68		3,383	
Food	311	808	4,654	63	i 53	62	i 48	D	4	0		0	
Chemicals	325	2,713	84,137	195	i 498	187	i 445	16	53	8		11	
Basic chemicals	3251	328	2,443	10	i 18	9	i 17	D	1	0		0	
Pharmaceuticals and medicines	3254	1,334	74,592	99	315	93	285	12	29	D		11	
Other chemicals	other 325	1,052	7,102	86	i 165	85	i 143	D	23	D		*	
Plastics and rubber products	326	912	2,751	159	i 163	159	i 163	0	0	0		0	
Nonmetallic mineral products	327	228	1,385	50	i 83	50	i 83	0	0	0		0	
Fabricated metal products	332	1,485	2,327	225	i 146	225	i 146	0	0	0		0	
Machinery	333	2,072	14,799	827	i 1,620	810	i 1,562	35	58	D		0 - 20	
Agricultural implement	33311	238	1,872	108	i 336	D	325 - 337	D	0 - 11	D		0 - 3	
Semiconductor machinery	333242	47	4,166	26	i 274	D	215 - 275	D	0 - 59	0		0	
Engine, turbine, and power transmission equipment	3336	71	2,483	23	i 248	D	199 - 249	D	0 - 49	D		0 - 20	
Other machinery	other 333	1,718	6,278	669	i 761	D	702 - 762	D	0 - 59	0		0	
Computer and electronic products	334	2,340	83,697	1,394	i 30,187	1,334	i 26,759	159	i 3,429	44		2,602	
Semiconductor and other electronic components	3344	648	31,052	185	i 7,523	167	i 7,352	42	i 170	D		22	
Other electronic products	other 334	1,692	52,645	1,210	i 22,665	1,167	i 19,406	117	i 3,258	D		2,580	
Electrical equipment, appliances, and components	335	761	4,487	290	i 633	286	i 613	17	i 20	D		0 - 20	
Transportation equipment	336	1,105	52,629	234	i 4,629	208	i 3,480	57	1,149	i 11		752	i
Motor vehicles, bodies, trailers, and parts	3361–63	661	25,586	123	i 1,920	100	i 1,635	46	i 284	4		2	
Other transportation	other 336	445	27,044	110	2,710	108	1,844	11	865	i 6		749	i
Miscellaneous	339	1,251	17,209	329	i 2,263	318	i 2,103	D	160	i 0		0	
Other manufacturing	312–16, 321–24, 331, 337	1,546	5,999	239	i 232	239	i 232	0	0	0		0	
Nonmanufacturing industries	21–23, 42–81	11,116	166,961	7,030	i 125,069	6,307	i 120,301	1,048	i 4,768	722	i 1,982		
Mining, quarrying, oil and gas extraction, and support activities	21	153	1,905	75	i 563	71	i 534	5	29	0		0	

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: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code			Software products and embedded software R&D																
								Paid for by others												
		Domestic R&D		Total		Paid for by company		Total		Federally funded										
		Companies ^a (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount									
Utilities	22	61	275	26	i	40	26	i	40	0		0	0		0					
Wholesale trade	42	778	906	i	143	i	117	i	142	i	113	i	D	3	0	0				
Information	51	2,660	94,349		2,383		86,457		2,354		85,856		69	i	601	7	15			
Publishing	511	987	32,770		886	i	29,175		865	i	28,887		46	i	288	D	11			
Telecommunications	517	183	3,696		116		2,906		D		2,849 - 2,894		D		12 - 57	0	0			
Data processing, hosting, and related services	518	1,201	23,306		1,143		21,045		1,138		20,863		17		182	i	D	3		
Other information	other 51	290	34,576		238		33,330	i	D		33,212 - 33,258	i	D		73 - 117	0	0			
Professional, scientific, and technical services	54	6,224	44,860		3,968	i	16,590		3,280	i	12,552		967	i	4,038	715	i	1,967		
Architectural, engineering, and related services	5413	1,283	3,961		488	i	747	i	356	i	332		196	i	415	i	134	i	259	i
Scientific research and development services	5417	1,469	20,185		668	i	1,956		268	i	347		488	i	1,609	400	i	1,308		
Research and development in biotechnology	541711	272	5,857		39	i	25	i	38	i	21	i	5		3	D		1		
Other scientific research and development	other 5417	1,197	14,327		628	i	1,932		230	i	326		483	i	1,606	D		1,308		
Other professional, scientific, and technical services	other 54	3,472	20,714		2,813	i	13,887		2,656	i	11,873		283	i	2,014	181	i	400		
Health care services	621–23	229	1,476		22	i	118	i	20	i	118	i	D		*	0		0		
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	1,015	23,191	i	414	i	21,184	i	414	i	21,087	i	D		96	0		0		
All companies (number of domestic employees)	–	26,313	441,036		11,034	i	165,576		10,185	i	155,935		1,372	i	9,641	790	i	5,365		
Small companies																				
10–19 ^c	–	4,294	4,390		2,128	i	1,496		1,898	i	1,335		367	i	161	230	i	101		
20–49	–	7,386	11,252		3,316	i	3,946		3,091	i	3,538		358	i	408	219	i	252		
Medium companies																				
50–99	–	4,591	12,321		1,850	i	3,677		1,776	i	3,238		138	i	439	60		235		
100–249	–	5,004	18,547		1,797	i	5,690		1,569	i	4,599		292	i	1,091	192	i	539		

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: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Software products and embedded software R&D													
				Total				Paid for by company				Paid for by others					
		Total										Federally funded					
		Companies ^a (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount						
Large companies																	
250–499	–	2,060	19,645	722	5,982	682	5,356	76	i	626	33	i	246	i			
500–999	–	1,152	17,657	429	5,730	407	5,387	38		343	11	i	13				
1,000–4,999	–	1,263	68,578	523	27,408	507	26,234	46		1,175	15		485				
5,000–9,999	–	241	45,337	114	13,619	108	13,405	21		214	7		63				
10,000–24,999	–	207	84,420	98	27,794	94	25,535	21		2,260	11	i	812	i			
25,000 or more	–	114	158,889	57	70,233	i	55	67,310	i	14	2,923	10		2,619			

* = 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.

NAICS = 2012 North American Industry Classification System.

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

^b Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse. These company count estimates 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. 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.

^c Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

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: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D							
		Companies ^a (number)	Amount	Total		Paid for by company		Paid for by others		Companies ^b (number)	Amount
				Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount		
All industries	21–23, 31–33, 42–81	26,313	441,036	2,470	i 62,862	2,129	i 48,915	650	i 13,947	i	
Manufacturing industries	31–33	15,205	274,075	1,733	i 53,272	1,644	i 46,842	293	i 6,430	i	
Food	311	808	4,654	160	i 1,007	i 142	i 983	i 25	i 24		
Chemicals	325	2,713	84,137	1,058	i 47,526	1,021	i 41,590	200	i 5,936	i	
Basic chemicals	3251	328	2,443	73	i 384	72	i 272	5	i 112		
Pharmaceuticals and medicines	3254	1,334	74,592	915	i 46,023	882	i 40,328	192	i 5,695	i	
Other chemicals	other 325	1,052	7,102	70	i 1,119	i 67	i 990	i 3	i 129		
Plastics and rubber products	326	912	2,751	57	i 48	57	i 48	0	i 0		
Nonmetallic mineral products	327	228	1,385	D	1	D	1	0	i 0		
Fabricated metal products	332	1,485	2,327	D	7	D	7	0	i 0		
Machinery	333	2,072	14,799	24	10	22	8	4	i 2	i	
Agricultural implement	33311	238	1,872	0	0	0	0	0	i 0		
Semiconductor machinery	333242	47	4,166	0	0	0	0	0	i 0		
Engine, turbine, and power transmission equipment	3336	71	2,483	D	2	D	2	0	i 0		
Other machinery	other 333	1,718	6,278	D	8	D	5	4	i 2	i	
Computer and electronic products	334	2,340	83,697	208	i 2,319	i 195	i 1,926	i 27	i 393	i	
Semiconductor and other electronic components	3344	648	31,052	7	21	7	21	0	i 0		
Other electronic products	other 334	1,692	52,645	201	i 2,298	i 188	i 1,905	i 27	i 393	i	
Electrical equipment, appliances, and components	335	761	4,487	7	5	6	5	D	i *		
Transportation equipment	336	1,105	52,629	8	35	8	35	0	i 0		
Motor vehicles, bodies, trailers, and parts	3361–63	661	25,586	D	*	D	*	0	i 0		
Other transportation	other 336	445	27,044	D	35	D	35	0	i 0		
Miscellaneous	339	1,251	17,209	176	i 2,147	160	i 2,085	33	i 62		
Other manufacturing	312–16, 321–24, 331, 337	1,546	5,999	31	166	30	153	D	i 13		
Nonmanufacturing industries	21–23, 42–81	11,116	166,961	737	i 9,590	485	i 2,073	357	i 7,517		
Mining, quarrying, oil and gas extraction, and support activities	21	153	1,905	4	11	4	10	D	i 1		
Utilities	22	61	275	0	0	0	0	0	i 0		
Wholesale trade	42	778	906	D	1	D	1	0	i 0		
Information	51	2,660	94,349	23	77	23	75	D	i 2		
Publishing	511	987	32,770	12	59	12	57	D	i 2		
Telecommunications	517	183	3,696	0	0	0	0	0	i 0		
Data processing, hosting, and related services	518	1,201	23,306	D	14	D	14	0	i 0		

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: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D									
		Companies ^a (number)	Amount	Total		Paid for by company		Paid for by others					
				Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount				
Other information	other 51	290	34,576	D	4	D	4	0	0				
Professional, scientific, and technical services	54	6,224	44,860	646	i	8,624	394	i	1,110	D	7,514		
Architectural, engineering, and related services	5413	1,283	3,961	112	i	192	27	i	41	90	i	151	i
Scientific research and development services	5417	1,469	20,185	489	i	8,272	335	i	960	250	i	7,312	
Research and development in biotechnology	541711	272	5,857	243	i	3,750	179	i	664	130	i	3,086	
Other scientific research and development	other 5417	1,197	14,327	246	i	4,522	156	i	296	120	i	4,226	i
Other professional, scientific, and technical services	other 54	3,472	20,714	45	i	160	33	i	110	D	51	i	
Health care services	621–23	229	1,476	51	i	852	51	i	852	0	0		
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	1,015	23,191	i	D	26	D	26	0	0			
All companies (number of domestic employees)	–	26,313	441,036	2,470	i	62,862	2,129	i	48,915	650	i	13,947	i
Small companies													
10–19 ^c	–	4,294	4,390	582	i	987	480	i	737	183	i	250	
20–49	–	7,386	11,252	699	i	2,803	600	i	2,445	185	i	358	
Medium companies													
50–99	–	4,591	12,321	311	i	3,508	281		2,932	79		576	
100–249	–	5,004	18,547	444	i	4,155	389	i	3,457	86	i	697	
Large companies													
250–499	–	2,060	19,645	170		5,313	144		4,783	48	i	530	
500–999	–	1,152	17,657	74	i	3,263	63		2,803	18	i	460	i
1,000–4,999	–	1,263	68,578	100		9,005	94		6,477	23	i	2,527	i
5,000–9,999	–	241	45,337	32		8,580	26		4,701	11		3,880	i
10,000–24,999	–	207	84,420	43		21,542	37		17,950	15		3,592	i
25,000 or more	–	114	158,889	16		3,706	16		2,628	4		1,078	

* = 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.

NAICS = 2012 North American Industry Classification System.

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

^b Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse. These company count estimates 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. 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.

^c Business 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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

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:
2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Nanotechnology R&D												
		Companies ^a (number)	Amount	Total		Paid for by company				Paid for by others						
				Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount					
All industries	21–23, 31–33, 42–81	26,313	441,036	957	i	16,799	i	842	i	14,820	i	184	i	1,979	i	
Manufacturing industries	31–33	15,205	274,075	772	i	14,783	i	709	i	13,169	i	111	i	1,614	i	
Food	311	808	4,654	D		1		D		1		0		0		
Chemicals	325	2,713	84,137	203	i	607		199	i	540		17		68		
Basic chemicals	3251	328	2,443	68	i	108		66	i	99		4	i	9	i	
Pharmaceuticals and medicines	3254	1,334	74,592	55	i	401		54		353		9		48		
Other chemicals	other 325	1,052	7,102	80	i	98		79	i	88		3		10		
Plastics and rubber products	326	912	2,751	76	i	71		75	i	67	i	D		4		
Nonmetallic mineral products	327	228	1,385	36	i	78	i	36	i	73	i	D		5		
Fabricated metal products	332	1,485	2,327	10		20		10		19		D		*	i	
Machinery	333	2,072	14,799	34	i	1,028	i	28		969		7	i	59	i	
Agricultural implement	33311	238	1,872	0		0		0		0		0		0		
Semiconductor machinery	333242	47	4,166	D		970		D		910 - 970		D		0 - 60		
Engine, turbine, and power transmission equipment	3336	71	2,483	D		*		D		*		0		0		
Other machinery	other 333	1,718	6,278	20		58	i	D		0 - 59		D		0 - 59	i	
Computer and electronic products	334	2,340	83,697	267	i	12,545	i	221	i	11,079	i	76	i	1,466	i	
Semiconductor and other electronic components	3344	648	31,052	114	i	12,330	i	82	i	10,880	i	47	i	1,450	i	
Other electronic products	other 334	1,692	52,645	154	i	214	i	139	i	198	i	29	i	16	i	
Electrical equipment, appliances, and components	335	761	4,487	42	i	59	i	42	i	59	i	0		0		
Transportation equipment	336	1,105	52,629	7		33	i	6		29	i	D		4		
Motor vehicles, bodies, trailers, and parts	3361–63	661	25,586	D		5		D		1		D		4		
Other transportation	other 336	445	27,044	D		28	i	D		28	i	0		0		
Miscellaneous	339	1,251	17,209	66	i	308	i	62	i	300		D		8	i	
Other manufacturing	312–16, 321–24, 331, 337	1,546	5,999	D		34		D		33		D		*		
Nonmanufacturing industries	21–23, 42–81	11,116	166,961	185	i	2,016	i	133	i	1,651	i	73	i	365	i	
Mining, quarrying, oil and gas extraction, and support activities	21	153	1,905	D		36		D		36		D		*		
Utilities	22	61	275	0		0		0		0		0		0		
Wholesale trade	42	778	906	i	17	i	6	i	17	i	6	i	0		0	
Information	51	2,660	94,349	11		1,095	i	11		1,093	i	D		2		
Publishing	511	987	32,770	D		1,090	i	D		1,088	i	D		2		
Telecommunications	517	183	3,696	0		0		0		0		0		0		

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: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Nanotechnology R&D											
		Companies ^a (number)	Amount	Total		Paid for by company				Paid for by others					
				Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount						
Data processing, hosting, and related services	518	1,201	23,306	D	5	D	5	0	0						
Other information	other 51	290	34,576	0	0	0	0	0	0						
Professional, scientific, and technical services	54	6,224	44,860	149	i	878	i	97	i	515	D	362	i		
Architectural, engineering, and related services	5413	1,283	3,961	17	i	187	i	15	i	23	i	D	164	i	
Scientific research and development services	5417	1,469	20,185	106	i	214	i	68	i	112	51	103	i		
Research and development in biotechnology	541711	272	5,857	28	i	38	i	19	i	21	9	i	16	i	
Other scientific research and development	other 5417	1,197	14,327	78	i	177	i	49	i	90	42	86	i		
Other professional, scientific, and technical services	other 54	3,472	20,714	27	i	477	15	i	381	D	96	i			
Health care services	621–23	229	1,476	0	0	0	0	0	0						
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	1,015	23,191	i	D	1	D	1	0	0					
All companies (number of domestic employees)	–	26,313	441,036	957	i	16,799	i	842	i	14,820	i	184	i	1,979	i
Small companies															
10–19 ^c	–	4,294	4,390	182	i	138	i	150	i	118	i	48	i	20	i
20–49	–	7,386	11,252	292	i	354	i	262	i	271	i	43	i	83	i
Medium companies															
50–99	–	4,591	12,321	137	i	330	i	119	i	243	i	28	87	i	
100–249	–	5,004	18,547	132	i	463	116	i	276	25	i	187	i		
Large companies															
250–499	–	2,060	19,645	75	732	66	514	15	217						
500–999	–	1,152	17,657	40	581	i	35	311	i	8	269	i			
1,000–4,999	–	1,263	68,578	57	3,517	54	2,734	7	i	783	i				
5,000–9,999	–	241	45,337	16	3,787	15	3,566	5	220						
10,000–24,999	–	207	84,420	13	2,020	i	13	1,966	i	D	53	i			
25,000 or more	–	114	158,889	12	4,877	i	12	4,819	i	D	58	i			

* = 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.

NAICS = 2012 North American Industry Classification System.

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

^b Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse. These company count estimates 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. 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.

^c Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 22

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2018

(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 company	Paid for by others	Total	Paid for by company	Paid for by others	Total	Paid for by company	Paid for by others
All industries	21-23, 31-33, 42-81	100,376	90,429	9,947	19,788	17,520	2,268	80,589	72,909	7,680
Manufacturing industries	31-33	64,878	63,400	1,478	13,594	13,291	303	51,284	50,109	1,175
Food	311	864	862	3	181	181	*	683	681	3 i
Beverage and tobacco products	312	516	516	0	186	186	0	330	330	0
Textile, apparel, and leather products	313-16	216	216	* i	32	32	0	184	184	* i
Wood products	321	3	3	0	1	1	0	1	1	0
Paper	322	80	80	* i	11	11	* i	69	69	* i
Printing and related support activities	323	4	4	0	* i	* i	0	4	4	0
Petroleum and coal products	324	192 - 194	192	0 - 2 i	56 - 59	57	0 - 2 i	136	136	* i
Chemicals	325	16,749	16,459	289	4,590	4,486	104 i	12,159	11,973	185
Basic chemicals	3251	603	601	2	203	201	1	400	400	*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	774 - 792	775	0 - 16	152 - 170	153	0 - 16	622	622	* i
Pesticide, fertilizer, and other agricultural chemicals	3253	328 - 337 i	322 i	6 - 14	82 - 91 i	76 i	6 - 14	246 i	246 i	0
Pharmaceuticals and medicines	3254	13,945	13,679	265	4,004	3,922	81 i	9,941	9,757	184
Soap, cleaning compound, and toilet preparation	3256	847	847	0	97	97	0	750	750	0
Paint, coating, adhesive, and other chemicals	3255, 3259	235 - 252	235	0 - 17 i	36 - 54	37	0 - 16 i	199	198	1 i
Plastics and rubber products	326	428	423	5	115	115	1	313	308	4
Nonmetallic mineral products	327	181 i	181 i	0	24 i	24 i	0	157 i	157 i	0
Primary metals	331	151	150	1	6	5	*	145 i	145 i	*
Fabricated metal products	332	216	204	12	66	64	2 i	150	140	11 i
Machinery	333	4,521	4,432	89	722	709	13	3,798	3,723	75
Agricultural implement	33311	858	855	3	258	257	1	601	599	2
Semiconductor machinery	333242	911	898	13	76	74	2 i	835	824	11 i
Engine, turbine, and power transmission equipment	3336	935 - 958	936	0 - 21	0 - 390 i	0 - 380 i	0 - 12	556 - 958 i	556 - 937 i	0 - 21
Other machinery	other 333	1,793 - 1,817	1,743	51 - 74	0 - 390	0 - 380	0 - 12	1,404 - 1,807	1,363 - 1,744	40 - 64
Computer and electronic products	334	28,322	27,744	578	5,084 i	4,970 i	115 i	23,238	22,775	463
Communications equipment	3342	3,376	3,369	7	533	533	* i	2,843	2,836	7
Semiconductor and other electronic components	3344	14,487	14,263	224	2,266 i	2,253 i	14	12,221 i	12,010 i	210
Navigational, measuring, electromedical, and control instruments	3345	4,172	3,843	329	1,065	966	99 i	3,107	2,877	230
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1,169 i	1,166 i	3	183 i	183 i	* i	986 i	983 i	3

TABLE 22

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2018

(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 company	Paid for by others	Total	Paid for by company	Paid for by others	Total	Paid for by company	Paid for by others
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	1,154	858	296	414	331	83 i	740	527	213
Other measuring and controlling device	other 3345	1,849	1,819	30	467	451	16	1,381	1,368	14
Other computer and electronic products	other 334	6,287	6,269	18	1,220	1,219	2	5,067	5,051	16
Electrical equipment, appliances, and components	335	1,693	1,687	6	259	257	1	1,434	1,430	4
Transportation equipment	336	7,446	6,990	457	1,797	1,736	61	5,649	5,254	395 i
Motor vehicles, bodies, trailers, and parts	3361-63	6,540	6,206	334 i	1,475	1,451	24	5,065	4,755	310 i
Aerospace products and parts	3364	686 - 711	599	87 - 111	229 - 254	224	5 - 30	457	375	81
Aircraft, aircraft engine, and aircraft parts	336411-13	685 - 710	599	87 - 111	229 - 254	224	5 - 30	456	375	81
Guided missile, space vehicle, and related parts	336414-15, 336419	1	1	0	*	*	0	*	*	0
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0	0	0	0
Other transportation	other 336	195 - 221	184	11 - 36	67 - 93	61	7 - 33	128	124	4
Furniture and related products	337	25	23	2 i	8	8	* i	17	16	1 i
Miscellaneous	339	3,270 - 3,274	3,234	36 - 40	454 - 458	449	5 - 9	2,816	2,785	31
Medical equipment and supplies	3391	2,884	2,847	37	393	387	6	2,492	2,461	31
Other miscellaneous manufacturing	3399	386 - 390	386	0 - 4 i	61 - 66 i	62 i	0 - 3 i	324	324	* i
Nonmanufacturing industries	21-23, 42-81	35,498	27,029	8,469	6,194 i	4,230 i	1,964	29,304	22,800	6,505
Mining, quarrying, oil and gas extraction, and support activities	21	163	161	1	12 i	12 i	*	150 i	149 i	1
Utilities	22	8	8	0	0 - 9	0 - 9	0	0 - 9	0 - 9	0
Wholesale trade	42	32	32	0	1	1	0	32	32	0
Electronic shopping and electronic auctions	454111-12	63 - 3,864 i	63 - 3,864 i	0	4 - 1,585 i	4 - 1,585 i	0	0 - 2,304 i	0 - 2,304 i	0
Transportation and warehousing	48-49	14	14	0	0 - 15 i	0 - 15 i	0	0 - 15	0 - 15	0
Information	51	17,156	17,125	31 i	1,634	1,628	6 i	15,522	15,497	25 i
Publishing	511	7,195	7,182	13	1,124	1,121	3	6,071	6,061	10
Newspaper, periodical, book, and directory publishers	5111	19	19	0	0	0	0	19	19	0
Software publishers	5112	7,175	7,162	13	1,124	1,121	3	6,052	6,042	10
Telecommunications	517	131 - 138	132	0 - 5 i	37	37	0	94 - 101	95	0 - 5
Data processing, hosting, and related services	518	4,739	4,725	14 i	260	257	3 i	4,479	4,468	11 i
Other information	other 51	5,086 - 5,092	5,086	0 - 5	214 i	214 i	*	4,872 - 4,878 i	4,873 i	0 - 5

TABLE 22

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2018

(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 company	Paid for by others	Total	Paid for by company	Paid for by others	Total	Paid for by company	Paid for by others
Finance and insurance	52	885	885	0	66	66	0	819	819	0
Real estate and rental and leasing	53	51	51	0	22	22	0	29	29	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	51	51	0	22	22	0	29	29	0
Professional, scientific, and technical services	54	13,307	4,873	8,435	2,872	914	1,958	10,435	3,958	6,477
Architectural, engineering, and related services	5413	56 - 66 i	26	30 - 39 i	7 - 17 i	4	3 - 13 i	49 i	22	27 i
Computer systems design and related services	5415	4,364	4,301	63 i	797	738	59	3,567 i	3,563 i	4 i
Scientific research and development services	5417	8,370 - 8,379	63	8,307 - 8,316	1,886 - 1,897	12	1,875 - 1,884	6,483	51 i	6,432
Research and development in biotechnology	541711	2,590	34	2,556	323	2 i	320	2,267 i	32 i	2,235 i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	5,778	28	5,750	1,564	9	1,554	4,215	19	4,196
Research and development in the social sciences and humanities	541720	1 - 12	1 i	0 - 10	0 - 11	* i	0 - 10	1 i	1 i	0
Other professional, scientific, and technical services	other 54	507	482	25	171 i	161 i	10	336	321 i	15
Health care services	621-23	22	20	2	5	5	0	16	14	2
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	0 - 3,801	0 - 3,801	0	0 - 1,581	0 - 1,581	0	0 - 2,304	0 - 2,304	0
All companies (number of domestic employees)	-	100,376	90,429	9,947	19,788	17,520	2,268	80,589	72,909	7,680
Small companies										
10-19 ^a	-	128	121	6	31	30	* i	97	91	6
20-49	-	569	557	12	99	96	3	470	461	9
Medium companies										
50-99	-	692	657	35	59	57	1 i	633	600	33 i
100-249	-	1,872	1,698	174	341	307	34 i	1,531	1,391	140
Large companies										
250-499	-	2,179	2,135	44	388	374	14	1,791	1,761	30
500-999	-	2,557	2,149	408	930	557	373	1,627	1,591	35 i
1,000-4,999	-	15,184	14,893	291	3,216	3,024	192	11,968	11,869	99
5,000-9,999	-	15,538	10,033	5,505	3,238	2,173 i	1,065	12,300	7,860	4,440
10,000-24,999	-	22,356	20,846	1,511	3,497	3,401	96 i	18,860	17,445	1,415 i
25,000 or more	-	39,301	37,339	1,961	7,988	7,499	489	31,313	29,840	1,473

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 23

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: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Total	Paid for by company	Paid for by others	Research (basic and applied)			Development				
					Total	Paid for by company	Paid for by others	Total	Paid for by company	Paid for by others		
Total domestic R&D performance												
All industries	21–23, 31–33, 42–81	327,713	291,002		36,711		62,669	52,085	10,584	265,044	238,917	26,127
Manufacturing industries	31–33	204,693	181,623		23,070		46,536	40,102	6,434	158,157	141,521	16,636
Chemicals	325	52,368	50,474		1,894		19,718	19,134	584	32,650	31,341	1,310
Pharmaceuticals and medicines	3254	45,962	44,402		1,560		17,534	17,277	257	28,429	27,125	1,303
Other chemicals	other 325	6,406	6,072		334		2,184	1,857	327	4,222	4,215	7
Computer and electronic products	334	72,231	66,425		5,806		10,615	9,674	940	61,616	56,751	4,865
Semiconductor and other electronic components	3344	27,158	26,765		393		3,494	3,469	25	23,664	23,295	368
Other computer and electronic products	other 334	45,073	39,660		5,413		7,121	6,205	916	37,952	33,455	4,497
Nonmanufacturing industries	21–23, 42–81	123,020	109,379		13,641		16,133	11,983	4,150	106,887	97,396	9,491
Information	51	79,876	79,501		375		7,679	7,601	78	72,197	71,900	297
Software publishers	5112	29,665	29,310		355		4,265	4,191	74	25,401	25,119	281
Other information	other 51	50,210	50,190		20		3,414	3,410	5	46,796	46,780	16
Professional, scientific, and technical services	54	24,150	10,942		13,208		6,353	2,286	4,067	17,797	8,656	9,141
Scientific research and development services	5417	12,722	468		12,254		3,540	143	3,396	9,182	324	8,858
Other professional, scientific, and technical services	other 54	11,428	10,474		954		2,813	2,143	670	8,615	8,331	283
Total foreign R&D performance												
All industries	21–23, 31–33, 42–81	100,376	90,429		9,947		19,788	17,520	2,268	80,589	72,909	7,680
Manufacturing industries	31–33	64,878	63,400		1,478		13,594	13,291	303	51,284	50,109	1,175
Chemicals	325	16,749	16,459		289		4,590	4,486	104	12,159	11,973	185
Pharmaceuticals and medicines	3254	13,945	13,679		265		4,004	3,922	81	9,941	9,757	184
Other chemicals	other 325	2,804	2,780		24		586	564	23	2,218	2,216	1
Computer and electronic products	334	28,322	27,744		578		5,084	4,970	115	23,238	22,775	463
Semiconductor and other electronic components	3344	14,487	14,263		224		2,266	2,253	14	12,221	12,010	210
Other computer and electronic products	other 334	13,835	13,481		354		2,818	2,717	101	11,017	10,764	253
Nonmanufacturing industries	21–23, 42–81	35,498	27,029		8,469		6,194	4,230	1,964	29,304	22,800	6,505
Information	51	17,156	17,125		31		1,634	1,628	6	15,522	15,497	25
Software publishers	5112	7,175	7,162		13		1,124	1,121	3	6,052	6,042	10
Other information	other 51	9,981	9,963		18		511	508	3	9,470	9,455	15
Professional, scientific, and technical services	54	13,307	4,873		8,435		2,872	914	1,958	10,435	3,958	6,477
Scientific research and development services	5417	8,370 - 8,379	63		8,307 - 8,316		1,886 - 1,896	12	1,875 - 1,884	6,483	51	6,432

TABLE 23
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: 2018
(Millions of U.S. dollars)

Industry	NAICS code	Total	Paid for by company	Paid for by others	Research (basic and applied)			Development		
					Total	Paid for by company	Paid for by others	Total	Paid for by company	Paid for by others
Other professional, scientific, and technical services	other 54	4,928 - 4,938	4,809	119 - 128 i	976 - 986 i	903 i	73 - 84	3,952 i	3,907 i	45 i

i = > 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. 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 24

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, selected industry, and location: 2018

(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	100,376	19,788	80,589
Manufacturing industries	31–33	64,878	13,594	51,284
Chemicals	325	16,749	4,590	12,159
Pharmaceuticals and medicines	3254	13,945	4,004	9,941
Computer and electronic products	334	28,322	5,084 i	23,238
Semiconductor and other electronic components	3344	14,487	2,266 i	12,221 i
Nonmanufacturing industries	21–23, 42–81	35,498	6,194 i	29,304
Information	51	17,156	1,634	15,522
Software publishers	5112	7,175	1,124	6,052
Professional, scientific, and technical services	54	13,307	2,872	10,435 i
Scientific research and development services	5417	8,370 - 8,379	1,886 - 1,897	6,483
Africa				
All industries	21–23, 31–33, 42–81	328	48	280
Manufacturing industries	31–33	95	26	69
Chemicals	325	67	19	48
Pharmaceuticals and medicines	3254	54	17	37
Computer/electronic products	334	2	1	1
Semiconductor and other electronic components	3344	*	* i	* i
Nonmanufacturing industries	21–23, 42–81	233	22 i	211
Information	51	89	0 - 8	81 - 90
Software publishers	5112	0 - 58	0 - 8	0 - 58
Professional, scientific, and technical services	54	108	3	105
Scientific research and development services	5417	102	3	99
Asia and Pacific				
All industries	21–23, 31–33, 42–81	33,045	5,698	27,347
Manufacturing industries	31–33	22,011	3,991	18,020
Chemicals	325	3,265	966	2,299
Pharmaceuticals and medicines	3254	2,555	834	1,722
Computer/electronic products	334	12,965	1,975 i	10,990
Semiconductor and other electronic components	3344	7,942	1,020 i	6,922
Nonmanufacturing industries	21–23, 42–81	11,033	1,707 i	9,326
Information	51	5,630	476	5,154
Software publishers	5112	2,459	341	2,118
Professional, scientific, and technical services	54	3,368	539 i	2,828 i
Scientific research and development services	5417	1,879	219	1,660
Canada				
All industries	21–23, 31–33, 42–81	6,140	1,369	4,771
Manufacturing industries	31–33	3,390	695 i	2,695
Chemicals	325	644	182	462
Pharmaceuticals and medicines	3254	547	149	398
Computer/electronic products	334	1,840	359 i	1,481 i
Semiconductor and other electronic components	3344	705	92	613 i
Nonmanufacturing industries	21–23, 42–81	2,751	674	2,077
Information	51	1,588	253	1,335
Software publishers	5112	1,051	217	835
Professional, scientific, and technical services	54	899	310	589 i
Scientific research and development services	5417	420	216	203 i
Europe				
All industries	21–23, 31–33, 42–81	47,805	9,950	37,855

TABLE 24

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, selected industry, and location: 2018

(Millions of U.S. dollars)

Industry and location	NAICS code	Total foreign R&D performance	Research (basic and applied)	Development
Manufacturing industries	31–33	29,679	6,598	23,080
Chemicals	325	11,415	2,983	8,432
Pharmaceuticals and medicines	3254	9,760	2,640	7,120
Computer/electronic products	334	8,055	1,627 i	6,428 i
Semiconductor and other electronic components	3344	3,386	646 i	2,740 i
Nonmanufacturing industries	21–23, 42–81	18,126	3,351	14,775 i
Information	51	8,559	802	7,757
Software publishers	5112	3,101	493	2,608
Professional, scientific, and technical services	54	7,182	1,814	5,367 i
Scientific research and development services	5417	5,495	1,421	4,073
Latin America and OWH				
All industries	21–23, 31–33, 42–81	6,436	1,411	5,025
Manufacturing industries	31–33	4,958	1,219	3,739
Chemicals	325	929	228	700
Pharmaceuticals and medicines	3254	667	186	481
Computer/electronic products	334	2,038 i	394 i	1,645 i
Semiconductor and other electronic components	3344	430	113 i	316 i
Nonmanufacturing industries	21–23, 42–81	1,478	193 i	1,286 i
Information	51	260	13	247
Software publishers	5112	0 - 82	0 - 12	0 - 71
Professional, scientific, and technical services	54	1,081	123 i	958 i
Scientific research and development services	5417	389	21	368 i
Middle East				
All industries	21–23, 31–33, 42–81	5,353	900 i	4,453 i
Manufacturing industries	31–33	3,626	700 i	2,926 i
Chemicals	325	332	163	169
Pharmaceuticals and medicines	3254	311	161	151
Computer/electronic products	334	2,769	472 i	2,298 i
Semiconductor and other electronic components	3344	1,916	371 i	1,545 i
Nonmanufacturing industries	21–23, 42–81	1,726	200 i	1,526
Information	51	1,019	85	933
Software publishers	5112	484	63	422
Professional, scientific, and technical services	54	580	66 i	513 i
Scientific research and development services	5417	85	8	77
Puerto Rico ^a				
All industries	21–23, 31–33, 42–81	493	217	276
Manufacturing industries	31–33	481	214	267
Chemicals	325	59 - 95	14 - 51	45
Pharmaceuticals and medicines	3254	46	15	31
Computer/electronic products	334	125 - 423	101 - 200	0 - 223
Semiconductor and other electronic components	3344	0 - 111	0 - 27	0 - 87
Nonmanufacturing industries	21–23, 42–81	12	2	10 i
Information	51	0 - 13	0 - 3 i	0 - 10 i
Software publishers	5112	0 - 13	0 - 3	0 - 10
Professional, scientific, and technical services	54	0 - 8 i	0 - 3	0 - 6 i
Scientific research and development services	5417	0 - 8 i	0 - 3	0 - 6 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.

^a 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 25

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2018

(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	377,806	211,925	28,203	16,489	6,871	24,609	6,812	14,772	2,674	11,922	53,529
Manufacturing industries	31-33	234,682	123,857	10,499	8,829	3,713	21,675	3,844	10,359	2,383	10,013	39,510
Food	311	4,412	2,674	40	78	35	494	40	201	3	192	653
Beverage and tobacco products	312	1,004	531	10	49	3	84	9	47	*	49	220
Textile, apparel, and leather products	313-16	986	637	13	22	70	95	5	15	3	19	107
Wood products	321	199	143	0	5	3	33	2	3	0	4	7
Paper	322	932	444	0	34	20	381	3	6	0	4	39
Printing and related support activities	323	238	154	16	13	1	15	2	13	*	3	20
Petroleum and coal products	324	1,246	723	0	19	17	32	4	35	*	305	112
Chemicals	325	73,584	32,532	4,397	4,254	523	6,340	1,212	3,399	1,318	3,937	15,672
Basic chemicals	3251	2,251	1,368	6	27 - 51	27	212	34	131	4	147	269 - 293
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,568	981	1	69	1	104	14	94 - 112	9	0 - 207	66 - 297
Pesticide, fertilizer, and other agricultural chemicals	3253	1,135	657	1	33 - 61	6	95	24	94	18	39	137 - 171
Pharmaceuticals and medicines	3254	64,800	27,171	4,377	3,997	458	5,707	1,111	2,933	1,282	3,529	14,236
Soap, cleaning compound, and toilet preparation	3256	2,573	1,518 - 1,544	12	85	12 - 17	128	17	84 - 104	*	17	648 - 679
Paint, coating, adhesive, and other chemicals	3255, 3259	1,257	813 - 835	1	17	12 - 17	94	12	43	4	0 - 207	24 - 260
Plastics and rubber products	326	2,667	1,572	18	45	51	435	25	79	14	34	392
Nonmetallic mineral products	327	1,361	712	5	33	27	135	34	73	0	76	266
Primary metals	331	817	429	9	6	3	158	3	43	1	16	148
Fabricated metal products	332	2,222	1,377	19	54	17	354	14	28	9	31	319
Machinery	333	13,765	7,987	237	537	112	1,883	252	588	35	212	1,922
Agricultural implement	33311	1,862	1,022	0	137	7	264	7	41	2	56	326
Semiconductor machinery	333242	3,623	1,756	186	12 - 32	29	470	71	274	0	23	779 - 804

TABLE 25

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2018

(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
Engine, turbine, and power transmission equipment	3336	2,310	1,411	1	243 - 263	4	275	10	95	0 - 34	3	211 - 270
Other machinery	other 333	5,970	3,797	50	106 - 126	72	873	164	178	0 - 34	130	543 - 603
Computer and electronic products	334	73,922	40,961	5,275	1,356	1,601	4,390	1,751	4,363	615	3,675	9,935
Communications equipment	3342	11,822	7,019	745	425	174	362	808	592	45	130	1,524
Semiconductor and other electronic components	3344	28,642	15,739	1,297	427	310	1,789	309	2,306	289	1,830	4,346
Navigational, measuring, electromedical, and control instruments	3345	10,864	6,917	326	321	126	956	102	228	6	379	1,502
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,046	1,684	178	104	32	217	52	71	2	203	503
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,388	2,361	32 - 57	119	13 - 62	326	14	69	1	80 - 111	322 - 374
Other measuring and controlling device	other 3345	4,430	2,872	91 - 116	98	32 - 81	412	36	89	2	66 - 97	626 - 676
Other computer and electronic products	other 334	22,594	11,285	2,907	184	991	1,283	532	1,238	275	1,336	2,563
Electrical equipment, appliances, and components	335	4,222	2,819	50	138	32	323	86	101	5	162	506
Transportation equipment	336	35,894	20,140	13	1,531	933	5,095	282	808	259	450	6,384
Motor vehicles, bodies, trailers, and parts	3361-63	23,080	13,902	5	1,308	895	3,721	250	682	251	190	1,876
Aerospace products and parts	3364	11,160	5,136	2 - 4	173	7 - 34	1,054	20 - 23	103	0 - 5	249	4,378 - 4,417
Aircraft, aircraft engine, and aircraft parts	336411-13	10,746	4,935	2	151	6 - 33	993	21	102	0 - 5	247	4,257 - 4,292
Guided missile, space vehicle, and related parts	336414-15, 336419	414	201	0 - 2	21	1	62	0 - 3	*	0	3	119 - 128
Military armored vehicle, tank, and tank component	336992	6	3	0	*	*	0 - 2	*	*	*	*	0 - 4

TABLE 25

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2018

(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 transportation	other 336	1,649	1,098	3 - 6	50	3 - 31	317 - 321	8 - 13	23	3 - 9	10	88 - 131
Furniture and related products	337	404	288	1	9	1	50	2	3	2	5	44
Miscellaneous	339	16,807	9,735	394	646	266	1,377	117	554	117	840	2,762
Medical equipment and supplies	3391	14,267	7,895	366	597	246	1,155	104	521	105	802	2,476
Other miscellaneous manufacturing	3399	2,540	1,839	28	49	20	222	14	33	11	38	287
Nonmanufacturing industries	21-23, 42-81	143,123	88,067	17,704	7,660	3,158	2,934	2,967	4,413	292	1,908	14,019
Mining, quarrying, oil and gas extraction, and support activities	21	1,775	1,153	46	133 - 143	13 - 19	149	13 - 25	0 - 52	0	6 - 37	155 - 219
Utilities	22	224	80 - 131	*	11	0 - 3	0 - 8	1	5	4	27	34 - 85
Wholesale trade	42	881	612	0	5 - 15	2	81 - 93	0 - 5	0 - 4	1	9 - 21	130 - 142
Electronic shopping and electronic auctions	454111-12	11,557	6,011 - 6,107	1,509 - 1,865	0 - 279	102 - 116	0 - 106	0 - 125	199 - 645	3	0 - 54	2,289 - 2,742
Transportation and warehousing	48-49	935	662 - 671	9	84	16	103	8	17 - 26	*	15	12
Information	51	93,487	56,547	14,727	4,221	2,420	1,177	2,421	2,706	183	1,314 - 1,344	7,738 - 7,775
Publishing	511	32,281	21,064	3,524	1,286	258	401	301	434	78	1,017	3,918
Newspaper, periodical, book, and directory publishers	5111	131	90	0	8	1	*	1	14	*	5	11
Software publishers	5112	32,150	20,974	3,524	1,278	256	401	300	420	78	1,012	3,907
Telecommunications	517	3,631	2,481 - 2,540	129 - 157	168	16 - 20	554	133 - 143	22 - 30	1	11 - 42	0 - 38
Data processing, hosting, and related services	518	23,115	15,791	2,830 - 2,846	522	281	142 - 147	522	451	87	179	2,289 - 2,305
Other information	other 51	34,459	17,152 - 17,212	8,201 - 8,229	2,245	1,860 - 1,864	74 - 79	1,455 - 1,465	1,790 - 1,798	16	76 - 107	1,478 - 1,520
Finance and insurance	52	7,426	4,391	217	1,788	74	63	46	290	8	120	430
Real estate and rental and leasing	53	1,022	608	84	27	23	4	5	44	*	9	218

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2018

[illegible]

TABLE 25

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2018

(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
50–99	–	10,446	6,384	301	423	106	1,048	269	187	125	520	1,084
100–249	–	14,626	9,369	557	610	133	1,312	242	365	115	472	1,451
Large companies												
250–499	–	16,604	9,462	1,071	825	302	1,228	448	391	120	487	2,270
500–999	–	15,561	8,953	940	732	194	1,200	272	404	327	570	1,970
1,000–4,999	–	58,509	35,432	5,104	1,848	791	3,291	738	1,949	385	1,316	7,656
5,000–9,999	–	36,274	20,431	2,519	1,774	355	2,280	524	1,503	88 i	653	6,146
10,000–24,999	–	74,423	39,617	4,915	3,298	1,319	5,087	1,196 i	4,000	369	3,380	11,241
25,000 or more	–	138,465	74,286	12,536	6,361	3,410	8,187	2,852	5,781	1,054	3,879	20,118

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 26

Domestic R&D paid for and performed by the company, by industry and company size: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19 ^a	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	377,806	3,340	9,556	10,446	14,626	16,604	15,561	58,509	36,274	74,423	138,465
Manufacturing industries	31–33	234,682	1,447	4,899	6,101	8,966	10,119	9,951	34,106	26,338	52,915	79,841
Food	311	4,412	4	87	56 - 69	191	264	193	384	138	2,195	883 - 896
Beverage and tobacco products	312	1,004	3	40	12	15	8	34	10	203	173	507
Textile, apparel, and leather products	313–16	986	10	5	12	29	47	48	271	294	79	190
Wood products	321	199	*	15	22	14	4	27	19	59	40	0
Paper	322	932	0	2	12	33	23	4	138	189	308	223
Printing and related support activities	323	238	0	8	13	30	68	30	42	28	19	0
Petroleum and coal products	324	1,246	3	12	23	22	42	60	24	24	113	924
Chemicals	325	73,584	751 - 772	2,440	3,095	3,992	4,698	3,084	9,272	7,355	27,752	11,127 - 11,149
Basic chemicals	3251	2,251	12	83	51	156	174	93	1,154	189	339	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,568	0 - 64	0 - 80	0 - 112	44	36	58	80 - 114	0	1,065 - 1,351	0
Pesticide, fertilizer, and other agricultural chemicals	3253	1,135	i 6	21 - 32	10	17 - 27	15	3	183 - 203	i 166	694	i 0
Pharmaceuticals and medicines	3254	64,800	671 - 693	2,213	2,913	3,603	4,282	2,772	6,825	6,785	23,820	10,896 - 10,918
Soap, cleaning compound, and toilet preparation	3256	2,573	0 - 64	44	9 - 20	85 - 95	83	50	543	i 214	1,226 - 1,547	0 - 232
Paint, coating, adhesive, and other chemicals	3255, 3259	1,257	0 - 64	0 - 80	0 - 112	68 - 78	108	107	454 - 475	0	3 - 512	0 - 232
Plastics and rubber products	326	2,667	5	89	123	185	270	294	812	538	351	0
Nonmetallic mineral products	327	1,361	4	18	17	41	12	73	95	155	946	0
Primary metals	331	817	0	17	21	92	41	50	179	120	288	9
Fabricated metal products	332	2,222	31	132	145	455	225	450	409	163	211	0
Machinery	333	13,765	102 - 115	367	558	864	561	652	2,475	3,062	1,982	3,131 - 3,138
Agricultural implement	33311	1,862	4	52	31	63	14 - 20	79	365	14	0	1,232 - 1,238
Semiconductor machinery	333242	3,623	6	6	29	i 59	26 - 117	67 - 569	588 - 682	2,245 - 2,747	0	0
Engine, turbine, and power transmission equipment	3336	2,310	6	11	10	36	0 - 46	4 - 64	141 - 301	0 - 502	0 - 1,983	0 - 1,901
Other machinery	other 333	5,970	87 - 100	298	488	707	380 - 471	0 - 502	1,171 - 1,313	303	0 - 1,983	0 - 1,901

TABLE 26

Domestic R&D paid for and performed by the company, by industry and company size: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)												
		All companies	10–19 ^a	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	73,922	247	868	1,003	1,553	2,394	3,033	12,233	9,090	i	8,536	34,966	
Communications equipment	3342	11,822	19	101	151 - 219	356	352	766	2,922	545 - 619		1,368	5,171	
Semiconductor and other electronic components	3344	28,642	54	324	313	518	1,608	1,125	4,517	5,097	i	4,465	10,622	
Navigational, measuring, electromedical, and control instruments	3345	10,864	61 - 176	372 - 399	420	542	181 - 436	604	3,551	367 - 442		1,901 - 1,996	2,394 - 2,856	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,046	49	155	154	144 - 181	145 - 179	340	1,178	0		846	0	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,388	13	21	31 - 80	33 - 132	36	0 - 265	502 - 675	0 - 442		0 - 795	1,959	
Other measuring and controlling device	other 3345	4,430	0 - 115	196 - 223	187 - 236	229 - 328	0 - 253	0 - 265	1,697 - 1,870	0 - 442		353 - 1,071	i 435 - 897	
Other computer and electronic products	other 334	22,594	0 - 115	43 - 70	50 - 118	137	0 - 253	538	1,244	3,006		708 - 801	16,316 - 16,777	
Electrical equipment, appliances, and components	335	4,222	47	227	310	241	217	424	1,145	501		625	485	
Transportation equipment	336	35,894	154	154	132	390	592	903	3,301	2,382		5,186	22,700	
Motor vehicles, bodies, trailers, and parts	3361–63	23,080	0 - 12	37 - 66	52 - 60	251	369	564	2,300	1,204		4,065	14,187 - 14,240	
Aerospace products and parts	3364	11,160	142	23 - 51	62	94 - 122	153	230	832 - 848	655		1,122	7,823	
Aircraft, aircraft engine, and aircraft parts	336411–13	10,746	134	7 - 36	42	83 - 111	139	230	589	549		1,122	7,823	
Guided missile, space vehicle, and related parts	336414–15, 336419	414	8	0 - 16	20	10	14	0	243 - 259	105		0	0	
Military armored vehicle, tank, and tank component	336992	6	0	0 - 6	0 - 6	0 - 6	0 - 6	0	0	0		0	0	
Other transportation	other 336	1,649	0 - 12	31 - 67	6 - 19	11 - 45	62 - 72	110	153 - 170	523		0	636 - 691	
Furniture and related products	337	404	0	13	23	37	24	9	79	205		14	0	
Miscellaneous	339	16,807	65 - 71	405	514 - 520	782	629	582	3,217	1,832		4,098	4,675	
Medical equipment and supplies	3391	14,267	64	360	281	551	309	476	2,290	1,421		3,977	4,539	
Other miscellaneous manufacturing	3399	2,540	2 - 8	45	234 - 240	231	320	106	927	411	i	121	i 136	i
Nonmanufacturing industries	21–23, 42–81	143,123	1,894	4,658	4,345	5,660	6,485	5,611	24,404	9,936		21,508	58,624	

TABLE 26

Domestic R&D paid for and performed by the company, by industry and company size: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	10–19 ^a	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	
Mining, quarrying, oil and gas extraction, and support activities	21	1,775	9	16	33	51	52	44	i 65	i 277	1,227	0	
Utilities	22	224	1	9	*	8	0	0 - 94	48	0 - 94	67	0 - 94	
Wholesale trade	42	881	i 35	142	118	i 262	i 105	i 172	i 47	0	*	0	
Electronic shopping and electronic auctions	454111–12	11,557	i 0 - 37	0 - 83	3	i 20	0 - 219	0 - 231	0 - 485	0 - 1,076	i 0	9,418 - 10,738	i
Transportation and warehousing	48–49	935	2	i 11	7	39	2	264	157	14	20	419	
Information	51	93,487	679	1,151	1,498	2,911	3,747	3,489	17,682	6,700	15,494	40,137	
Publishing	511	32,281	202	487	476	979	761	715	7,802	4,849	1,854	14,157	
Newspaper, periodical, book, and directory publishers	5111	131	0	7	7	*	52	i 15	i 0	0	50	i 0	
Software publishers	5112	32,150	202	480	469	979	709	700	7,802	4,849	1,804	14,157	
Telecommunications	517	3,631	0 - 478	0 - 665	0 - 181	0 - 421	265	0 - 535	0 - 2,675	0 - 444	0 - 3,367	0 - 3,367	
Data processing, hosting, and related services	518	23,115	0 - 478	0 - 665	843	1,511 - 1,530	2,115	2,240	7,207	1,408	1,767 - 2,931	4,861	
Other information	other 51	34,459	0 - 478	0 - 665	0 - 181	0 - 421	606	0 - 535	0 - 2,675	0 - 444	7,341 - 11,874	17,751 - 21,120	
Finance and insurance	52	7,426	249	11	33	150	461	182	1,133	i 1,086	1,753	2,369	
Real estate and rental and leasing	53	1,022	0	2	8	14	2	57	938	0	0	0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	0	0	*	6	0	0	0	0	0	0	
Other real estate and rental and leasing	other 53	1,016	0	2	8	9	2	57	938	0	0	0	
Professional, scientific, and technical services	54	22,374	873	3,194	2,400	1,958	1,236	902	3,794	784	2,397	4,837	
Architectural, engineering, and related services	5413	2,277	119	286	311	445	292	97	272	241	214	*	
Computer systems design and related services	5415	13,633	352	1,573	1,178	867	577	580	2,767	476	1,744	3,518	
Scientific research and development services	5417	2,424	345	689	547	233	131	27	206	3	197	46	
Research and development in biotechnology	541711	820	125 - 133	142	186	67	57 - 67	0	189	0	0	46	
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	1,577	213	539	361	167	53	27	17	3	197	0	
Research and development in the social sciences and humanities	541720	27	0 - 6	8	*	0	12 - 20	0	0	0	0	0	

TABLE 26

Domestic R&D paid for and performed by the company, by industry and company size: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19 ^a	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 professional, scientific, and technical services	other 54	4,041	58	646	364	412	237	197	549	65 i	242	1,273
Health care services	621–23	1,401	13	43	136	81	665	274 i	60	3	0	127 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,041	0 - 37	0 - 83	108	165	0 - 219	0 - 231	0 - 485	0 - 1,076 i	549	0 - 1,221

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 27

Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2018

(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	377,806	22,312	53,229	302,264
Manufacturing industries	31–33	234,682	16,520	38,126	180,037
Food	311	4,412	416 i	1,374 i	2,621
Beverage and tobacco products	312	1,004	108	232	664
Textile, apparel, and leather products	313–16	986	55	82	849
Wood products	321	199	12	37	150
Printing and related support activities	323	238	18	37	183
Chemicals	325	73,584	9,763	17,274	46,546
Pharmaceuticals and medicines	3254	64,800	8,876	15,279	40,645
Other chemicals	other 325	8,784	887	1,996	5,901
Plastics and rubber products	326	2,667	168	452	2,048
Nonmetallic mineral products	327	1,361	198 i	299 i	864 i
Primary metals	331	817	38	119	659
Fabricated metal products	332	2,222	122	445	1,655
Machinery	333	13,765	888	1,594	11,283
Computer and electronic products	334	73,922	2,162	8,955	62,806
Semiconductor and other electronic components	3344	28,642	548 i	3,188 i	24,906 i
Navigational, measuring, electromedical, and control instruments	3345	10,864	790 i	1,545	8,529
Other computer and electronic products	other 334	34,416	823	4,223	29,371
Electrical equipment, appliances, and components	335	4,222	253	532	3,436
Transportation equipment	336	35,894	1,379	4,113	30,402
Aerospace products and parts	3364	11,160	403	1,356	9,401
Other transportation	other 336	24,735	976	2,757	21,001
Furniture and related products	337	404	25	60	319
Miscellaneous manufacturing	322, 324, 339	18,984	914	2,519	15,551
Nonmanufacturing industries	21–23, 42–81	143,123	5,793	15,104	122,227
Information	51	93,487	3,068	8,842	81,577
Publishing	511	32,281	1,492	3,129	27,659
Telecommunications	517	3,631	233	1,565	1,833
Data processing, hosting, and related services	518	23,115	948 - 1,029	2,250 - 2,329	19,837
Other information	other 51	34,459	313 - 394	1,818 - 1,897	32,248
Professional, scientific, and technical services	54	22,374	1,406	3,494	17,474
Architectural, engineering, and related services	5413	2,277	175	714	1,388
Computer systems design and related services	5415	13,633	853	1,869	10,910 i
Scientific research and development services	5417	2,424	264	475	1,685
Research and development in biotechnology	541711	820	91	186	543
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	1,577	171	270	1,136
Research and development in the social sciences and humanities	541720	27	1	20	6
Other professional, scientific, and technical services	other 54	4,041	115	435	3,491
Other nonmanufacturing	21–23, 42–49, 52, 53, 55–81	27,263 i	1,319 i	2,768	23,176 i
All companies (number of domestic employees)	–	377,806	22,312	53,229	302,264
Small companies					
10–19 ^a	–	3,340	308	718	2,315
20–49	–	9,556	805	2,163	6,589
Medium companies					
50–99	–	10,446	732	1,827	7,888

TABLE 27

Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
100–249	–	14,626	1,229	2,392	11,005
Large companies					
250–499	–	16,604	967	3,123	12,514
500–999	–	15,561	1,026	2,358	12,178
1,000–4,999	–	58,509	4,430	9,168	44,911
5,000–9,999	–	36,274	2,087	6,188	27,999
10,000–24,999	–	74,423	4,650	11,688	58,085
25,000 or more	–	138,465	6,079	13,606	118,781

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

NAICS = 2012 North American Industry Classification System.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 28-A
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2018
(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total ^a (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	24,698	377,806	1,284	20	e	4,673	423	129,656	4,286	6,193	1,432	i	278	4,498	4,094	89	2,376	12,239	6,004	2,556	1,645	1,178	359	266	4,227	22,581	20,323	7,021	250	3,976	157																	
Manufacturing industries	31–33	14,727	234,682	889	5	e	3,731	267	66,968	2,792	5,499	1,289	i	51	2,463	2,348	41	i	2,312	9,636	5,676	2,256	1,238	990	202	217	2,832	17,696	19,265	5,799	211	3,114	99	i															
Food	311	802	4,412	6	2	e	5	44	182	33	39	695	i	*	e	21	33	1	e	51	774	i	27	733	i	36	27	5	e	1	e	58	103	155	385	2	e	27	3										
Beverage and tobacco products	312	195	1,004	*	e	*	e	2	i	*	e	*	e	*	e	14	98	*	e	*	e	91	1	e	*	i	*	e	28	*	e	1	e	*	e	7	1	e	1	e	*	e	3	*	e				
Textile, apparel, and leather products	313–16	236	986	6	*	e	1	e	3	352	11	2	i	*	e	0	17	97	*	e	*	e	9	4	1	e	2	3	1	e	1	e	1	e	78	17	2	e	1	e	1	e	*	e					
Wood products	321	181	199	1	e	*	e	*	e	2	23	*	e	*	e	0	1	e	7	*	e	*	e	2	2	e	14	*	e	1	e	*	e	*	e	*	e	2	46	1	e	1	e	*	e				
Paper	322	154	932	51	0	*	e	31	9	*	e	5	*	e	0	15	46	0	*	e	18	1	1	4	18	8	12	10	16	17	11	1	1	e	*	e	2	6	1	e	*	e							
Printing and related support activities	323	172	238	*	e	*	e	1	i	*	93	i	8	*	e	*	e	*	e	1	2	i	*	e	*	e	5	*	e	2	i	*	e	*	e	5	6	7	*	e	6	2							
Petroleum and coal products	324	94	1,246	*	e	*	e	*	e	2	20	*	e	*	e	0	3	1	0	*	e	31	26	0	5	16	*	e	*	e	6	*	e	2	i	*	e	7	3	0									
Chemicals	325	2,631	73,584	93	i	*	e	123	24	15,941	277	4,316	487	26	659	204	29	i	28	4,088	i	3,161	203	160	216	i	50	11	1,310	10,858	882	393	34	2,018	7														
Basic chemicals	3251	321	2,251	1	0	2	8	92	10	66	96	i	0	11	29	*	e	1	e	62	14	52	4	12	20	*	e	71	98	23	2	6	i	18	1														
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	174	1,568	0	- 8	e	0	0	- 6	e	*	0	- 138	e	4	*	0	- 17	e	21	4	*	12	0	- 337	5	0	- 68	e	19	19	3	*	e	51	9	- 375	20	2	0	- 35	i	0						
Pesticide, fertilizer, and other agricultural chemicals	3253	78	1,135	i	2	*	e	7	2	i	42	5	i	*	e	66	i	*	i	7	14	23	i	3	27	i	3	i	32	i	7	*	3	e	*	e	1	i	4	i	16	42	8	i	347	i	1	i	
Pharmaceuticals and medicines	3254	1,285	64,800	84	i	*	109	12	15,532	257	4,049	320	26	616	119	1	e	16	3,781	i	2,807	112	77	26	7	8	1,238	10,598	470	i	172	17	1,611	4															
Soap, cleaning compound, and toilet preparation	3256	278	2,573	*	e	0	2	2	179	2	e	65	i	*	e	0	11	12	*	e	8	100	3	e	1	e	6	- 74	i	*	e	1	i	0	*	78	1	e	126	*	e	10	*	e					
Paint, coating, adhesive, and other chemicals	3255, 3259	496	1,257	0	- 8	0	0	- 6	*	e	77	2	0	- 138	*	e	0	0	- 17	8	i	0	*	106	i	0	- 337	2	e	0	- 68	i	159	i	1	e	*	e	1	e	29	0	- 360	31	*	e	0	- 35	1
Plastics and rubber products	326	899	2,667	18	*	e	274	6	133	69	40	8	0	54	19	*	e	2	i	95	98	20	9	38	37	1	e	105	34	256	83	20	16	*	e														
Nonmetallic mineral products	327	227	1,361	3	*	e	*	e	*	e	54	37	*	e	*	e	*	e	3	8	*	e	*	e	2	2	*	e	*	e	*	e	6	3	6	16	1	e	*	e									
Primary metals	331	226	817	8	0	16	3	4	i	4	1	i	1	0	2	i	8	0	*	e	25	84	26	1	2	*	e	*	e	16	1	e	39	27	22	4	*	e											
Fabricated metal products	332	1,427	2,222	35	*	e	58	9	230	42	94	1	*	e	33	22	*	e	3	175	97	14	i	27	25	9	1	e	16	43	104	63	3	55	*	e													
Machinery	333	2,020	13,765	23	*	e	80	45	3,186	35	241	*	e	0	189	392	*	e	37	i	1,527	326	863	154	80	43	3	e	176	i	591	471	510	18	100	4	- 70	i											
Agricultural implement	33311	237	1,862	*	e	0	21	4	e	82	3	1	e	0	0	1	e	44	0	1	e	340	7	830	55	1	e	14	*	e	*	e	0	6	i	116	i	1	e	1	e	*	e						
Semiconductor machinery	333242	44	3,623	*	e	0	15	i	0	2,358	1	i	2	i	0	0	12	0	0	0	0	- 37	i	*	e	*	e	0	0	0	0	0	1	i	282	i	0	0	- 355	0	0	0	- 70	i					
Engine, turbine, and power transmission equipment	3336	70	2,310	1	0	1	*	e	134	2	0	0	0	32	0	- 349	0	0	0	0	- 1,188	138	2	4	*	e	0	- 30	*	e	0	- 176	24	52	i	41	*	e	4	*	e								
Other machinery	other 333	1,672	5,970	21	*	e	42	41	613	29	0	0	0	143	0	- 349	*	e	0	- 37	0	- 1,188	181	32	94	78	0	- 30	3	e	0	- 176	i	284	413	0	- 355	17	95	0	- 70	e							
Computer and electronic products	334	2,218	73,922	188	2	2,722	57	36,292	1,501	265	68	24	642	699	i	7	2,172	1,305	108	287	499	25	17	42	290	3,298	341	999	18	62	10																		
Communications equipment	3342	266	11,822	98	1	80	6	5,333	284	35	3	20	336	501	i	5	39	681	37	19	45	10	5	4	161	462	97	85	5	29	3																		

TABLE 28-A
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2018
(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total ^a (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
Semiconductor and other electronic components	3344	595	28,642	33	1	1,795	29	12,691	336	31	11	2	85	61	*	2,032	201	11 e	52 i	0 - 44	2	1	26	52	1,238 i	125	179	2	14	1 i
Navigational, measuring, electromedical, and control instruments	3345	1,101	10,864	45	* e	823	22 i	3,235	370	198	52	1 i	146	128	1 i	0 - 103 i	269	44	213	187 - 408	12 i	10	12	62	977	104	388	3	18 i	5
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	260	3,046	* e	0	62 i	18 i	1,333	56	106 i	1	*	20 i	24 i	*	*	104 i	8 i	5 i	3	7 i	* e	1 e	12 i	429	19 i	95	*	3	*
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	105	3,388	11	0	398 - 762	0	371	54	10	0	0	85	33	1 i	1 e	0 - 166	21	0 - 209	179 - 402	1	9	11	26	223	20	133	1 e	2	1
Other measuring and controlling device	other 3345	737	4,430	34	* e	0 - 362 i	4	1,532	260	83	51	* i	41	71	0	0 - 102 i	0 - 166	14	0 - 209 i	4	4 i	1 e	* e	24	325	65	161	2	13 i	4
Other computer and electronic products	other 334	255	22,594	12	0	23	0	15,032	511	1	1	1	74	10	*	0 - 102	154	16	3	42 - 244	2	*	1	14	621	15	347	9	1	*
Electrical equipment, appliances, and components	335	750	4,222	5 e	*	51	4 e	761	20	77	1 e	*	57	89	*	2 e	264	47	25	7	4	4 e	2	33	462 i	432	77	10	49	5
Transportation equipment	336	1,065	35,894	421	1 e	236	30	4,898	477	275	2 e	*	524	463	2	6 e	624	1,232	24	316	493	24	14	595	245	16,189	338	37	742	5
Motor vehicles, bodies, trailers, and parts	3361–63	636	23,080	77	* e	23	9	2,491 i	14	19	* e	0	10	84	0	3	439	1,042	14	11	488	* e	1 e	42	76	15,838	71	19	25	1 e
Aerospace products and parts	3364	243	11,160	309	* e	198	19	2,326	452	238	2 e	*	460	94	2	2 e	144	179	9	299	5 e	18	7	520	161	165	58	15	704	4
Aircraft, aircraft engine, and aircraft parts	336411–13	207	10,746	269	* e	198	19	2,266	266	224	2 e	*	445	94	2	2 e	144	179	9	299	* e	18	* e	520	159	124	58	11	699	4
Guided missile, space vehicle, and related parts	336414–15, 336419	36	414	40 i	*	0	0	60	186	14	0	0	15 i	0	*	0	0	0	0	0	5 e	0	7	0	2	41	0	4 i	6	0
Military armored vehicle, tank, and tank component	336992	6	6	0	0	2	0	*	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1 i	0	0	0	0	0	0
Other transportation	other 336	182	1,649	35	* e	13	2 e	82	12	17	* e	0	54	285	* e	1 i	40	10 e	1 e	5	1 e	6 e	6	33	8	186	209	3 e	12	0
Furniture and related products	337	231	404	2	* e	4	* e	23	27	* e	* e	0	* e	29	* e	* e	7	27	28	* e	1	*	* e	*	* e	82	23	11	* e	* e
Miscellaneous	339	1,220	16,807	29	* e	159	7 i	4,700	244	142	26 i	0	229	129	1 e	11 i	523	424	14	16	7 e	3 e	128	215	1,947	266 i	2,830	9	27	0 - 55
Medical equipment and supplies	3391	684	14,267	26	* e	112	3 i	4,186	196	87	23	0	208	96	* e	1 e	419	404	2 e	3 e	3 e	1 e	127	209	1,835	241 i	2,801	3	20	1 e
Other miscellaneous manufacturing	3399	537	2,540	3 e	* e	46	4 i	514	48	55 i	3 i	0	20	33 i	* e	11 i	104	20	13	13	3 e	3 e	1 e	6	112	24	29	6	8	0 - 54
Nonmanufacturing industries	21–23, 42–81	9,978	143,123	394	15 e	943	156	62,688	1,494	694 i	143	227	2,035	1,747	49	64	2,603	328	300	407	188	157	49	1,395	4,885	1,058	1,222	39	862	57
Mining, quarrying, oil and gas extraction, and support activities	21	149	1,775	* e	* e	39	* e	112	17	3	* e	0	* e	3	* e	4	3	1 e	* e	* e	1 e	19	* e	* e	* e	* e	1	3	* e	* e
Utilities	22	61	224	21	* e	* e	* e	47	* e	* e	* e	3	2	22	1	* e	10	* e	* e	* e	* e	15	* e	8	2	* e	* e	3	2	* e
Wholesale trade	42	768	881 i	3 e	* e	9	2 i	161 i	9	4 i	* e	* e	8 e	14 i	* e	1 i	23 i	9	13 i	8 i	38 i	4	* e	2 e	3 e	33 i	73 i	1 e	10 i	2 i
Electronic shopping and electronic auctions	454111–12	84	11,557 i	0 - 10 i	* e	0 - 80 i	0 - 9	635 - 2,508 i	0 - 71 i	0 - 82 i	0 - 7 i	0 - 24 i	0 - 42 i	0 - 103 i	0 - 3 e	0 - 5 e	0 - 104 i	0 - 42 i	0 - 18	0 - 11 i	18 i	0 - 24	0 - 4	0 - 27 i	0 - 495 i	53 i	24 i	0 - 5 e	0 - 21 i	0 - 3 i
Transportation and warehousing	48–49	87	935	1 e	1 e	1 e	12	148	5	1 e	* e	* e	23	4 e	11	* e	72	6	2 e	6	2 e	2 e	* e	268	58	6 e	2 e	1 e	2 e	* e

TABLE 28-A
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2018
(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total ^a (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	2,626	93,487	201	4	e	297	91		50,138	1,007		405	i	30		140	1,146	843	14	i	27	e	812	151		184	56		54	30		18		296	2,976	444	537	12		148	40										
Publishing	511	975	32,281	77	1		140	3	e	9,819	276		128	i	8	e	29	484	198	4		17		354	104		30	16		7	8	e	13		144	1,726	267	358	6		80	6										
Newspaper, periodical, book, and directory publishers	5111	33	131	*	e	*	e	*	e	24	*		*	e	*	e	15	i	3		1	i	*	e	*	e	2		*	e	*	e	*	e	*	e	*	e	*	e	*	e	*	e								
Software publishers	5112	941	32,150	77	1		140	3	e	9,795	276		128	i	8	e	15	481	198	4		17		352	104		30	16		7	7	e	13		144	1,700	265	308	6		80	6										
Telecommunications	517	177	3,631	4	2	e	23	1	e	249	52		1	e	*	e	1	e	335	38	*	e	1	e	25	4		2	e	15		1	e	1	e	1	e	16	73	4	e	3	e	1	e	4	1	e				
Data processing, hosting, and related services	518	1,192	23,115	111	1	e	123	86		14,759	404		65 - 154		18		50	280	411	9	i	6	e	296	37		79	24		37		19		3		119	732	116	158	2	e	55	32									
Other information	other 51	284	34,459	9	1	e	11	e	2	e	25,311	276		121 - 209	i	4		59	47	196	1	e	3	e	137	6	e	72	2	e	8		3	e	2	e	17	445	58	18	3		9	e	2	e						
Finance and insurance	52	209	7,426	23	i	*	e	119	15	i	2,017	33		49		95		*	e	313	76	i	*	e	1		741	16		38	5		3		3	i	*		363	108	68	18	1	e	23	*	e					
Real estate and rental and leasing	53	30	1,022	*	e	*	e	*	e		751	4		*	e	*	e	*	e	*	2		*	e	*	e	3		*	e	2		*	e	*	i	*	e	*	e	*	e	1	i	*	e	*	e	*	e		
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5	6	0	0		0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	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 real estate and rental and leasing	other 53	25	1,016	*	e	*	e	*	e	*		751	4		*	e	*	e	*	e	*	2		*	e	*	e	3		*	e	2		*	e	*	i	*	e	*	e	*	e	1	i	*	e	*	e	*	e	
Professional, scientific, and technical services	54	5,204	22,374	137	9	e	388	29		5,805	336		154		13	e	62	e	501	684	22		29		835	107		47	324		42	e	64		29		429	1,174	309	498	17		660	14								
Architectural, engineering, and related services	5413	1,150	2,277	44	3	e	19	4		249	66		36		2		9	70	205	9		11		81	25		8	31		15		28		4		107	55	79	37	12		83	8									
Computer systems design and related services	5415	2,410	13,633	73	3	e	135	14		3,785	174		57		9	e	35	e	263	353	10		10		439	44	e	31	283		20	e	16	e	22		233	e	632	169	356	4	e	563	2	e						
Scientific research and development services	5417	785	2,424	12	e	0		216	8		870	35		26		1		1	i	54	18	2		2	i	27	28		3	3		2		1		1		50	281	35	24	*		1	i	3	i					
Research and development in biotechnology	541711	202	820	2	e	0		192	*	e	302	1	e	4		*		0	8	8	*		0		8	2	i	2	*		1		*		*		15	i	61		2	i	5	*	e	1	i	1				
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	573	1,577	10	0		24	8		551	34		22		1		*	45	10	2		2	i	19	26		1	e	2		1	i	1	i	1		34	219	33	19	*		*	e	2	i						
Research and development in the social sciences and humanities	541720	10	27	0	0		0	0		17	0		0		0		1	i	*	0	0	0	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 professional, scientific, and technical services	other 54	859	4,041	8	e	4	e	17	e	2	e	901	62		35		1	e	16	e	115	107	1	e	5		288	10	e	6	e	7	e	5	e	19		2	e	39	e	206		28	e	80	1	e	12	e	1	e
Health care services	621–23	178	1,401	2		*	e	14		2		1,006	i	17		*	e	*	e	4		*		*	e	5		*	e	*		*	e	*	e	*	i	6		73	92	i	13	i	*	i	*	e	*	e		
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	592	2,041	0 - 10		*	e	0 - 80		0 - 9		0 - 1,863	0 - 71		0 - 82	i	0 - 7	0 - 24	0 - 42	0 - 103		0 - 3	e	0 - 5	0 - 104	0 - 42	0 - 18	0 - 11		31		0 - 24		0 - 4	e	0 - 27		0 - 495		53		55		0 - 5	e	0 - 21		0 - 3				
All companies (number of domestic employees)	–	24,698	377,806	1,284	20	e	4,673	423		129,656	4,286		6,193		1,432	i	278	4,498	4,094	89		2,376		12,239	6,004		2,556	1,645		1,178		359		266		4,227		22,581		20,323		7,021		250		3,976		157				

TABLE 28-A
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2018
(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total ^a (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
Small companies																														
10-19 ^b	–	3,948	3,340	17 e	2 e	32 e	5 e	809	80	36 e	8 e	11 e	97 e	63 e	4	11 e	82 e	42	14 e	18 e	18 e	11 e	4 e	82	234	66 e	57 e	4 e	32 e	3 e
20–49	–	6,950	9,556	43 e	6 e	72 e	24 e	2,787	149 e	225 i	19 e	31 e	226 e	161 e	17	17 e	300 e	95 e	77	44 e	42 e	28 e	16 e	253	1,154	229 e	204	22 e	64 e	13
Medium companies																														
50–99	–	4,406	10,446	63	2 e	135	13 e	3,281	147	171	12 e	30	203	119 e	5	17 e	312	165	53	56	40 e	32	11 e	210	1,230	274	158	12 e	91	18
100–249	–	4,562	14,626	138	3 e	146	42	4,693	313	194	23	17	302	229	3 e	27	591	155	56	82	86	42	8 e	225	1,503	365	336	36	109	9
Large companies																														
250–499	–	1,967	16,604	49	2 e	158	38	6,398	393	197	7	24	233	185	1 e	53	280	126	102	63	65	42	3 e	537	1,738	502	310	9	116	19
500–999	–	1,098	15,561	41	1 e	127	25	4,613	284	94	9	18 i	255	131	3	9	1,044	152	175	45	73	11	5	187	2,149	494	270	25	80	0 - 59
1,000–4,999	–	1,221	58,509	393	1 e	616	126	22,251	868	928	447	57	816	945	12 i	126	1,147	613	224	551	709 i	95	180	855	6,081	1,909	1,052	35	277	22
5,000–9,999	–	231	36,274	75	0 - 6	673 i	41	14,481	846	591	97 i	5	340	452	10	1,929	620	465	61	122	49	7	1	222	1,377 i	851	693	41	187	0 - 59 i
10,000–24,999	–	201	74,423	76	0 - 6 e	467	33 i	22,954	369	544	721 i	46	668	819	26 i	102	4,353 i	3,180	1,016 i	550	57	34	10	724	3,491	2,334	1,036	48	1,528	6
25,000 or more	–	114	138,465	388	2	2,247	76	47,389	839	3,212	90	39	1,358	989	7	85	3,509	1,011	778	114	39	56	26	933	3,623	13,299	2,904	18	1,491	12

* = 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.

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

^b Business Research and Development Survey does not include companies with fewer than ten 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. Changes in data collection and imputation processes have affected the comparability of company count estimates in this table with estimates published for previous years. 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 28-B
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2018
(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total ^a (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 ^c					
All industries	21–23, 31–33, 42–81	24,698	377,806	513	638	992	16,843	374	15,370	7,790	284	6,820	822	8,446	10,633	663	1,462	179	1,184	18,267	2,642	233	4,092	29,498	209	i	5,334	34	2,399				
Manufacturing industries	31–33	14,727	234,682	216	432	727	12,876	254	7,129	5,068	146	5,619	541	6,944	8,626	622	1,191	142	1,023	12,190	1,312	132	1,688	4,769	155	i	3,696	16	1,284				
Food	311	802	4,412	57	3	* e	270	2	i	38	19	5	114	15	12	1 e	4	5	30	27	7	4	133	32	* e	87	* e	33					
Beverage and tobacco products	312	195	1,004	* e	* e	* e	1 e	* i	233	80	* e	* e	2	2 e	1 e	* e	* e	* e	1 e	147	* e	* e	99	43	* e	7	* e	65					
Textile, apparel, and leather products	313–16	236	986	* e	1	9	19	* e	38	57	* e	89	2	29	7	1 e	71	* e	4 e	4 e	6	1	3 e	7	* e	20	* e	10					
Wood products	321	181	199	* e	* e	1	i	2	* e	1 e	5	9	1 e	* e	4	3	11	* e	2	13	1	i	* i	5	9	* e	9	* e	12				
Paper	322	154	932	1	* e	2	19	* e	25	37	0	27	* e	*	43	4	45	* e	35	12	1	2	64	7	* e	326	0	6					
Printing and related support activities	323	172	238	* e	* e	* e	1	1	2	i	26	* e	7	* e	2	11	* e	1	i	* e	10	* e	* i	* e	* e	7	5	12	* e	10			
Petroleum and coal products	324	94	1,246	* e	* e	* e	349	* e	* e	1	0	9	58	3	15	* e	2	* e	* e	663	* e	0	*	* e	* e	* e	3	* e	21				
Chemicals	325	2,631	73,584	37	11	27	10,457	13	3,136	1,955	6	2,394	42	84	5,702	60	81	37	283	1,164	195	34	i	349	986	118	i	436	9	370			
Basic chemicals	3251	321	2,251	4	* e	2	210	* e	130	72	* e	279	10	11	172	2	25	28	237	153	5	0	117	14	9	i	14	1 e	58				
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	174	1,568	0 - 5	2	0 - 8	i	26	0	0 - 84	i	10	i	*	235	* e	6	131	2	14	0	5	245	* e	* e	0 - 15	e	0 - 5	26	12	0	0 - 68	
Pesticide, fertilizer, and other agricultural chemicals	3253	78	1,135	i	*	3	i	* e	195	*	1	152	* i	56	1	e	1	1	i	1	i	2	i	6	i	2	* e	3	3	* e	40	0	4
Pharmaceuticals and medicines	3254	1,285	64,800	29	5	e	19	9,674	12	2,723	1,659	5	486	29	58	5,287	49	28	7	26	666	183	28	i	215	966	16 - 85	i	249	8	210 - 279		
Soap, cleaning compound, and toilet preparation	3256	278	2,573	1	i	* e	* e	280	i	* e	201	i	31	0	1,170	* e	1 e	* e	5	46	* e	5	2 e	1 e	0	108	0	16 - 85					
Paint, coating, adhesive, and other chemicals	3255, 3259	496	1,257	0 - 5	i	1 e	0 - 8	72	* e	0 - 84	31	0	167	2	6	105	7	12	* e	9	49	4	* e	0 - 15	i	0 - 5	e	0 - 68	13	* e	15		
Plastics and rubber products	326	899	2,667	2	e	3	20	i	41	* e	97	64	1 e	176	46	9	i	80	13	264	2	47	107	5	* e	57	i	8	1 e	117	* e	74	
Nonmetallic mineral products	327	227	1,361	* e	* e	* e	8	* e	961	10	* e	54	* e	4	55	* e	8	* e	4	5	1	* e	* e	4	* e	8	*		10				
Primary metals	331	226	817	* e	* i	6	4	* e	5	22	* e	40	* e	8	190	3	9	1	15	27	1	1	i	5	i	8	1	167	i	* e	11		
Fabricated metal products	332	1,427	2,222	8	2	9	131	* e	65	33	1	i	177	13	22	58	3	i	31	1	29	174	20	* e	14	91	1	e	126	2	51		
Machinery	333	2,020	13,765	35	i	12	56	52	2 e	494	316	105	413	231	517	271	30	105	12	47	964	60	i	16	62	99	5	e	673	3	4 - 72		
Agricultural implement	33311	237	1,862	30	i	*	* e	* e	* e	* e	59	38	90	1 e	7	1 e	0	3	5	6	7 e	1 e	0	1 e	1 e	1	i	75	* e	4			
Semiconductor machinery	333242	44	3,623	0	0	* i	7	0	58	* e	0	* e	0	0 - 509	16	0	0	0	* i	0 - 358	i	0 - 60	i	2	* i	0	0	0	0	1			
Engine, turbine, and power transmission equipment	3336	70	2,310	* e	4	2	1	i	* e	0 - 437	71	1	13	2	3	3	* e	62	* e	0 - 358	* e	* e	30	8	* e	110	0	0 - 68					
Other machinery	other 333	1,672	5,970	5	e	8	53	44	1 e	0 - 437	186	66	310	228	0 - 509	251	30	40	7	40	601	0 - 60	14	30	89	4	e	488	2	0 - 68			
Computer and electronic products	334	2,218	73,922	43	48	475	755	223	1,185	i	1,791	15	633	56	5,686	1,017	65	173	67	95	7,462	i	340	55	366	935	4	349	1	e	147		
Communications equipment	3342	266	11,822	6	19	113	391	21	268	i	685	0 - 16	88	9	46	436	i	4	0 - 57	1	46	692	50	1	248	235	2	25	0	0 - 56			
Semiconductor and other electronic components	3344	595	28,642	8	3	e	183	75	165	207	i	576	i	*	153	8	5,293	252	40	56	42	12	2,155	79	15	12	176	1	e	100	* e	0 - 44	
Navigational, measuring, electromedical, and control instruments	3345	1,101	10,864	29	13	i	151	247	31	223	360	0 - 16	343	i	36	237	242	21	62	24	33	563	186	i	37	102	280	* e	119	1	e	1 - 57	

TABLE 28-B
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2018
(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total ^a (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 ^c	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	260	3,046	* e	8 i	22	34 i	* 92 i	90 i	0	63 i	4	13 i	109	2	12 i	* e	21	70 i	109 i	5 i	27 i	8 i	* 49 i	0	2			
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	105	3,388	0 - 30	3	111	34	26	67	0 - 271	0 - 16	34	23	92	46	16	11	6	3	252	50	0 - 33	37	53	0	11	1 e	0 - 56	
Other measuring and controlling device	other 3345	737	4,430	0 - 30	2 i	18	179	5	64	0 - 271	0 - 16 e	246 i	9	131	87	3	38	18	10	241 i	26	0 - 33	38	219	* e	60	* e	0 - 56	
Other computer and electronic products	other 334	255	22,594	* e	12	28	42	6	488 i	170	* e	49	3	110	86	*	0 - 57	0	4	4,053 i	25	1	5	244	* e	105 i	* e	91	
Electrical equipment, appliances, and components	335	750	4,222	1 e	9	10	80	1 e	97	170	* e	92	5	57	303	10	38	3	37	122	2 e	2 e	35	45	1 e	491	*	123	
Transportation equipment	336	1,065	35,894	31	25	42	113	9	452	254	3 e	1,016	61	305	329	11	326	9	187	991	395	7	417	2,130	15	304	* e	249	
Motor vehicles, bodies, trailers, and parts	3361–63	636	23,080	4 e	12	16	13	1	211	185	1 e	308	10	247	55	2	140	3 e	172	162	249	* e	25	114	2 e	106	* e	244	
Aerospace products and parts	3364	243	11,160	25	13	25	94	8	239	51	*	704	51	56	192	7	175	*	6	805	145	7	122	2,006	14	21	* e	2	
Aircraft, aircraft engine, and aircraft parts	336411–13	207	10,746	25	13	25	85	8	234	51	*	698	51	56	192	7	175	*	6	804	145	7	119	1,997	14	20	* e	2	
Guided missile, space vehicle, and related parts	336414–15, 336419	36	414	0	0	0	9	*	4	0	0	7	0	0	*	i	0	0	0	1 e	0	0	3	9	0	1 e	0	0	
Military armored vehicle, tank, and tank component	336992	6	6	0	0	0	0	0	0	0	0	1	0	0	0	0	*	i	0	0	0	0	0	0	0	0	0	*	
Other transportation	other 336	182	1,649	2	* e	1 i	5	*	2 e	18	1	3	* e	2 e	82	1 e	11	6	9	24	* e	* e	270	11 e	* e	177	0	2	
Furniture and related products	337	231	404	* e	* e	* i	3	* e	7	17	* e	5 i	* e	4	26	3 i	4	1 i	9	6	12	3	2 i	2	1	21	*	12	
Miscellaneous	339	1,220	16,807	1 e	318	70	572 i	3 e	293	211	1 e	372	11	197 i	451	417 i	18	1 e	188	301	267	5	74	355	1 e	542	* e	16 - 71	
Medical equipment and supplies	3391	684	14,267	* e	2	49	544 i	2	153	178	* e	316	7	56	402	23	9	* e	177	271	227	* e	49	266	1 e	509	* e	17	
Other miscellaneous manufacturing	3399	537	2,540	1 e	316	22	28 i	1 e	140	33 i	* e	56	4	141 i	49	394 i	8	1 e	11	30	39	5	25 i	90	1 e	32	* e	0 - 54	
Nonmanufacturing industries	21–23, 42–81	9,978	143,123	297	206 i	265	3,967	120	8,241	2,722	139	1,201	280	1,503	2,007	41	271	37	161	6,077	1,330	101	2,404	24,730	54	1,638	17	1,115	
Mining, quarrying, oil and gas extraction, and support activities	21	149	1,775	* e	5	* e	* e	2 e	* e	* e	1 e	1 e	57	* e	19	* e	* e	* e	* e	1,425	8 i	* e	* e	* e	1 e	3	6	37	
Utilities	22	61	224	* e	* e	* e	* e	* e	12	1 i	12	9	* e	*	9	* e	*	*	* e	26	*	* e	4	6	4	*	1	1	
Wholesale trade	42	768	881 i	2 i	1 e	1	12	1 i	156 i	40 i	1 i	8 e	2 e	4	12 i	1	6	9 i	5	83 i	2 i	* e	7 i	8 i	2 i	23 i	* e	61	
Electronic shopping and electronic auctions	454111–12	84	11,557 i	0 - 7 e	0 - 110 i	0 - 8 i	0 - 212 i	0 - 10 i	0 - 294 i	0 - 69 i	0 - 6 i	0 - 102 i	0 - 12 i	0 - 254 i	0 - 66 i	0 - 8 i	9 i	0 - 4 i	0 - 10 i	0 - 635 i	0 - 247 i	0 - 13 e	0 - 592 i	5,151 - 7,063 i	1 i	0 - 98 i	0 - 4 e	0 - 9	
Transportation and warehousing	48–49	87	935	4	2	* e	4 e	* e	6 e	13	1 e	27	1 e	12	24	* e	1 e	* e	21	33	4	* e	5	137	* e	2 e	* e	2	
Information	51	2,626	93,487	235	55	205	2,171	59	5,443	1,498	94	504	79	771	967	11	165	13	60 e	1,665	828	27	889	16,663	18	912	6	44	
Publishing	511	975	32,281	14	26	96	239	17	1,063	881	90	250	13 e	353	283	3 e	17	6	18 e	616	314	21	319	12,582	11	739	4	2	
Newspaper, periodical, book, and directory publishers	5111	33	131	* e	* e	* e	* e	* e	5	* e	* e	* e	* e	* i	*	i	* e	* e	* e	* i	* e	* e	* e	* e	* e	* e	* e	*	*
Software publishers	5112	941	32,150	14	26	96	238	17	1,058	881	90	250	13 e	353	283	3 e	17	6	18 e	616	314	21	319	12,582	11	739	4	1	
Telecommunications	517	177	3,631	1 e	4	34	1,607	1 e	547	49	1 e	8	3 e	11	11	* e	7	2 e	2 e	60	4 e	* e	63	337	* e	18	1 e	2	
Data processing, hosting, and related services	518	1,192	23,115	176	14 e	51	194	11	607	511	2 e	205	5 e	271	269	7 i	86	3	26	737	332	5 e	334	1,037	6	130	1 e	0 - 42	
Other information	other 51	284	34,459	43	12	24	132	30	3,226	57	1 e	40	59	135	404	* e	56	2 e	14 e	252	179	1 e	172	2,707	1 e	25	1 e	0 - 42	
Finance and insurance	52	209	7,426	2	5	2	475	15 i	532	288	* e	189	4	13 i	321 i	8	13	3 i	5	291	23	1	9 i	42	6 i	449	* e	605	

TABLE 28-B
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2018
(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total ^a (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 ^c																		
Real estate and rental and leasing	53	30	1,022	12	3	i	*	i	*	*	e	13	*	e	*	e	7	*	e	*	e	1	i	*	e	1	*	e	134 - 176	*	e	6	*	e	0 - 9											
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5	6	6	0		0		0	0	0	*	i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*																		
Other real estate and rental and leasing	other 53	25	1,016	6	3	i	*	i	*	*	e	13	*	e	*	e	6	*	e	*	e	1	i	*	e	1	*	e	134 - 176	*	e	6	*	e	0 - 9											
Professional, scientific, and technical services	54	5,204	22,374	39	29	e	52		1,075	36		1,786	815	27	347	129	444	546	16	e	62	11	62	e	1,874	208	62	895	676	19	143	3	e	301												
Architectural, engineering, and related services	5413	1,150	2,277	11	7		11		51	5	e	101	38	3	e	31	12	114	110	3	e	16	5	15	207	24	4	70	62	1	e	29	1	e	48											
Computer systems design and related services	5415	2,410	13,633	13	e	16	e	18	241	e	17	1,423	619	20	189	35	312	i	188	9	e	37	5	30	e	1,240	126	44	584	e	432	11		76	1	e	215									
Scientific research and development services	5417	785	2,424	9	1		18	i	107	10		42	78	3	45	1	i	7	139	2	i	1	1	4	101	22	1	i	22	i	84	4		8	0	9										
Research and development in biotechnology	541711	202	820	9	*	e	2		6	8		7	i	56	*		3	*	e	1	i	63	*	e	*	e	1	*	e	7	2	i	1	i	10	i	24	*	e	1	e	0	1			
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	573	1,577	*	e	1		15	i	99	2	e	34	22	3	38	1	i	6		76	2	i	1	*	i	3		94	20	1	i	12		60	4		8	0	8						
Research and development in the social sciences and humanities	541720	10	27	0	0		*		1	0		2	0	0	4	0	*	i	0	0	0	0	0	0	0	0	0	0	*	0	0	0	0	0	0	0	0	0								
Other professional, scientific, and technical services	other 54	859	4,041	7	5	e	4		676	4	e	220	80	1	e	83	81	12	e	109	2	e	9	e	1	e	13	e	327	36	14	i	219		98	3	e	29	1	e	30					
Health care services	621–23	178	1,401	*	e	*	e	*	e	22	*	e	4	2	*	e	12	*	e	8	i	47	i	*	e	12	i	*	e	2		3	14	i	*	e	7		4	*	e	7	*	e	21	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	592	2,041	0 - 7	0 - 110		0 - 8		0 - 212	0 - 10		0 - 294	0 - 69	0 - 6	0 - 102	0 - 12	0 - 254	0 - 66	0 - 8	2	0 - 4	0 - 10	0 - 635	0 - 247	i	0 - 13	i	0 - 592	0 - 1,863	2	0 - 98	0 - 4		39												
All companies (number of domestic employees)	–	24,698	377,806	513	638		992		16,843	374		15,370	7,790	284	6,820	822	8,446	10,633	663	1,462	179	1,184	18,267	2,642	233	4,092	29,498	209	i	5,334	34		2,399													
Small companies																																														
10-19 ^b	–	3,948	3,340	7	e	12	e	20	413	13		180	e	92	3	e	62	e	13	e	37	101	14	13	e	4	e	24	e	178	e	31	e	3	e	81	e	125	3	e	38	e	2	e	28	
20–49	–	6,950	9,556	18	e	24	e	48	343	13	e	377	e	149	e	12	e	235	e	42	e	102	292	28	54	e	12	e	56	e	511	e	105		24		314	e	240	8	e	117	e	3	e	110
Medium companies																																														
50–99	–	4,406	10,446	26	38		69		340	30		411	393	10	211	30	e	102	393	19	39	e	15	i	56	e	411	150	22	i	202	e	303	10		160	7		141							
100–249	–	4,562	14,626	39	35		62		677	34		437	202	13	338	48		151	471	23	48	18		66		723	191	16		209		539	17		337	6		197								
Large companies																																														
250–499	–	1,967	16,604	37	115		41		531	10		652	294	6	392	29		170	566	16	54	7		78		622	142	32		226		595	1	e	188		3		148							
500–999	–	1,098	15,561	26	22		130		454	4		623	774	2	207	18		72	197	13	121	9		54		955	162	4		277		446	12		289	3	i	283 - 393								
1,000–4,999	–	1,221	58,509	170	225		350		1,293	24		1,722	1,479	94	1,420	252		963	1,742	248	321	90		168		1,943	614	22		613		2,234	20		741	10		414								
5,000–9,999	–	231	36,274	21	3		29	1,546	i	6		2,215	1,325	9	547	13		607	599	211	i	174	2		167	i	1,412	i	651	17	i	215		436	i	11	i	1,680	0 - 4		49 - 166					
10,000–24,999	–	201	74,423	132	34		113		6,514	43		4,236	1,534	2	1,939	226		660	3,536	51	333	6		278		4,166	322	32	i	443		2,996	106	i	1,272	0 - 4	e	223 - 282								
25,000 or more	–	114	138,465	38	130	i	131		4,732	199		4,519	1,549	133	1,469	151		5,583	2,735	40	305	14		238		7,347	i	275	61		1,513		21,584	21		511	*		654	**						

* = 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.

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

^b Business Research and Development Survey does not include companies with fewer than 10 domestic employees.

^c 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 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. Changes in data collection and imputation processes have affected the comparability of company count estimates in this table with estimates published for previous years. 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 29

Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2018

(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	377,806	4,459	25,777	33,923	23,273	290,374
Manufacturing industries	31–33	234,682	2,811	13,187	20,555	15,835	182,294
Food	311	4,412	201	546	537	509	2,619 i
Beverage and tobacco products	312	1,004	28	84	67	249	577
Textile, apparel, and leather products	313–16	986	40	208	270	278	190
Wood products	321	199	49	53	97	0	0
Paper	322	932	31	101	146	68	585
Printing and related support activities	323	238	31	93	114	0	0
Petroleum and coal products	324	1,246	19	61 - 85	113	104 - 128	924
Chemicals	325	73,584	445	2,497	7,109	5,488	58,045
Basic chemicals	3251	2,251	55	362 - 386	658	492 - 513	662
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,568	0 - 184	133	112	0	1,138 - 1,325
Pesticide, fertilizer, and other agricultural chemicals	3253	1,135 i	13	61 - 82	65	0	975 - 996 i
Pharmaceuticals and medicines	3254	64,800	157	1,513	5,765	4,649	52,716
Soap, cleaning compound, and toilet preparation	3256	2,573	37 - 52	190	231	146	1,953 - 1,969
Paint, coating, adhesive, and other chemicals	3255, 3259	1,257	0 - 184	201 - 219	278	180 - 202	393 - 598
Plastics and rubber products	326	2,667	187	711	1,002	180	588
Nonmetallic mineral products	327	1,361	52	133	155	75	946
Primary metals	331	817	42	230	208	177	160
Fabricated metal products	332	2,222	334	786	606	238	258
Machinery	333	13,765	344 - 379	1,940	1,791	1,277 - 1,315	8,377
Agricultural implement	33311	1,862	40	162	123	302	1,235
Semiconductor machinery	333242	3,623	9	0 - 45	27 - 204	99 - 229	3,139 - 3,489
Engine, turbine, and power transmission equipment	3336	2,310	0 - 120	75	5 - 175	0 - 170	1,891 - 2,061
Other machinery	other 333	5,970	174 - 331	1,657 - 1,705	1,291 - 1,468	704 - 828	1,761 - 1,974
Computer and electronic products	334	73,922	373	2,326	3,551	2,912	64,760
Communications equipment	3342	11,822	41	322 - 386	636	689 - 754	10,069
Semiconductor and other electronic components	3344	28,642	77	760	1,354	783	25,670
Navigational, measuring, electromedical, and control instruments	3345	10,864	217	1,010	1,079	880	7,678
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,046	52	272	377	448	1,897 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,388	0 - 63	126	162	50 - 113	2,989

TABLE 29

Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2018

(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 measuring and controlling device	other 3345	4,430	101 - 166	611	540	318 - 383	2,793
Other computer and electronic products	other 334	22,594	38	170 - 234	483	496 - 561	21,343
Electrical equipment, appliances, and components	335	4,222	161	683	912	704	1,762
Transportation equipment	336	35,894	163	1,293	1,623	2,461	30,354
Motor vehicles, bodies, trailers, and parts	3361–63	23,080	100	729	978	1,452	19,819
Aerospace products and parts	3364	11,160	35	348 - 389	468 - 525	781	9,428 - 9,527
Aircraft, aircraft engine, and aircraft parts	336411–13	10,746	34	298	402	740	9,272
Guided missile, space vehicle, and related parts	336414–15, 336419	414	2	49 - 91	66 - 124	41	156 - 256
Military armored vehicle, tank, and tank component	336992	6	*	5	0	0	0
Other transportation	other 336	1,649	28	168 - 210	119 - 176	227	1,009 - 1,108
Furniture and related products	337	404	49	108	247	0	0
Miscellaneous	339	16,807	221 - 256	1,310 - 1,340	2,008	1,080 - 1,119	12,150
Medical equipment and supplies	3391	14,267	115 - 150	778	1,475	921 - 960	10,941
Other miscellaneous manufacturing	3399	2,540	76 - 107	532 - 562	533	159	1,209
Nonmanufacturing industries	21–23, 42–81	143,123	1,648	12,589	13,368	7,438	108,080
Mining, quarrying, oil and gas extraction, and support activities	21	1,775	21	197	177	0	1,380
Utilities	22	224	6	50	120	48	0
Wholesale trade	42	881	182	573	125	0	0
Electronic shopping and electronic auctions	454111–12	11,557	11	1 - 817	10 - 535	0	10,197 - 11,536
Transportation and warehousing	48–49	935	11	75	202	251	396
Information	51	93,487	376	4,297	6,507	5,145	77,161
Publishing	511	32,281	164 - 173	1,367	1,828	1,503	27,408 - 27,420
Newspaper, periodical, book, and directory publishers	5111	131	3	30	97	0	0
Software publishers	5112	32,150	161 - 170	1,337	1,731	1,503	27,408 - 27,420
Telecommunications	517	3,631	24	181	498	172	2,755
Data processing, hosting, and related services	518	23,115	133 - 142	2,137 - 2,148	3,609	3,147	14,080
Other information	other 51	34,459	39 - 48	600 - 612	572	323	32,906 - 32,918

TABLE 29

Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2018

(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
Finance and insurance	52	7,426	44	264	807	347	5,965
Real estate and rental and leasing	53	1,022	6	27	112	0	877
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	*	6	0	0	0
Other real estate and rental and leasing	other 53	1,016	6	22	112	0	877
Professional, scientific, and technical services	54	22,374	878	6,119	4,312	1,159	9,906
Architectural, engineering, and related services	5413	2,277	233	1,007	568	315	153
Computer systems design and related services	5415	13,633	426	3,112	1,788	483	7,824
Scientific research and development services	5417	2,424	78	987	805	129	424
Research and development in biotechnology	541711	820	0 - 23	247 - 272	235 - 265	71	219
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	1,577	56	716	541	58	205
Research and development in the social sciences and humanities	541720	27	0 - 23	0 - 24	0 - 28	0	0
Other professional, scientific, and technical services	other 54	4,041	141	1,013	1,150	231	1,505
Health care services	621–23	1,401	27	174	476 i	345 i	379 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,041	86	0 - 816	0 - 525	142 i	476 - 1,815
All companies (number of domestic employees)	–	377,806	4,459	25,777	33,923	23,273	290,374
Small companies							
10–19 ^a	–	3,340	896	1,827	375	0	243
20–49	–	9,556	1,453	5,826	2,012	113	151 i
Medium companies							
50–99	–	10,446	665 - 857	4,844	3,929	709	105 - 297
100–249	–	14,626	834 - 1,030	5,753	5,359	2,390	96 - 292
Large companies							
250–499	–	16,604	232	3,351	5,496	3,069	4,456
500–999	–	15,561	109	2,085	4,360	3,685	5,323
1,000–4,999	–	58,509	69	1,707	8,523	8,751	39,460
5,000–9,999	–	36,274	3	187	2,175	2,160	31,749
10,000–24,999	–	74,423	6	106	1,111	1,861	71,339
25,000 or more	–	138,465	0	90	583	536	137,256

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 30
Companies with domestic R&D paid for and performed by the company in energy and environmental protection application areas, by industry and company size:
2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Energy		Environmental protection	
		Companies ^a (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount
All industries	21–23, 31–33, 42–81	24,698	377,806	3,439	23,275	2,541	7,994
Manufacturing industries	31–33	14,727	234,682	2,567	19,367	1,953	7,076
Food	311	802	4,412	47	51	84	82
Chemicals	325	2,631	73,584	284	481	364	440
Basic chemicals	3251	321	2,251	145	299	147	176
Pharmaceuticals and medicines	3254	1,285	64,800	5	3	9	16
Other chemicals	other 325	1,026	6,533	133	179	208	248
Plastics and rubber products	326	899	2,667	179	161	181	162
Nonmetallic mineral products	327	227	1,361	90	397	60	53
Fabricated metal products	332	1,427	2,222	161	323	96	44
Machinery	333	2,020	13,765	566	2,695	369	1,165
Agricultural implement	33311	237	1,862	45	63	32	136
Semiconductor machinery	333242	44	3,623	D	0 - 1,347	D	1
Engine, turbine, and power transmission equipment	3336	70	2,310	35	1,287	29	630
Other machinery	other 333	1,672	5,970	D	0 - 1,347	D	398
Computer and electronic products	334	2,218	73,922	452	8,074	273	771
Semiconductor and other electronic components	3344	595	28,642	178	6,217	46	286
Other electronic products	other 334	1,623	45,280	273	1,857	227	486
Electrical equipment, appliances, and components	335	750	4,222	389	1,178	157	362
Transportation equipment	336	1,065	35,894	118	5,244	111	3,679
Motor vehicles, bodies, trailers, and parts	3361–63	636	23,080	72	4,660	75	3,595
Other transportation	other 336	430	12,814	46	584	37	84
Miscellaneous	339	1,220	16,807	81	222	56	64
Other manufacturing	312–16, 321–24, 331, 337	1,487	5,826	201	541	202	254
Nonmanufacturing industries	21–23, 42–81	9,978	143,123	872	3,908	588	918
Mining, quarrying, oil and gas extraction, and support activities	21	149	1,775	62	1,462	30	73
Utilities	22	61	224	56	211	23	68
Wholesale trade	42	768	881	80	59	62	21
Information	51	2,626	93,487	123	992	27	131
Publishing	511	975	32,281	67	434	15	98
Telecommunications	517	177	3,631	D	7	D	2
Data processing, hosting, and related services	518	1,192	23,115	45	541	D	28
Other information	other 51	284	34,459	D	10	D	4

TABLE 30
Companies with domestic R&D paid for and performed by the company in energy and environmental protection application areas, by industry and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Energy		Environmental protection	
		Companies ^a (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount
Professional, scientific, and technical services	54	5,204	22,374	489	1,038	412	606
Architectural, engineering, and related services	5413	1,150	2,277	307	506	310	373
Scientific research and development services	5417	785	2,424	122	326	61	100
Research and development in biotechnology	541711	202	820	0	0	D	1
Other scientific research and development	other 5417	583	1,603	122	326	D	99
Other professional, scientific, and technical services	other 54	3,269	17,673	60	206	41	133
Health care services	621-23	178	1,401	D	9	0	0
Other nonmanufacturing	23, 44-45, 48-49, 52-53, 55-56, 624, 71-72, 81	998	22,982	D	137	34	19
All companies (number of domestic employees)	-	24,698	377,806	3,439	23,275	2,541	7,994
Small companies							
10-19 ^c	-	3,948	3,340	408	172	280	91
20-49	-	6,950	9,556	976	637	704	282
Medium companies							
50-99	-	4,406	10,446	540	547	419	313
100-249	-	4,562	14,626	634	876	460	263
Large companies							
250-499	-	1,967	16,604	281	989	214	193
500-999	-	1,098	15,561	199	877	144	337
1,000-4,999	-	1,221	58,509	240	3,526	189	1,074
5,000-9,999	-	231	36,274	69	2,247	56	666
10,000-24,999	-	201	74,423	64	4,873	55	1,454
25,000 or more	-	114	138,465	28	8,532	20	3,320

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.

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

^b Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse. These company count estimates 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. 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.

^c Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 31

Companies with domestic R&D paid for and performed by the company in health or medical, defense, and agricultural application areas, by industry and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Health or medical		Defense		Agriculture	
		Companies ^a (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount
All industries	21–23, 31–33, 42–81	24,698	377,806	5,721	i 89,550	2,220	i 12,721	1,743	i 7,273
Manufacturing industries	31–33	14,727	234,682	4,045	i 82,612	1,641	i 10,628	1,482	i 6,359
Food	311	802	4,412	164	i 309	0	0	194	i 1,765
Chemicals	325	2,631	73,584	1,446	i 62,279	104	i 151	307	i 2,640
Basic chemicals	3251	321	2,251	85	i 139	12	22	114	i 93
Pharmaceuticals and medicines	3254	1,285	64,800	1,139	i 61,864	19	103	31	980
Other chemicals	other 325	1,026	6,533	222	i 276	73	i 26	162	i 1,566
Plastics and rubber products	326	899	2,667	247	i 542	87	i 74	163	i 70
Nonmetallic mineral products	327	227	1,361	50	i 237	31	i 23	0	0
Fabricated metal products	332	1,427	2,222	178	i 101	208	i 187	88	i 38
Machinery	333	2,020	13,765	331	i 237	146	i 150	324	i 1,319
Agricultural implement	33311	237	1,862	D	* i	4	1	218	i 1,263
Semiconductor machinery	333242	44	3,623	0	0	D	2	0	0
Engine, turbine, and power transmission equipment	3336	70	2,310	10	53	19	i 44	6	14
Other machinery	other 333	1,672	5,970	D	184	D	103	100	i 42
Computer and electronic products	334	2,218	73,922	658	i 6,363	625	i 4,039	157	i 283
Semiconductor and other electronic components	3344	595	28,642	176	i 967	280	i 1,848	12	24
Other electronic products	other 334	1,623	45,280	482	i 5,396	344	i 2,190	144	i 259
Electrical equipment, appliances, and components	335	750	4,222	138	i 118	154	i 72	100	i 36
Transportation equipment	336	1,065	35,894	38	i 565	163	i 5,823	47	i 90
Motor vehicles, bodies, trailers, and parts	3361–63	636	23,080	21	i 427	30	23	32	i 45
Other transportation	other 336	430	12,814	17	i 138	132	i 5,800	15	45
Miscellaneous	339	1,220	16,807	642	i 11,757	39	53	8	16
Other manufacturing	312–16, 321–24, 331, 337	1,487	5,826	153	i 102	84	i 57	94	i 102
Nonmanufacturing industries	21–23, 42–81	9,978	143,123	1,676	i 6,938	579	i 2,094	261	i 914
Mining, quarrying, oil and gas extraction, and support activities	21	149	1,775	D	*	D	1	6	2
Utilities	22	61	224	0	0	0	0	D	7
Wholesale trade	42	768	881	i 79	i 30	D	1	24	i 25
Information	51	2,626	93,487	381	2,019	97	836	41	665
Publishing	511	975	32,281	172	i 1,243	71	i 752	20	607
Telecommunications	517	177	3,631	7	5	7	20	D	5
Data processing, hosting, and related services	518	1,192	23,115	197	741	14	56	9	44
Other information	other 51	284	34,459	6	30	5	7	D	10

TABLE 31

Companies with domestic R&D paid for and performed by the company in health or medical, defense, and agricultural application areas, by industry and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Health or medical		Defense		Agriculture							
		Companies ^a (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount						
Professional, scientific, and technical services	54	5,204	22,374	1,022	i	3,102	466	i	1,240	i	166	i	178		
Architectural, engineering, and related services	5413	1,150	2,277	83	i	76	i	110	i	125	i	61	i	54	i
Scientific research and development services	5417	785	2,424	545	i	1,294	132	i	86		86	i	117		
Research and development in biotechnology	541711	202	820	156	i	595	D		1		24	i	66		
Other scientific research and development	other 5417	583	1,603	389	i	699	D		85		62	i	51		
Other professional, scientific, and technical services	other 54	3,269	17,673	394	i	1,731	225	i	1,030		19		8		
Health care services	621–23	178	1,401	109	i	1,285	i	D	1	i	0		0		
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	998	22,982	i	D	503	9		14		D		38	i	
All companies (number of domestic employees)	–	24,698	377,806	5,721	i	89,550	2,220	i	12,721		1,743	i	7,273		
Small companies															
10–19 ^c	–	3,948	3,340	1,087	i	1,057	319	i	106	i	226	i	65	i	
20–49	–	6,950	9,556	1,665	i	3,360	655	i	632		496	i	211	i	
Medium companies															
50–99	–	4,406	10,446	887	i	3,840	360	i	343		231	i	174		
100–249	–	4,562	14,626	1,064	i	4,719	405	i	456		337	i	257		
Large companies															
250–499	–	1,967	16,604	404		5,894	213		330	i	169		262		
500–999	–	1,098	15,561	200		4,105	81		386	i	83		182		
1,000–4,999	–	1,221	58,509	280		11,670	110		1,653		136		728	i	
5,000–9,999	–	231	36,274	53		9,480	34		808	i	34		387		
10,000–24,999	–	201	74,423	52		28,103	28		1,329		20		3,071	i	
25,000 or more	–	114	138,465	28		17,322	16		6,679		11		1,936		

* = 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.

NAICS = 2012 North American Industry Classification System.

^a Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse. 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.^b Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse. These company count estimates 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. 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.^c Business 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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 32

Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
All industries	21–23, 31–33, 42–81	377,806	3.5	3.7
Manufacturing industries	31–33	234,682	3.9	4.0
Food	311	4,412	0.8	0.8
Beverage and tobacco products	312	1,004	0.7	0.7
Textile, apparel, and leather products	313–16	986	1.4	1.4
Wood products	321	199	0.7	0.7
Paper	322	932	1.0	1.0
Printing and related support activities	323	238	0.8	0.8
Petroleum and coal products	324	1,246	0.3	0.3
Chemicals	325	73,584	6.3	6.4
Basic chemicals	3251	2,251	1.3	1.3
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,568	2.5	2.5
Pesticide, fertilizer, and other agricultural chemicals	3253	1,135	1.1	1.1
Pharmaceuticals and medicines	3254	64,800	9.9	10.1
Soap, cleaning compound, and toilet preparation	3256	2,573	2.3	2.3
Paint, coating, adhesive, and other chemicals	3255, 3259	1,257	2.0	2.0
Plastics and rubber products	326	2,667	1.5	1.6
Nonmetallic mineral products	327	1,361	2.4	3.3
Primary metals	331	817	0.6	0.6
Fabricated metal products	332	2,222	1.7	1.7
Machinery	333	13,765	3.7	3.7
Agricultural implement	33311	1,862	4.2	4.2
Semiconductor machinery	333242	3,623	16.7	16.7
Engine, turbine, and power transmission equipment	3336	2,310	4.4	4.4
Other machinery	other 333	5,970	2.3	2.4
Computer and electronic products	334	73,922	9.0	9.0
Communications equipment	3342	11,822	14.0	14.0
Semiconductor and other electronic components	3344	28,642	9.5	9.5
Navigational, measuring, electromedical, and control instruments	3345	10,864	6.0	6.0
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,046	11.0	11.0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,388	4.3	4.3
Other measuring and controlling device	other 3345	4,430	6.0	6.0

TABLE 32

Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
Other computer and electronic products	other 334	22,594	8.9	8.9
Electrical equipment, appliances, and components	335	4,222	3.2	3.2
Transportation equipment	336	35,894	2.7	2.9
Motor vehicles, bodies, trailers, and parts	3361-63	23,080	2.6	2.8
Aerospace products and parts	3364	11,160	3.0	3.0
Aircraft, aircraft engine, and aircraft parts	336411-13	10,746	3.1	3.1
Guided missile, space vehicle, and related parts	336414-15, 336419	414	2.4	2.4
Military armored vehicle, tank, and tank component	336992	6	1.4	1.4
Other transportation	other 336	1,649	2.4	2.4
Furniture and related products	337	404	1.0	1.0
Miscellaneous	339	16,807	5.6	5.6
Medical equipment and supplies	3391	14,267	7.0	7.0
Other miscellaneous manufacturing	3399	2,540	2.6	2.6
Nonmanufacturing industries	21-23, 42-81	143,123	3.0	3.3
Mining, quarrying, oil and gas extraction, and support activities	21	1,775	0.9	0.9
Utilities	22	224	0.1	0.1
Wholesale trade	42	881	0.6	0.6
Electronic shopping and electronic auctions	454111-12	11,557	6.4	6.5
Transportation and warehousing	48-49	935	0.4	0.4
Information	51	93,487	7.1	7.2
Publishing	511	32,281	14.4	14.4
Newspaper, periodical, book, and directory publishers	5111	131	3.5	3.5
Software publishers	5112	32,150	14.6	14.6
Telecommunications	517	3,631	0.8	0.8
Data processing, hosting, and related services	518	23,115	6.5	6.5
Other information	other 51	34,459	13.7	14.4
Finance and insurance	52	7,426	0.8	0.8
Real estate and rental and leasing	53	1,022	16.6	16.6
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	2.5	2.5
Other real estate and rental and leasing	other 53	1,016	17.2	17.2
Professional, scientific, and technical services	54	22,374	5.3	5.3
Architectural, engineering, and related services	5413	2,277	2.2	2.2

TABLE 32

Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
Computer systems design and related services	5415	13,633	8.7	8.8
Scientific research and development services	5417	2,424	3.4	3.4
Research and development in biotechnology	541711	820	2.9	2.9
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	1,577	3.7	3.7
Research and development in the social sciences and humanities	541720	27	2.9	2.9
Other professional, scientific, and technical services	other 54	4,041	4.3	4.3
Health care services	621–23	1,401	1.4	1.4
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,041	0.2	0.4
All companies (number of domestic employees)	–	377,806	3.5	3.7
Small companies				
10–19 ^c	–	3,340	16.4	17.2
20–49	–	9,556	13.7	14.1
Medium companies				
50–99	–	10,446	8.2	8.4
100–249	–	14,626	4.9	4.9
Large companies				
250–499	–	16,604	5.9	6.0
500–999	–	15,561	3.8	3.9
1,000–4,999	–	58,509	4.0	4.1
5,000–9,999	–	36,274	3.6	3.8
10,000–24,999	–	74,423	3.3	3.3
25,000 or more	–	138,465	2.9	3.2

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

NAICS = 2012 North American Industry Classification System.

^a 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.^b 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.^c Business 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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 33

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: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
All industries	21–23, 31–33, 42–81	420,474	3.9	4.1
Manufacturing industries	31–33	273,761	4.6	4.7
Food	311	4,644	0.9	0.9
Beverage and tobacco products	312	1,237	0.8	0.8
Textile, apparel, and leather products	313–16	1,004	1.4	1.4
Wood products	321	212	0.7	0.8
Paper	322	946	1.1	1.1
Printing and related support activities	323	240	0.8	0.8
Petroleum and coal products	324	1,475	0.4	0.4
Chemicals	325	105,155	9.0	9.1
Basic chemicals	3251	2,323	1.3	1.3
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,574 - 1,586	D	D
Pesticide, fertilizer, and other agricultural chemicals	3253	1,235	1.2	D
Pharmaceuticals and medicines	3254	95,879	14.7	14.9
Soap, cleaning compound, and toilet preparation	3256	2,843	2.5	2.5
Paint, coating, adhesive, and other chemicals	3255, 3259	1,290 - 1,302	D	D
Plastics and rubber products	326	2,735	1.6	1.6
Nonmetallic mineral products	327	1,376	2.4	3.4
Primary metals	331	854	0.6	0.7
Fabricated metal products	332	2,307	1.8	1.8
Machinery	333	14,194	3.8	3.8
Agricultural implement	33311	2,050	4.6	4.6
Semiconductor machinery	333242	3,624 - 3,633	D	D
Engine, turbine, and power transmission equipment	3336	2,360	4.5	4.5
Other machinery	other 333	6,152 - 6,161	D	D
Computer and electronic products	334	75,707	9.2	9.2
Communications equipment	3342	12,602	14.9	14.9
Semiconductor and other electronic components	3344	29,027	9.6	9.6
Navigational, measuring, electromedical, and control instruments	3345	11,223	6.2	6.2
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,126	11.3	11.3
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,564 - 3,575	D	D
Other measuring and controlling device	other 3345	4,523 - 4,534	D	D

TABLE 33

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: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
Other computer and electronic products	other 334	22,855	9.0	9.0
Electrical equipment, appliances, and components	335	4,330	3.3	3.3
Transportation equipment	336	39,112	3.0	3.1
Motor vehicles, bodies, trailers, and parts	3361-63	25,688	2.9	3.1
Aerospace products and parts	3364	11,715	3.2	3.2
Aircraft, aircraft engine, and aircraft parts	336411-13	11,168	3.2	3.2
Guided missile, space vehicle, and related parts	336414-15, 336419	546	3.2	3.2
Military armored vehicle, tank, and tank component	336992	6	1.4	1.4
Other transportation	other 336	1,704	2.5	2.5
Furniture and related products	337	424	1.0	D
Miscellaneous	339	17,810	5.9	D
Medical equipment and supplies	3391	15,106	7.4	7.4
Other miscellaneous manufacturing	3399	2,703	2.8	D
Nonmanufacturing industries	21-23, 42-81	146,712	3.1	3.4
Mining, quarrying, oil and gas extraction, and support activities	21	1,916	1.0	1.0
Utilities	22	435	0.1	0.1
Wholesale trade	42	916	i 0.6	0.6
Electronic shopping and electronic auctions	454111-12	11,557 - 11,688	i D	D
Transportation and warehousing	48-49	965	0.4	0.4
Information	51	95,548	7.3	7.4
Publishing	511	33,389	14.9	14.9
Newspaper, periodical, book, and directory publishers	5111	136	3.6	3.6
Software publishers	5112	33,253	15.1	15.1
Telecommunications	517	3,983	0.8	0.8
Data processing, hosting, and related services	518	23,322	6.6	6.6
Other information	other 51	34,854	13.9	14.4
Finance and insurance	52	7,773	0.8	0.8
Real estate and rental and leasing	53	1,022	16.6	16.6
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	2.5	2.5
Other real estate and rental and leasing	other 53	1,016	17.2	17.2
Professional, scientific, and technical services	54	22,926	5.4	5.4
Architectural, engineering, and related services	5413	2,380	2.3	2.3

TABLE 33

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: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
Computer systems design and related services	5415	13,743	8.8	8.8
Scientific research and development services	5417	2,661	3.7	3.7
Research and development in biotechnology	541711	891	3.1	3.1
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	1,744	4.1	4.1
Research and development in the social sciences and humanities	541720	27	2.9	2.9
Other professional, scientific, and technical services	other 54	4,141	4.4	4.4
Health care services	621–23	1,481	1.5	1.5
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,043 - 2,175	D	D
All companies (number of domestic employees)	–	420,474	3.9	4.1
Small companies				
10–19 ^c	–	3,755	18.5	19.1
20–49	–	11,118	15.9	16.0
Medium companies				
50–99	–	12,282	9.7	9.9
100–249	–	16,688	5.6	5.6
Large companies				
250–499	–	18,956	6.8	6.9
500–999	–	16,788	4.1	4.2
1,000–4,999	–	64,205	4.4	4.5
5,000–9,999	–	42,512	4.2	4.4
10,000–24,999	–	89,224	3.9	4.0
25,000 or more	–	144,944	3.0	3.3

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.

^a 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.^b 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.^c Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 34

Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2018

(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	63,230	36,004	556	2,051	389	5,410	990	1,638	217	4,239	i 11,737
Manufacturing industries	31–33	39,393	22,892	376	1,190	261	3,872	596	979	198	1,421	7,608
Food	311	242	147	1	9	1	15	15	11	0	17	25
Beverage and tobacco products	312	109	62	*	i 5	1	8	4	8	0	12	9
Textile, apparel, and leather products	313–16	4	2	0	* i	0	*	* i	* i	0	* i	1
Wood products	321	4	3	* i	* i	*	*	*	*	0	* i	1
Paper	322	2	1	* i	*	* i	*	* i	* i	0	*	* i
Printing and related support activities	323	4	4	* i	* i	* i	*	*	* i	0	* i	* i
Petroleum and coal products	324	23	15	0	*	1	2	1	1	0	1	2
Chemicals	325	10,553	5,593	301	480	75	528	275	514	3	773	2,012
Basic chemicals	3251	192	126	0	0 - 23	6	13	3	10	*	14	0 - 23
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	85	68	0	*	0	1	2	0 - 16	0	*	0 - 16
Pesticide, fertilizer, and other agricultural chemicals	3253	326	152	* i	99 - 126	* i	17	4	21	* i	* i	2 - 35
Pharmaceuticals and medicines	3254	9,792	5,138	300	350	67	491	256	465	3	754	1,966
Soap, cleaning compound, and toilet preparation	3256	137	86 - 112	* i	6	0 - 3	i 4	9	0 - 20	0	4	0 - 30
Paint, coating, adhesive, and other chemicals	3255, 3259	21	0 - 20	0	*	0 - 3	2	*	*	0	*	0 - 20
Plastics and rubber products	326	83	31	0	* i	*	40	*	1	0	5	6
Nonmetallic mineral products	327	24	13	0	1	0	1	2	1	0	*	5
Primary metals	331	22 i	7	0	1 i	0	9	* i	* i	0	* i	5 i
Fabricated metal products	332	105	45	5	17	12	11	2	5	*	0	9
Machinery	333	1,034	732	*	18	7	132	3	47	*	37	58
Agricultural implement	33311	10	7	0	0	*	1	*	*	0	0	2
Semiconductor machinery	333242	543	443	0	0 - 19	*	34	*	44	0	*	0 - 24
Engine, turbine, and power transmission equipment	3336	173	112	*	0 - 19	5	35	2	2	0	0	0 - 20
Other machinery	other 333	307	170	0	0 - 19	1	61	1	1	*	37	14 - 39
Computer and electronic products	334	9,775	6,355	64	303	84	1,159	182	250	78	149	1,151

TABLE 34

Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2018

(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
Communications equipment	3342	1,285 i	948 i	3 i	27 i	15 i	135 i	82 i	30 i	1 i	26 i	17 i
Semiconductor and other electronic components	3344	2,410	1,580	38	51	19 i	80	68	102	76	85	310
Navigational, measuring, electromedical, and control instruments	3345	5,863	3,681	23	208	49	938	29	109	*	33	793
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	163	99	0	9	2	9	4	3	0	5	32
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	5,455	3,445	0 - 24	186	0 - 48	902	23	84	*	0 - 29	712 - 762
Other measuring and controlling device	other 3345	245	137	0 - 24	i 13	0 - 48	27	2	21	*	0 - 29	0 - 48
Other computer and electronic products	other 334	217	147	*	i 17	*	7	2	8	* i	5	30
Electrical equipment, appliances, and components	335	266	163	3	21	2	15	8	12	*	4	38
Transportation equipment	336	16,735	9,444 i	1	314	74	1,917	104	121	116	415	4,230 i
Motor vehicles, bodies, trailers, and parts	3361-63	2,506	1,254	*	144	50	447	76	79	101	42	314
Aerospace products and parts	3364	13,131 i	7,618 i	0 - 1	148 i	0 - 25 i	1,355 i	18 - 21	30	0 - 5	340	3,585 - 3,623 i
Aircraft, aircraft engine, and aircraft parts	336411-13	12,222 i	7,132 i	0	95 i	0 - 25 i	1,163 i	19	30	0 - 5	330	3,422 - 3,457 i
Guided missile, space vehicle, and related parts	336414-15, 336419	909	487	0 - 1	54	0	192	0 - 3	*	*	10 i	160 - 169
Military armored vehicle, tank, and tank component	336992	6	2	0	0 - 5	0 - 5	0 - 2	*	0 - 5	0	0	0 - 5
Other transportation	other 336	1,092	571 i	0 - 1	i 16 - 23	i 0 - 25	112 - 116 i	6 - 11 i	6 - 14 i	10 - 16 i	33 i	287 - 332 i
Furniture and related products	337	5	3	*	i *	*	*	*	*	*	*	1 i
Miscellaneous	339	402	271	1	21	5	35	1	6 i	*	7	54
Medical equipment and supplies	3391	264	165	1	21	5	28	1	2	*	4	38
Other miscellaneous manufacturing	3399	138 i	106 i	0	1 i	0	7 i	0	5 i	0	3 i	16 i

TABLE 34

Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2018

(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
Nonmanufacturing industries	21-23, 42-81	23,838	13,113	179	861	128	1,537	395	659	19	2,818	i 4,129
Mining, quarrying, oil and gas extraction, and support activities	21	130	67	0	0 - 9	i 0 - 5	i *	i 0 - 10	0 - 52	i 2	i 0 - 29	0 - 63
Utilities	22	51	0 - 49	i *	*	0 - 3	0 - 8	1	0	0	2	0 - 49
Wholesale trade	42	25	15	0	0 - 9	1	0 - 11	0 - 5	0 - 4	*	0 - 11	0 - 11
Electronic shopping and electronic auctions	454111-12	94	0 - 95	0	0 - 9	i 0	0	0	0 - 88	0	0 - 29	0 - 95 i
Transportation and warehousing	48-49	7	0 - 8	0	0	0	0	0	0 - 8	0	0	0
Information	51	862	617	51	28	17	18	15	16	*	36 - 66	31 - 68
Publishing	511	489	354	26	4	15	10	7	9	*	36	28
Newspaper, periodical, book, and directory publishers	5111	*	*	0	0	0	0	0	0	0	0	0
Software publishers	5112	489	353	26	4	15	10	7	9	*	36	28
Telecommunications	517	65	0 - 57	0 - 26	4	0 - 2	5	0 - 9	0 - 7	0	0 - 29	0 - 38
Data processing, hosting, and related services	518	191	160	0 - 15	16	1	0 - 4	1	1	*	1	0 - 15
Other information	other 51	117	45 - 104	0 - 26	4	0 - 2	i 0 - 4	0 - 9	0 - 7	0	0 - 29	0 - 40
Finance and insurance	52	45	45	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	22,486	12,206	128	826	107	1,499	370	556 - 644	17	2,752	i 3,932 - 4,028
Architectural, engineering, and related services	5413	1,684	1,006	4	111	8	196	22	0 - 65	i *	67	201 - 273
Computer systems design and related services	5415	2,291	1,638	24	25	*	22	18	18	*	35	512
Scientific research and development services	5417	17,761	9,129	101	589	90	1,247	312	539	17	2,623	i 3,114
Research and development in biotechnology	541711	5,037	2,340	48	188	4	311	68	57 - 137	2	1,058	i 878 - 958

TABLE 34

Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2018

(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	12,080	6,294	36	381	80	934	224	403	15	1,557	i 2,157
Research and development in the social sciences and humanities	541720	644	494	17	21	6	3	21	0 - 78	*	8	0 - 78
Other professional, scientific, and technical services	other 54	750	434	*	i 101	9	34	18	0 - 61	*	27	62 - 130
Health care services	621-23	75	47	*	i 0	*	9	i 0 - 10	i 0 - 21	0	0 - 21	i 0 - 21
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	62	0 - 63	0	0 - 9	0 - 5	0 - 13	0 - 10	0 - 63	0	0	0 - 63
All companies (number of domestic employees)	-	63,230	36,004	556	2,051	389	5,410	990	1,638	217	4,239	i 11,737
Small companies												
10-19 ^a	-	1,050	607	5	i 30	10	85	21	26	* i	50	217
20-49	-	1,695	1,022	7	66	21	156	45	24	3	97	255
Medium companies												
50-99	-	1,875	960	42	55	36	179	57	32	9	102	404
100-249	-	3,921	2,162	66	202	33	302	109	94	4 i	298	651
Large companies												
250-499	-	3,041	1,892	14	202	43	167	75	75	2	159	411
500-999	-	2,096	1,289	29	68	24	185	59	90	i 5	80	267
1,000-4,999	-	10,068	5,965	209	464	81	899	254	489	77	284	i 1,347
5,000-9,999	-	9,063	4,532	70	351	43	730	139	i 417	8	1,321	i 1,451
10,000-24,999	-	9,997	6,111	113	i 276	29	i 503	129	i 173	i 95	1,270	i 1,298
25,000 or more	-	20,423	11,464	2	337	68	2,205	102	218	15 i	578	5,435

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 35

Domestic R&D paid for by others and performed by the company, by industry and company size: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19 ^a	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	63,230	1,050	1,695	1,875	3,921	3,041	2,096	10,068	9,063	9,997	20,423
Manufacturing industries	31–33	39,393	239	471	751	1,186	1,381	1,272	8,165	2,652	6,641	16,634
Food	311	242	0	*	0 - 12	94	6	1	87	44	1	0 - 12
Beverage and tobacco products	312	109	0	2	0	*	101	0	0	5	0	0
Textile, apparel, and leather products	313–16	4	0	0	*	*	3	0	0	0	0	0
Wood products	321	4	0	0	*	0	* i	4	0	0	0	0
Paper	322	2	0	0	0	1	0	0	1	0	0	0
Printing and related support activities	323	4	0	0	*	*	3	1	0	0	0	0
Petroleum and coal products	324	23	0	0	0	3	0	0	2	0	18	0
Chemicals	325	10,553	44 - 65	189	414	388	281	352	4,324	550	3,931 i	55 - 75
Basic chemicals	3251	192	4	7	2	*	0	12	163	3	*	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	85	*	0 - 10	0 - 9	0	10	0	43 - 76	0	0 - 26	0
Pesticide, fertilizer, and other agricultural chemicals	3253	326	0	0 - 10 i	0	0 - 8	0	0	307 - 326	0	*	0
Pharmaceuticals and medicines	3254	9,792	40 - 61	174	404	381	269	340	3,771	547	3,787 i	55 - 75
Soap, cleaning compound, and toilet preparation	3256	137	0	*	0 - 9	0 - 8	0	0	0	0	119 - 138	0
Paint, coating, adhesive, and other chemicals	3255, 3259	21	1	*	0 - 9	0 - 8	2	0	0 - 20	0	0 - 20	0
Plastics and rubber products	326	83	*	4	3	14	7	7	44	0	3	0
Nonmetallic mineral products	327	24	0	0	3	7	2	0	3	9	0	0
Primary metals	331	22 i	0	0	1	1	7 i	0	9	2	2 i	0
Fabricated metal products	332	105	4	7	11	8	2	*	74	0	0	0
Machinery	333	1,034	49 - 60	37	63	45	89	58	634	0	51	0 - 5
Agricultural implement	33311	10	0	0	0	6	0 - 5	0	1	0	0	0 - 5
Semiconductor machinery	333242	543	*	0	0	2	0 - 90	0	450 - 542	0	0	0
Engine, turbine, and power transmission equipment	3336	173	1 i	0	7	8 i	0 - 46	0 - 58	0 - 159	0	0 - 52	*
Other machinery	other 333	307	47 - 60	37	55	28	0 - 90	0 - 58	0 - 141	0	0 - 52	0
Computer and electronic products	334	9,775	91	142	172	427	433	628	1,474	801 i	1,684	3,922

TABLE 35

Domestic R&D paid for by others and performed by the company, by industry and company size: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19 ^a	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	1,285 i	*	0	0 - 67	43	109	8	13	375 - 448	i 667 i	0
Semiconductor and other electronic components	3344	2,410	4	77	59	227	287	496	1,020	214	0	26
Navigational, measuring, electromedical, and control instruments	3345	5,863	0 - 88	40 - 66	47	153	6 - 39	125	318	138 - 213	924 - 1,018	3,896
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	163	*	1	0	55 - 92	0 - 33	66	0	0	6	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	5,455	0	40	0 - 48	0 - 98	1	0	146 - 318	137 - 213	918 - 1,013	3,896
Other measuring and controlling device	other 3345	245	0 - 88	0 - 26	0 - 48	0 - 98	6	60	0 - 172	1	0	0
Other computer and electronic products	other 334	217	0 - 88	0 - 26	0 - 67	4	0 - 33	0	123	0	0 - 92	0
Electrical equipment, appliances, and components	335	266	1	26	9	4	20	6	199	1	0	0
Transportation equipment	336	16,735	21 i	27	58	177	408	168	1,146	1,175	945	12,609 i
Motor vehicles, bodies, trailers, and parts	3361–63	2,506	0	0 - 27	29 - 35	127	400	0 - 113	1,048	109	508	145 - 287
Aerospace products and parts	3364	13,131 i	21 i	0 - 28	23	23 - 51	5	56	83 - 99	1,063	437	11,373 i
Aircraft, aircraft engine, and aircraft parts	336411–13	12,222 i	1	0 - 27	10	23 - 51	0	56	65	229	437	11,373 i
Guided missile, space vehicle, and related parts	336414–15, 336419	909	20 i	0 - 17	13	0	5	0	19 - 35	834	0	0
Military armored vehicle, tank, and tank component	336992	6	0	0	1 - 6	0	0 - 5	0	0	0	0	0
Other transportation	other 336	1,092	0	0 - 27	0	0 - 27	0 - 5	0 - 113	0 - 16	3	0	948 - 1,090
Furniture and related products	337	5	0	4	*	i 1	0	0	*	0	0	0
Miscellaneous	339	402	10 - 16	33	7 - 13	18	19	46	166 i	64	5	30
Medical equipment and supplies	3391	264	11	27	8	14	9	40	56	64	5	30
Other miscellaneous manufacturing	3399	138 i	0 - 5	6 i	0 - 5	5	9	6	110 i	0	0	0
Nonmanufacturing industries	21–23, 42–81	23,838	810	1,224	1,124	2,735	1,660	824	1,904	6,411	3,356	3,789
Mining, quarrying, oil and gas extraction, and support activities	21	130	0	*	8	0	16	0	0	0	105	0
Utilities	22	51	5	3	0	0	0	0	0	0	*	42
Wholesale trade	42	25	0	1	*	11	13	0	0	0	0	0

TABLE 35

Domestic R&D paid for by others and performed by the company, by industry and company size: 2018

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19 ^a	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
Electronic shopping and electronic auctions	454111–12	94	2	0	0	93	0	0	0	0	0	0
Transportation and warehousing	48–49	7	0	0	0	0	0	4	0	4	0	0
Information	51	862	26	46	33	156	71	97	165	58	0	211
Publishing	511	489	4	12	2	5	53	63	96	44	0	211
Newspaper, periodical, book, and directory publishers	5111	*	0	0	*	0	0	0	0	0	0	0
Software publishers	5112	489	4	12	2	5	53	63	96	44	0	211
Telecommunications	517	65	10	32	23	0	0	0	1	0	0	0
Data processing, hosting, and related services	518	191	0 - 13	2	8	35 - 54	18	33	65	14 i	0	0
Other information	other 51	117	0 - 13	0	0	98 - 115	*	1	3	0	0	0
Finance and insurance	52	45	0	0	0	0	0	0	0	0	0	45
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	22,486	775	1,165	1,036	2,456	1,546	720 i	1,710	6,337	3,250	3,490
Architectural, engineering, and related services	5413	1,684	164	226	77	123	102	281 i	25	157	57	471
Computer systems design and related services	5415	2,291	55	127	54	134	65	44 i	0	3	1,399	409
Scientific research and development services	5417	17,761	499	735	806	1,948	1,157	352	1,684	6,175	1,795	2,610
Research and development in biotechnology	541711	5,037	102 - 110	98	167	0 - 95	74	71	20 - 124	0	1,791	2,610
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,080	390	627	639	1,854	1,082	280	1,028	6,175	4	0
Research and development in the social sciences and humanities	541720	644	0 - 6	10	0	0 - 95	0	0	533 - 635	0	0	0
Other professional, scientific, and technical services	other 54	750	56	76	99	251	223	44 i	0	1	0	0
Health care services	621–23	75	2	3	44 i	6	14	4	2	0	0	1 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	62	1	6	3	13	0	0	27	13	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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 36

Domestic R&D paid for by others and performed by the company, by type of R&D, industry, and company size: 2018

(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	63,230	6,668	11,993	44,570
Manufacturing industries	31–33	39,393	4,353 i	5,901	29,139
Food	311	242	26	83	134
Beverage and tobacco products	312	109	13	22	73
Textile, apparel, and leather products	313–16	4	0	*	4
Wood products	321	4	* i	1	3
Printing and related support activities	323	4	*	*	3
Chemicals	325	10,553	2,208	1,256	7,089
Pharmaceuticals and medicines	3254	9,792	2,081	899	6,813
Other chemicals	other 325	761	128	358	276
Plastics and rubber products	326	83	1	5	78
Nonmetallic mineral products	327	24	2	2	21
Primary metals	331	22 i	1 i	3 i	19 i
Fabricated metal products	332	105	6 i	20 i	79 i
Machinery	333	1,034	52	103	879
Computer and electronic products	334	9,775	283	992	8,499
Semiconductor and other electronic components	3344	2,410	82	100	2,228
Navigational, measuring, electromedical, and control instruments	3345	5,863	115 i	782	4,966
Other computer and electronic products	other 334	1,502 i	86 i	110	1,305 i
Electrical equipment, appliances, and components	335	266	32	44	189
Transportation equipment	336	16,735	1,683 i	3,327	11,725
Aerospace products and parts	3364	13,131 i	1,575 i	2,053 i	9,503 i
Other transportation	other 336	3,604	107	1,274	2,223
Furniture and related products	337	5	*	1	5
Miscellaneous manufacturing	322, 324, 339	428	46	43	339
Nonmanufacturing industries	21–23, 42–81	23,838	2,315	6,092	15,431
Information	51	862	182	137	543
Publishing	511	489	38	59	393
Telecommunications	517	65	20	0	45
Data processing, hosting, and related services	518	191	9 - 89	0 - 79	102
Other information	other 51	117	36 - 116	0 - 79	2
Professional, scientific, and technical services	54	22,486	2,076	5,890	14,520
Architectural, engineering, and related services	5413	1,684	98 i	698	887
Computer systems design and related services	5415	2,291	386	815	1,090
Scientific research and development services	5417	17,761	1,526	4,229	12,006 i
Research and development in biotechnology	541711	5,037	682	159	4,197 i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,080	442	3,899	7,739
Research and development in the social sciences and humanities	541720	644	402	171 i	71 i
Other professional, scientific, and technical services	other 54	750	66	148	537
Other nonmanufacturing	21–23, 42–49, 52, 53, 55–81	490	57	64	368
All companies (number of domestic employees)	–	63,230	6,668	11,993	44,570
Small companies					
10–19 ^a	–	1,050	64 i	298	688
20–49	–	1,695	142	381	1,172
Medium companies					
50–99	–	1,875	350	300	1,226
100–249	–	3,921	422	1,160 i	2,340
Large companies					

TABLE 36

Domestic R&D paid for by others and performed by the company, by type of R&D, industry, and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
250–499	–	3,041	248	415	2,377
500–999	–	2,096	180	441	1,475
1,000–4,999	–	10,068	2,319	2,391	5,359
5,000–9,999	–	9,063	59	1,672	7,331
10,000–24,999	–	9,997	457 i	1,481	8,060 i
25,000 or more	–	20,423	2,426 i	3,455 i	14,542

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 37

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2018

(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			
All industries	21–23, 31–33, 42–81	63,230	19,087		15,775	2,558		24,685	103	248		66	5	366	337	i
Manufacturing industries	31–33	39,393	5,323		12,871	1,752		18,980	33	183 - 230		12	*	81	108 - 159	
Food	311	242	3		235	*	i	*	i	0		0	0	3	0	
Beverage and tobacco products	312	109	1	i	106	0		0		0		0	0	2	i	0
Textile, apparel, and leather products	313–16	4	*	i	*	i		0		0		0	0	3	0	
Wood products	321	4	*	i	4	*	i	*	i	*		0	*	i	*	i
Paper	322	2	1	i	1	0		0		0		0	0	0	0	
Printing and related support activities	323	4	1		3	*	i	*	i	*		0	*	i	*	i
Petroleum and coal products	324	23	5		18	1		*		0		0	0	0	0	
Chemicals	325	10,553	2,277		6,811	1,190		204		15		0	8	*	29	19
Basic chemicals	3251	192	12		168	12		1	i	0		0	0	0	0	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	85	5	i	71 - 80	0 - 7	i	1	i	*		0	*	i	*	i
Pesticide, fertilizer, and other agricultural chemicals	3253	326	0 - 5	i	310 - 323	0 - 7	i	3		*		0	*	i	*	i
Pharmaceuticals and medicines	3254	9,792	2,257		6,103	1,173		188		15		0	8	*	29	18
Soap, cleaning compound, and toilet preparation	3256	137	0 - 5	i	125 - 138	0 - 7	i	*	i	*		0	*	i	*	i
Paint, coating, adhesive, and other chemicals	3255, 3259	21	0 - 5	i	0 - 11	0 - 7	i	11		*		0	*	i	*	i
Plastics and rubber products	326	83	68		11	*		2		0		0	*	0	2	0
Nonmetallic mineral products	327	24	7		15	*		2		*		0	0	0	0	
Primary metals	331	22	i	5	5	i	7	2	i	2		*	*	0	*	i
Fabricated metal products	332	105	55		46	*	i	3	i	0		*	i	*	i	*
Machinery	333	1,034	187		598 - 666	0 - 66		175		2	i	0	*	0	4	0
Agricultural implement	33311	10	*		0 - 8	0 - 8		2		0		0	0	0	0	

TABLE 37

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2018

(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						
Semiconductor machinery	333242	543	3	i	473 - 541	0 - 66	*	i	*	i	0	0	0	*	i	0			
Engine, turbine, and power transmission equipment	3336	173	13		15	0	145		0		0	0	0	*		0			
Other machinery	other 333	307	171		36 - 104	0 - 66	28		2	i	0	*	0	4		0			
Computer and electronic products	334	9,775	1,499		2,645	321	5,174		0 - 16		0 - 47	2	*	7 - 29	i	59 - 110			
Communications equipment	3342	1,285	i	340	i	109	8	821	i	*	i	*	i	0	3	i	3		
Semiconductor and other electronic components	3344	2,410		270		1,879	194	50		*		0 - 10	0 - 3	*	4 - 12	i	0 - 10		
Navigational, measuring, electromedical, and control instruments	3345	5,863		870		561 - 659	23 - 121	4,198		0 - 16		0 - 47	0 - 3	0	0 - 12		45 - 108		
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	163		0 - 12		151	*	i	1	i	*	i	0	0	0		0 - 12	*	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	5,455		798 - 871		210 - 417	0 - 121	4,152		0 - 16		0 - 47	0 - 3	0	0		45 - 108		
Other measuring and controlling device	other 3345	245		0 - 60		20 - 200	0 - 121	46		*	i	0	0 - 3	0	*	i	0		
Other computer and electronic products	other 334	217		18		0 - 94	0 - 94	105		*		0	0	0	1		0		
Electrical equipment, appliances, and components	335	266		23		191	11	39		*	i	0	0	0	1	i	0		
Transportation equipment	336	16,735		1,118		1,906	151	13,321	i	0 - 16		184	1	0	6 - 28		29		
Motor vehicles, bodies, trailers, and parts	3361-63	2,506		436		1,882	96	64 - 88		0 - 16		0	0	0	0 - 25		*		
Aerospace products and parts	3364	13,131	i	680		0 - 16	55	12,167	i	0		184	1	0	2 - 18		29		
Aircraft, aircraft engine, and aircraft parts	336411-13	12,222	i	651 - 667		0 - 16	55	11,286	i	0		184	1	0	3		29		
Guided missile, space vehicle, and related parts	336414-15, 336419	909		12 - 29		0	0	881		0		0	*	i	0	0	0 - 16		0

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2018

[illegible]

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2018

[illegible]

TABLE 37

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2018

(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
50–99	–	1,875	550	522	121	561	15	* i	15	*	82	9
100–249	–	3,921	920	1,457	58	1,378	8	10	13	1	73	4
Large companies												
250–499	–	3,041	622	1,084	233	1,016	26	* i	2	* i	51	8
500–999	–	2,096	467	909	382	128	* i	* i	1 i	* i	1 i	209 i
1,000–4,999	–	10,068	1,202	6,842	493	1,462	28	*	1	*	25	15
5,000–9,999	–	9,063	7,064 i	359	443	1,175	* i	0	1	0	21	* i
10,000–24,999	–	9,997	3,259	3,881	677	2,161	9	0	0	0	10	0
25,000 or more	–	20,423	4,161	243	76	15,583	6	214	*	0	52	87

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 38

Companies with domestic R&D paid for by others and performed by the company in energy and environmental protection application areas, by industry and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Energy		Environmental protection	
		Companies ^a (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount
All industries	21–23, 31–33, 42–81	3,876	63,230	790	i 1,949	237	1,763
Manufacturing industries	31–33	1,764	39,393	290	i 1,005	109	786
Food	311	36	242	D	1	4	30
Chemicals	325	377	10,553	16	108	16	73
Basic chemicals	3251	24	192	7	39	4	10
Pharmaceuticals and medicines	3254	241	9,792	4	i 46	6	56
Other chemicals	other 325	112	569	5	23	5	6
Plastics and rubber products	326	90	83	29	i 7	4	1 i
Nonmetallic mineral products	327	19	24	D	1	D	2
Fabricated metal products	332	110	105	D	8	D	*
Machinery	333	212	1,034	59	166	14	64
Agricultural implement	33311	8	10	0	0	D	1
Semiconductor machinery	333242	7	543	D	0 - 106	D	0 - 46
Engine, turbine, and power transmission equipment	3336	25	173	5	61	3	19
Other machinery	other 333	174	307	D	0 - 106	D	0 - 46
Computer and electronic products	334	382	9,775	87	i 350	39	i 511
Semiconductor and other electronic components	3344	154	2,410	50	i 249	D	0 - 512 i
Other electronic products	other 334	229	7,365	38	i 101	D	0 - 512
Electrical equipment, appliances, and components	335	91	266	58	i 51	D	1
Transportation equipment	336	187	16,735	27	307	19	82
Motor vehicles, bodies, trailers, and parts	3361–63	118	2,506	22	263	19	82
Other transportation	other 336	69	14,229	i 5	44	0	0
Miscellaneous	339	126	402	D	2	5	i 9
Other manufacturing	312–16, 321–24, 331, 337	136	173	6	4	4	13
Nonmanufacturing industries	21–23, 42–81	2,114	23,838	500	i 944	128	i 977
Mining, quarrying, oil and gas extraction, and support activities	21	10	130	5	89	D	13
Utilities	22	6	51	5	50	D	34
Wholesale trade	42	40	25	0	0	0	0
Information	51	150	862	3	136	0	0
Publishing	511	53	489	3	136	0	0
Telecommunications	517	12	65	0	0	0	0
Data processing, hosting, and related services	518	42	191	0	0	0	0
Other information	other 51	43	117	0	0	0	0

TABLE 38

Companies with domestic R&D paid for by others and performed by the company in energy and environmental protection application areas, by industry and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Energy		Environmental protection				
		Companies ^a (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount			
Professional, scientific, and technical services	54	1,766	22,486	482	i	659	i	116	i	911
Architectural, engineering, and related services	5413	348	1,684	105	i	318	i	52	i	852
Scientific research and development services	5417	1,010	17,761	356	i	323		53		46
Research and development in biotechnology	541711	143	5,037	5	i	*	i	7	i	1
Other scientific research and development	other 5417	866	12,724	351	i	323		46		45
Other professional, scientific, and technical services	other 54	408	3,041	20		18		11		13
Health care services	621–23	86	75	0		0		0		0
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	56	209	5		9		6		18
All companies (number of domestic employees)	–	3,876	63,230	790	i	1,949		237		1,763
Small companies										
10–19 ^c	–	939	1,050	224	i	216		53	i	38
20–49	–	1,059	1,695	191	i	148		50	i	76
Medium companies										
50–99	–	484	1,875	64	i	74		30		35
100–249	–	726	i	3,921	178	i	156	26	i	83
Large companies										
250–499	–	233	3,041	34	i	111		18		97
500–999	–	123	2,096	21	i	103	i	12		137
1,000–4,999	–	173	10,068	39		310		25		100
5,000–9,999	–	47	9,063	11		133	i	3		193
10,000–24,999	–	57	9,997	18		271		12		38
25,000 or more	–	36	20,423	10		426		8		966

* = 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.

NAICS = 2012 North American Industry Classification System.

^a Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse. 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.^b Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse. These company count estimates 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. 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.^c Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 39

Companies with domestic R&D paid for by others and performed by the company in health or medical, defense, and agricultural application areas, by industry and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Health or medical		Defense		Agriculture	
		Companies ^a (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount
All industries	21–23, 31–33, 42–81	3,876	63,230	1,216	24,947	1,093	22,088	114	617
Manufacturing industries	31–33	1,764	39,393	435	10,230	260	17,295	51	440
Food	311	36	242	3	51	0	0	6	47
Chemicals	325	377	10,553	230	9,588	26	98	9	339
Basic chemicals	3251	24	192	D	2	D	*	D	0 - 193
Pharmaceuticals and medicines	3254	241	9,792	226	9,585	21	91	5	11
Other chemicals	other 325	112	569	D	1	D	7	D	134 - 329
Plastics and rubber products	326	90	83	9	17	5	3	D	*
Nonmetallic mineral products	327	19	24	D	1	D	2	0	0
Fabricated metal products	332	110	105	D	*	D	*	D	2
Machinery	333	212	1,034	4	1	36	186	6	8
Agricultural implement	33311	8	10	0	0	0	0	D	7
Semiconductor machinery	333242	7	543	0	0	0	0	0	0
Engine, turbine, and power transmission equipment	3336	25	173	0	0	5	132	0	0
Other machinery	other 333	174	307	4	1	31	54	D	2
Computer and electronic products	334	382	9,775	80	269	106	4,330	21	36
Semiconductor and other electronic components	3344	154	2,410	33	96	17	68	9	21
Other electronic products	other 334	229	7,365	47	173	89	4,262	12	15
Electrical equipment, appliances, and components	335	91	266	0	0	21	24	D	*
Transportation equipment	336	187	16,735	D	39	47	12,612	D	1
Motor vehicles, bodies, trailers, and parts	3361–63	118	2,506	D	1	7	116	0	0
Other transportation	other 336	69	14,229	D	38	39	12,496	D	1
Miscellaneous	339	126	402	99	229	10	33	0	0
Other manufacturing	312–16, 321–24, 331, 337	136	173	D	36	5	5	D	7
Nonmanufacturing industries	21–23, 42–81	2,114	23,838	781	14,717	833	4,793	63	177
Mining, quarrying, oil and gas extraction, and support activities	21	10	130	0	0	0	0	0	0
Utilities	22	6	51	0	0	0	0	0	0
Wholesale trade	42	40	25	D	2	0	0	D	2
Information	51	150	862	D	15	D	23	0	0
Publishing	511	53	489	D	15	D	11	0	0
Telecommunications	517	12	65	D	1	5	12	0	0
Data processing, hosting, and related services	518	42	191	0	0	0	0	0	0

TABLE 39
Companies with domestic R&D paid for by others and performed by the company in health or medical, defense, and agricultural application areas, by industry and company size: 2018
(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Health or medical		Defense		Agriculture	
		Companies ^a (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount	Companies ^b (number)	Amount
Other information	other 51	43	117	0	0	0	0	0	0
Professional, scientific, and technical services	54	1,766	22,486	757	i 14,635	823	i 4,770	59	171
Architectural, engineering, and related services	5413	348	1,684	123	i 223	154	i 626	16	i 98
Scientific research and development services	5417	1,010	17,761	569	i 13,956	484	i 3,057	37	67
Research and development in biotechnology	541711	143	5,037	132	i 4,978	14	i 29	5	16
Other scientific research and development	other 5417	866	12,724	437	i 8,977	470	i 3,028	32	51
Other professional, scientific, and technical services	other 54	408	3,041	65	i 456	185	i 1,087	6	6
Health care services	621–23	86	75	16	56	0	0	0	0
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	56	209	4	9	D	*	D	4
All companies (number of domestic employees)	–	3,876	63,230	1,216	i 24,947	1,093	i 22,088	114	617
Small companies									
10–19 ^c	–	939	1,050	315	i 400	265	i 290	18	i 12
20–49	–	1,059	1,695	313	i 646	323	i 651	32	31
Medium companies									
50–99	–	484	1,875	138	883	110	i 590	17	40
100–249	–	726	i 3,921	251	i 1,242	231	i 1,429	23	49
Large companies									
250–499	–	233	3,041	72	1,004	53	702	6	9
500–999	–	123	2,096	33	789	20	i 220	D	53
1,000–4,999	–	173	10,068	46	4,655	41	845	10	357
5,000–9,999	–	47	9,063	16	6,870	15	1,033	i 3	28
10,000–24,999	–	57	9,997	20	5,635	i 18	1,649	D	10
25,000 or more	–	36	20,423	11	2,822	15	14,679	D	27

* = 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.

NAICS = 2012 North American Industry Classification System.

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

^b Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse. These company count estimates 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. 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.

^c Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 40

Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
All industries	21–23, 31–33, 42–81	63,230	0.6	0.6
Manufacturing industries	31–33	39,393	0.7	0.7
Food	311	242	*	*
Beverage and tobacco products	312	109	0.1	0.1
Textile, apparel, and leather products	313–16	4	*	*
Wood products	321	4	*	*
Paper	322	2	*	*
Printing and related support activities	323	4	*	*
Petroleum and coal products	324	23	*	*
Chemicals	325	10,553	0.9	0.9
Basic chemicals	3251	192	0.1	0.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	85	0.1	0.1
Pesticide, fertilizer, and other agricultural chemicals	3253	326	0.3	0.3
Pharmaceuticals and medicines	3254	9,792	1.5	1.5
Soap, cleaning compound, and toilet preparation	3256	137	0.1	0.1
Paint, coating, adhesive, and other chemicals	3255, 3259	21	*	*
Plastics and rubber products	326	83	*	*
Nonmetallic mineral products	327	24	*	0.1
Primary metals	331	22	*	*
Fabricated metal products	332	105	0.1	0.1
Machinery	333	1,034	0.3	0.3
Agricultural implement	33311	10	*	*
Semiconductor machinery	333242	543	2.5	2.5
Engine, turbine, and power transmission equipment	3336	173	0.3	0.3
Other machinery	other 333	307	0.1	0.1
Computer and electronic products	334	9,775	1.2	1.2
Communications equipment	3342	1,285	1.5	1.5
Semiconductor and other electronic components	3344	2,410	0.8	0.8
Navigational, measuring, electromedical, and control instruments	3345	5,863	3.3	3.3
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	163	0.6	0.6
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	5,455	6.9	6.9
Other measuring and controlling device	other 3345	245	0.3	0.3

TABLE 40

Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
Other computer and electronic products	other 334	217	0.1	0.1
Electrical equipment, appliances, and components	335	266	0.2	0.2
Transportation equipment	336	16,735	1.3	1.3
Motor vehicles, bodies, trailers, and parts	3361-63	2,506	0.3	0.3
Aerospace products and parts	3364	13,131	i 3.6	3.6
Aircraft, aircraft engine, and aircraft parts	336411-13	12,222	i 3.5	3.5
Guided missile, space vehicle, and related parts	336414-15, 336419	909	5.3	5.3
Military armored vehicle, tank, and tank component	336992	6	1.4	1.4
Other transportation	other 336	1,092	1.6	1.6
Furniture and related products	337	5	*	*
Miscellaneous	339	402	0.1	0.1
Medical equipment and supplies	3391	264	0.1	0.1
Other miscellaneous manufacturing	3399	138	i 0.1	0.1
Nonmanufacturing industries	21-23, 42-81	23,838	0.5	0.6
Mining, quarrying, oil and gas extraction, and support activities	21	130	0.1	0.1
Utilities	22	51	*	*
Wholesale trade	42	25	*	*
Electronic shopping and electronic auctions	454111-12	94	0.1	0.1
Transportation and warehousing	48-49	7	*	*
Information	51	862	0.1	0.1
Publishing	511	489	0.2	0.2
Newspaper, periodical, book, and directory publishers	5111	*	*	*
Software publishers	5112	489	0.2	0.2
Telecommunications	517	65	*	*
Data processing, hosting, and related services	518	191	0.1	0.1
Other information	other 51	117	*	*
Finance and insurance	52	45	*	*
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	22,486	5.3	5.3
Architectural, engineering, and related services	5413	1,684	1.6	1.7

TABLE 40

Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
Computer systems design and related services	5415	2,291	1.5	1.5
Scientific research and development services	5417	17,761	24.7	24.8
Research and development in biotechnology	541711	5,037	17.8	17.9
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,080	28.3	28.3
Research and development in the social sciences and humanities	541720	644	69.1	70.3
Other professional, scientific, and technical services	other 54	750	0.8	0.8
Health care services	621-23	75	0.1	0.1
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	62	*	*
All companies (number of domestic employees)	-	63,230	0.6	0.6
Small companies				
10-19 ^c	-	1,050	5.2	5.4
20-49	-	1,695	2.4	2.5
Medium companies				
50-99	-	1,875	1.5	1.5
100-249	-	3,921	1.3	1.3
Large companies				
250-499	-	3,041	1.1	1.1
500-999	-	2,096	0.5	0.5
1,000-4,999	-	10,068	0.7	0.7
5,000-9,999	-	9,063	0.9	0.9
10,000-24,999	-	9,997	0.4	0.4
25,000 or more	-	20,423	0.4	0.5

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

NAICS = 2012 North American Industry Classification System.

^a 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.^b 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.^c Business 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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 41

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: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
All industries	21–23, 31–33, 42–81	73,109	0.7	0.7
Manufacturing industries	31–33	47,634	0.8	0.8
Food	311	244	*	*
Beverage and tobacco products	312	109	0.1	0.1
Textile, apparel, and leather products	313–16	4	*	*
Wood products	321	4	*	*
Paper	322	3	*	*
Printing and related support activities	323	4	*	*
Petroleum and coal products	324	23	*	*
Chemicals	325	14,533	1.2	1.3
Basic chemicals	3251	193	0.1	0.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	84 - 164	D	D
Pesticide, fertilizer, and other agricultural chemicals	3253	325 - 332	D	D
Pharmaceuticals and medicines	3254	13,694	2.1	2.1
Soap, cleaning compound, and toilet preparation	3256	136 - 216	D	D
Paint, coating, adhesive, and other chemicals	3255, 3259	20 - 100	D	D
Plastics and rubber products	326	131	0.1	0.1
Nonmetallic mineral products	327	24	*	0.1
Primary metals	331	23	*	*
Fabricated metal products	332	106	0.1	0.1
Machinery	333	1,089	0.3	0.3
Agricultural implement	33311	11	*	*
Semiconductor machinery	333242	576 - 586	D	D
Engine, turbine, and power transmission equipment	3336	172 - 194	D	D
Other machinery	other 333	307 - 330	D	D
Computer and electronic products	334	10,204	1.2	1.2
Communications equipment	3342	1,349	1.6	1.6
Semiconductor and other electronic components	3344	2,424	0.8	0.8
Navigational, measuring, electromedical, and control instruments	3345	6,205	3.4	3.4
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	163	0.6	0.6
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	5,783	7.3	7.3
Other measuring and controlling device	other 3345	259	0.4	0.4

TABLE 41

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: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
Other computer and electronic products	other 334	227		0.1	0.1
Electrical equipment, appliances, and components	335	315		0.2	0.2
Transportation equipment	336	20,366		1.6	1.6
Motor vehicles, bodies, trailers, and parts	3361-63	2,659 - 2,683		D	D
Aerospace products and parts	3364	16,586	i	4.5	4.5
Aircraft, aircraft engine, and aircraft parts	336411-13	15,677	i	4.5	4.5
Guided missile, space vehicle, and related parts	336414-15, 336419	909		5.3	5.3
Military armored vehicle, tank, and tank component	336992	6		1.4	1.4
Other transportation	other 336	1,091 - 1,115		D	D
Furniture and related products	337	5 - 6		D	D
Miscellaneous	339	442 - 447		D	D
Medical equipment and supplies	3391	291		0.1	0.1
Other miscellaneous manufacturing	3399	152 - 156		D	D
Nonmanufacturing industries	21-23, 42-81	25,475		0.5	0.6
Mining, quarrying, oil and gas extraction, and support activities	21	130		0.1	0.1
Utilities	22	62		*	*
Wholesale trade	42	29		*	*
Electronic shopping and electronic auctions	454111-12	94		0.1	0.1
Transportation and warehousing	48-49	7		*	*
Information	51	941		0.1	0.1
Publishing	511	565		0.3	0.3
Newspaper, periodical, book, and directory publishers	5111	1		*	*
Software publishers	5112	564		0.3	0.3
Telecommunications	517	67		*	*
Data processing, hosting, and related services	518	193		0.1	0.1
Other information	other 51	117		*	*
Finance and insurance	52	46		*	*
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

TABLE 41

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: 2018

(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 ^a	Percent of domestic sales of R&D performers ^b
Professional, scientific, and technical services	54	23,955	5.6	5.7
Architectural, engineering, and related services	5413	2,000	2.0	2.0
Computer systems design and related services	5415	2,320	1.5	1.5
Scientific research and development services	5417	18,810	26.2	26.2
Research and development in biotechnology	541711	5,036 - 5,188	D	D
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	12,980	30.5	30.5
Research and development in the social sciences and humanities	541720	643 - 795	D	D
Other professional, scientific, and technical services	other 54	825	0.9	0.9
Health care services	621-23	124	0.1	0.1
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	86	*	*
All companies (number of domestic employees)	-	73,109	0.7	0.7
Small companies				
10-19 ^c	-	1,162	5.7	6.0
20-49	-	2,091	3.0	3.1
Medium companies				
50-99	-	2,050	1.6	1.7
100-249	-	4,582	1.5	1.5
Large companies				
250-499	-	3,672	1.3	1.3
500-999	-	2,346	0.6	0.6
1,000-4,999	-	11,547	0.8	0.8
5,000-9,999	-	9,478	0.9	1.0
10,000-24,999	-	11,700	0.5	0.5
25,000 or more	-	24,480	0.5	0.6

* = 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.

^a 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.

^b 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.

^c Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 42

Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2018

(Millions of U.S. dollars)

Funders' business activity ^a	Business code ^b	Amount	
All business activities	21100–81000	37,420	
Oil and gas extraction	21100	113	
Mining	21200	*	
Support activities for mining, including oil and gas	21300	32	
Utilities	22100	14	
Construction	23000	14	
Food manufacturing	31100	213	
Beverage manufacturing	31210	103	
Tobacco manufacturing	31220	5	
Textile, apparel, and leather products manufacturing	31990	*	i
Wood products manufacturing	32100	4	
Paper manufacturing	32200	1	
Printing and related support activities	32300	3	
Petroleum refineries	32401	28	i
Asphalt paving, roofing, and saturated materials manufacturing	32402	0	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	3	
Basic chemicals manufacturing	32510	88	
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	74	
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	29	
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	15,338	
In vitro diagnostic substances manufacturing	32542	1	
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	6,230	
Soap, cleaning compound, and toilet preparations manufacturing	32591	164	
Paint, adhesive, and other chemical manufacturing	32592	10	i
Plastics and rubber products manufacturing	32600	23	
Clay and glass products manufacturing	32710	2	i
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	9	
Primary metal manufacturing	33100	12	i
Fabricated metal products manufacturing	33200	87	
Agricultural machinery and equipment manufacturing	33311	12	i
Construction machinery manufacturing	33312	2	i
Mining, oil, and gas field machinery and equipment manufacturing	33319	61	
Semiconductor machinery manufacturing	33321	0 - 646	
Industrial machinery manufacturing (except semiconductor machinery)	33322	27	
Photographic and photocopying equipment manufacturing	33331	1	
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	6	i
Digital cameras manufacturing	33333	0	

TABLE 42

Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2018

(Millions of U.S. dollars)

Funders' business activity ^a	Business code ^b	Amount	
Engine, turbine, and power transmission equipment manufacturing	33360	136	
Metalworking and other general purpose machinery manufacturing	33390	15	
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	62	
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	1	i
Radio, television, and wireless communication equipment manufacturing	33422	365	i
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	37	
Audio and video equipment manufacturing	33430	7	
Semiconductor and other electronic components manufacturing	33440	2,729	
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	91	
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	848	
Measuring and control instruments manufacturing (not listed elsewhere)	33459	106	
Electrical equipment, appliances, and components manufacturing	33500	519	
Motor vehicles manufacturing	33610	2,747	
Motor vehicle body and trailer manufacturing	33620	0	
Motor vehicle parts manufacturing	33630	223	
Aircraft manufacturing	33641	318	
Aircraft engine and engine parts manufacturing	33642	213	
Other aircraft parts and auxiliary equipment manufacturing	33643	277	
Guided missiles, space vehicles, and related parts manufacturing	33644	359	
Railroad rolling stock manufacturing	33651	*	i
Ship and boat building	33660	0	
Motorcycle, bicycle, and parts manufacturing	33691	14	
Military armored vehicle, tank, and tank components manufacturing	33692	0 - 646	
All other transportation equipment manufacturing	33699	19	
Furniture and related products manufacturing	33700	1	
Medical equipment and supplies manufacturing	33910	678	
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	143	i
Merchant wholesalers, durable goods	42300	13	
Merchant wholesalers, nondurable goods	42400	2	
Wholesale electronic markets and agents and brokers (business to business)	42500	4	
Retail trade (except electronic shopping and electronic auctions)	44000	20	
Electronic shopping and electronic auctions	45411	93	
Transportation	48000	*	
Couriers, messengers, and express delivery services	49200	15	
Warehousing and storage	49300	6	
Newspaper, periodical, book, and directory publishers (except Internet)	51110	0	
Software publishers (except Internet)	51120	222	

TABLE 42

Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2018

(Millions of U.S. dollars)

Funders' business activity ^a	Business code ^b	Amount	
Motion picture and sound recording (except Internet)	51200	0	
Broadcasting (except Internet)	51500	0	
Wired telecommunications carriers	51710	5	
Wireless telecommunications carriers (except satellite)	51720	10	
Satellite telecommunications	51740	0 - 646	
Other telecommunications (not listed elsewhere)	51790	23	
Data processing, hosting, and related services	51800	22	i
Cloud computing applications and Internet-based software services	51801	143	i
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	0 - 646	
Finance: banking and credit intermediation	52200	2	
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	9	
Insurance carriers and related activities	52400	11	
Real estate	53100	20	
Rental and leasing services	53200	0	
Lessors of nonfinancial intangible assets, including patent licensing	53300	0	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	2	i
Architectural, engineering, and related services	54130	299	
Specialized design services	54140	8	
Computer systems design and related services	54150	1,387	
Management, scientific, and technical consulting services	54160	4	i
Research and development services in social sciences and humanities	54172	10	
Research and development services in biotechnology	54173	445	
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	649	
Advertising and related services	54180	0	
Professional, scientific, and technical services (not listed elsewhere)	54190	215	
Management of companies and enterprises	55100	15	
Administrative and support services	56100	0	
Waste management and remediation services	56200	0	
Offices of physicians	62110	4	
Medical and diagnostic laboratories	62150	28	i
Other ambulatory health care services (ambulance, dental, home health care)	62199	0	
Hospitals and nursing care facilities	62200	2	
Social assistance services	62400	*	
Arts, entertainment, and recreation	71000	*	
Accommodation and food services	72000	0	
Other services (not listed elsewhere)	81000	94	

TABLE 42
Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2018
(Millions of U.S. dollars)

Funders' business activity ^a	Business code ^b	Amount
Undistributed	–	419 i

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

^a Data are tabulated independent of the industry classification and business activities of the company that performs R&D.

^b 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 43

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: 2018

(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	24,685	2,510 i	5,097 i	17,078
Manufacturing industries	31–33	18,980	1,732 i	2,766 i	14,481
Food	311	*	*	*	*
Beverage and tobacco products	312	0	0	0	0
Textile, apparel, and leather products	313–16	0	0	0	0
Wood products	321	*	*	*	*
Printing and related support activities	323	*	*	*	*
Chemicals	325	204	24	32	149
Pharmaceuticals and medicines	3254	188	23	25	140
Other chemicals	other 325	16	1	7	8
Plastics and rubber products	326	2	*	1	1
Nonmetallic mineral products	327	2	0	0	2
Primary metals	331	2 i	*	*	2 i
Fabricated metal products	332	3 i	*	*	3 i
Machinery	333	175	3	9 i	163
Computer and electronic products	334	5,174	146 i	690	4,338
Semiconductor and other electronic components	3344	50	*	13	36 i
Navigational, measuring, electromedical, and control instruments	3345	4,198	85 i	598	3,515
Other computer and electronic products	other 334	927 i	61 i	78	787 i
Electrical equipment, appliances, and components	335	39	2 i	1 i	36 i
Transportation equipment	336	13,321 i	1,556 i	2,026 i	9,739
Aerospace products and parts	3364	12,167 i	1,539 i	1,888 i	8,740 i
Other transportation	other 336	1,154	17	138	999
Furniture and related products	337	3 i	*	*	2 i
Miscellaneous manufacturing	322, 324, 339	54	1	7	46
Nonmanufacturing industries	21–23, 42–81	5,705	778	2,331	2,597
Information	51	50	6	18	26
Publishing	511	36	5	17	14
Telecommunications	517	8	0	0	8
Data processing, hosting, and related services	518	5	*	1 i	3
Other information	other 51	1 i	0	1 i	*
Professional, scientific, and technical services	54	5,620	771	2,308	2,542
Architectural, engineering, and related services	5413	875	19	595	260
Computer systems design and related services	5415	493	29 i	205	258
Scientific research and development services	5417	3,920	676	1,462	1,783
Research and development in biotechnology	541711	77	0 - 38	11 - 49	29
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	3,215 - 3,324	248 - 359	1,278	1,688
Research and development in the social sciences and humanities	541720	518 - 627	280 - 403	134 - 172 i	66 i
Other professional, scientific, and technical services	other 54	332	47	45	241
Other nonmanufacturing	21–23, 42–49, 52, 53, 55–81	35	1	5	29
All companies (number of domestic employees)	–	24,685	2,510 i	5,097 i	17,078
Small companies					
10–19 ^a	–	462	28 i	180	253
20–49	–	759	36 i	183	540
Medium companies					
50–99	–	561	73	137	350

TABLE 43

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: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
100–249	–	1,378	144	416 i	818
Large companies					
250–499	–	1,016	122	257	637
500–999	–	128	26	34	68
1,000–4,999	–	1,462	385	567	510
5,000–9,999	–	1,175	8 i	31	1,136
10,000–24,999	–	2,161	83 i	226	1,853
25,000 or more	–	15,583	1,605 i	3,065 i	10,913

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 44

Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2018

(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	24,685	15,182	589	4,724	385	77	37	1	11	3,680
Manufacturing industries	31–33	18,980	11,734	226	3,992	87	41	9	0	*	2,890
Food	311	* i	* i	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	0	0	0	0	0	0	0	0	0	0
Wood products	321	* i	0	* i	0	* i	0	0	0	0	0
Paper	322	0	0	0	0	0	0	0	0	0	0
Printing and related support activities	323	* i	0	0	0	* i	0	0	0	0	0
Petroleum and coal products	324	*	0	*	0	0	0	0	0	0	0
Chemicals	325	204	47	5	0	70	17	0	0	0	66
Basic chemicals	3251	1 i	0	1 i	0	* i	0	0	0	0	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1 i	0	* i	0	1 i	0	0	0	0	0
Pesticide, fertilizer, and other agricultural chemicals	3253	3	0	* i	0	2 i	0	0	0	0	2
Pharmaceuticals and medicines	3254	188	41	2	0	67	17	0	0	0	61
Soap, cleaning compound, and toilet preparation	3256	* i	* i	* i	0	* i	0	0	0	0	0
Paint, coating, adhesive, and other chemicals	3255, 3259	11	6	2	0	* i	0	0	0	0	2
Plastics and rubber products	326	2	1	0	1	* i	0	0	0	0	0
Nonmetallic mineral products	327	2	1	1	*	* i	0	0	0	0	0
Primary metals	331	2 i	0	1 i	1 i	0	0	0	0	0	0
Fabricated metal products	332	3 i	0	1 i	2 i	* i	0	0	0	0	0
Machinery	333	175	105	67	3	0	0	0	0	0	0
Agricultural implement	33311	2	0	2	0	0	0	0	0	0	0
Semiconductor machinery	333242	* i	0	* i	* i	0	0	0	0	0	0
Engine, turbine, and power transmission equipment	3336	145	79 - 106	39 - 66	0	0	0	0	0	0	0
Other machinery	other 333	28	0 - 26	0 - 26 i	3	0	0	0	0	0	0
Computer and electronic products	334	5,174	4,589	58	395	10	7	9	0	*	104
Communications equipment	3342	821 i	592 i	* i	224 i	0	0	0	0	0	5
Semiconductor and other electronic components	3344	50	20 i	0 - 28	0 - 28	0 - 11	0	0	0	0	1 - 21
Navigational, measuring, electromedical, and control instruments	3345	4,198	3,926	23	140	0 - 11	7	9	0	0	79 - 96
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1 i	* i	* i	* i	* i	0	0	0	0	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,152	3,905	0 - 24	134	0	0 - 8	0 - 10	0	0	71 - 96
Other measuring and controlling device	other 3345	46	21	0 - 22	5	0 - 11	0 - 8	0 - 10	0	0	0 - 22

TABLE 44

Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2018

(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	105	51	8 - 36 i	4 - 33 i	0 - 11	*	*	0	*	*
Electrical equipment, appliances, and components	335	39	18	15	4	0	0	0	0	0	2
Transportation equipment	336	13,321 i	6,939	74	3,583 i	0	17	0	0	0	2,707
Motor vehicles, bodies, trailers, and parts	3361-63	64 - 88	4 - 72	0 - 43	0	0	16	0	0	0	0
Aerospace products and parts	3364	12,167 i	5,844 i	32	3,583 i	0	0	0	0	0	2,707
Aircraft, aircraft engine, and aircraft parts	336411-13	11,286 i	5,075 i	0	3,504 i	0	0	0	0	0	2,706
Guided missile, space vehicle, and related parts	336414-15, 336419	881	769	32	79	0	0	0	0	0	1
Military armored vehicle, tank, and tank component	336992	2 - 6	0 - 6	0	0	0	1	0	0	0	0
Other transportation	other 336	1,062 - 1,084	1,018 - 1,084	0 - 43	* i	0	0	0	0	0	0
Furniture and related products	337	3 i	0	1 i	2 i	0	0	0	0	0	0
Miscellaneous	339	54	32	4 i	0	6 i	0	0	0	0	11
Medical equipment and supplies	3391	47	27	3 i	0	6 i	0	0	0	0	11
Other miscellaneous manufacturing	3399	6	5	* i	0	1 i	0	0	0	0	0
Nonmanufacturing industries	21-23, 42-81	5,705	3,448	363	733	297	36	27	1	10	790
Mining, quarrying, oil and gas extraction, and support activities	21	0	0	0	0	0	0	0	0	0	0
Utilities	22	30	* i	30	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	2 i	0	0	0	0	0	0	0	2 i	0
Transportation and warehousing	48-49	0	0	0	0	0	0	0	0	0	0
Information	51	50	17	16	0	5	2	0	0	0	10
Publishing	511	36	9	13	0	4	0	0	0	0	10
Newspaper, periodical, book, and directory publishers	5111	* i	0	* i	0	* i	0	0	0	0	0
Software publishers	5112	36	9	13	0	4	0	0	0	0	10
Telecommunications	517	8	8	*	0	* i	0	0	0	0	0
Data processing, hosting, and related services	518	5	0	1 i	0	1	2	0	0	0	0
Other information	other 51	1 i	0	1 i	0	* 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	5,620	3,430	318	733	288	34	27	1	9	780
Architectural, engineering, and related services	5413	875	707	102	45	0	1	10	0	0	10
Computer systems design and related services	5415	493	400	42 i	7 i	13 i	5	4	0	*	21
Scientific research and development services	5417	3,920	2,149	165	583	267	23	11	1	9	712

TABLE 44

Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	DOD	DOE	NASA	NIH	DHS	DOT	EPA	NSF	All other agencies
Research and development in biotechnology	541711	77	17	0	0	0 - 61	0	0	*	1	0 - 61
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	3,215 - 3,324	2,088	165	581	190	23	7	1	7	149 - 265
Research and development in the social sciences and humanities	541720	518 - 627	45	0	1 i	15 - 78	0	4	0	1 i	387 - 562
Other professional, scientific, and technical services	other 54	332	175	9	97	8	4	2	*	0	37
Health care services	621-23	4	0	0	0	4	0	0	0	0	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1 i	1 i	0	0	0	0	0	0	0	0
All companies (number of domestic employees)	-	24,685	15,182	589	4,724 i	385	77	37	1	11	3,680
Small companies											
10-19 ^a	-	462	198	49 i	28 i	76	0	7	*	5 i	99
20-49	-	759	466	73 i	100 i	84	5	6	*	0 - 3	18 - 29
Medium companies											
50-99	-	561	406	34	33 i	28	7	6	*	4	44
100-249	-	1,378	820	100	269	61 i	19	4	*	*	104
Large companies											
250-499	-	1,016	612	23	253	93	3	0 - 13	0	0	16 - 35
500-999	-	128	113	0 - 14 i	1 i	0 - 12 i	2	0	0	0	0 - 14
1,000-4,999	-	1,462	690	76	111	29 i	0 - 5	4	0	1 i	543 - 555
5,000-9,999	-	1,175	862	66	212	6	0	0	0	0	28
10,000-24,999	-	2,161	1,892 i	68 - 92	149 i	0 - 12	0 - 5	0 - 13	0	0 - 3	0 - 53 i
25,000 or more	-	15,583	9,124	81	3,567 i	0 - 12	40	0 - 13	0	0	2,744 - 2,773

* = amount < \$500,000; i = > 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 45

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: 2018

(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 ^a	Company's parent	Unaffiliated companies				
All industries	21-23, 31-33, 42-81	42,438	23,515	15,775	2,558		248	5	337 i
Manufacturing industries	31-33	31,065	16,101	12,871	1,752		183 - 230	*	108 - 159
Food	311	317	82 i	235	*	i	0	0	0
Beverage and tobacco products	312	118	11	106	0		0	0	0
Textile, apparel, and leather products	313-16	1	1	*	0	i	0	0	0
Wood products	321	4	0	4	*	i	0	0	* i
Paper	322	1	*	1	0		0	0	0
Printing and related support activities	323	3	0	3	*	i	0	0	* i
Petroleum and coal products	324	189	171	18	1		0	0	0
Chemicals	325	10,716	2,697	6,811	1,190		0	*	19
Basic chemicals	3251	198	18	168	12		0	0	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	80	1	71 - 80	0 - 7	i	0	0	* i
Pesticide, fertilizer, and other agricultural chemicals	3253	315 - 323	0	310 - 323	0 - 7	i	0	0	* i
Pharmaceuticals and medicines	3254	9,936	2,640	6,103	1,173		0	*	18
Soap, cleaning compound, and toilet preparation	3256	129 - 178	0 - 40	125 - 138	0 - 7	i	0	0	* i
Paint, coating, adhesive, and other chemicals	3255, 3259	2 - 52	0 - 40	0 - 11	0 - 7	i	0	0	* i
Plastics and rubber products	326	50	38	11	*		0	0	0
Nonmetallic mineral products	327	26	11	15	*		0	0	0
Primary metals	331	15	3	5	7	i	*	0	0
Fabricated metal products	332	49	3	46	*	i	*	i	0
Machinery	333	792	127	598 - 666	0 - 66		0	0	0
Agricultural implement	33311	17	10	0 - 8	0 - 8		0	0	0
Semiconductor machinery	333242	540	0	473 - 541	0 - 66		0	0	0
Engine, turbine, and power transmission equipment	3336	18	2	15	0		0	0	0
Other machinery	other 333	217	114	36 - 104	0 - 66		0	0	0
Computer and electronic products	334	15,492	12,418	2,645	321		0 - 47	*	59 - 110
Communications equipment	3342	3,708	3,588	109	8		*	i	0

TABLE 45

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: 2018

(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 ^a	Company's parent	Unaffiliated companies			
Semiconductor and other electronic components	3344	3,375	1,294	1,879	194	0 - 10	*	0 - 10
Navigational, measuring, electromedical, and control instruments	3345	910	129	561 - 659	23 - 121	0 - 47	0	45 - 108
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	209	57	151	*	0	0	* i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	488	0 - 60	210 - 417	0 - 121	0 - 47	0	45 - 108
Other measuring and controlling device	other 3345	214	13 - 73	20 - 200	0 - 121	0	0	0
Other computer and electronic products	other 334	7,499	7,406	0 - 94	0 - 94	0	0	0
Electrical equipment, appliances, and components	335	313	111	191	11	0	0	0
Transportation equipment	336	2,374	104	1,906	151	184	0	29
Motor vehicles, bodies, trailers, and parts	3361-63	2,065	87	1,882	96	0	0	*
Aerospace products and parts	3364	282 - 299	16	0 - 16	55	184	0	29
Aircraft, aircraft engine, and aircraft parts	336411-13	282 - 299	16	0 - 16	55	184	0	29
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
Other transportation	other 336	9 - 26	0	8 - 25	*	* i	0	0
Furniture and related products	337	6	6	*	i	* i	0	* i
Miscellaneous	339	597	320	202 - 270	i 8 - 75	0	0	0
Medical equipment and supplies	3391	478	319	150	9	0	0	0
Other miscellaneous manufacturing	3399	119 i	*	52 - 119	i 0 - 66	0	0	0
Nonmanufacturing industries	21-23, 42-81	11,374	7,414	2,904	806	18 - 65	4	178 - 229 i
Mining, quarrying, oil and gas extraction, and support activities	21	550	510 - 547	0	4 - 39	0	0	0
Utilities	22	4	0	3	1	0	0	0
Wholesale trade	42	28	3	24	1	0	0	0
Electronic shopping and electronic auctions	454111-12	92 - 1,266	0 - 1,173	93	0	0	0	0
Transportation and warehousing	48-49	3	3	0	0	0	0	0
Information	51	4,895 i	4,165 i	605	124	0	0	* i
Publishing	511	1,226	803	319	104	0	0	* i
Newspaper, periodical, book, and directory publishers	5111	* i	0	0	* i	0	0	0
Software publishers	5112	1,225	803	319	104	0	0	* i

TABLE 45

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: 2018

(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 ^a	Company's parent	Unaffiliated companies			
Telecommunications	517	51 - 72	24	27 - 47	0	0	0	0
Data processing, hosting, and related services	518	343	182	138 - 162	0 - 21	0	0	* i
Other information	other 51	3,253 - 3,274 i	3,156 i	76 - 117	0 - 21 i	0	0	* i
Finance and insurance	52	891	891	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	3,716	669	2,162	635	18 - 65	4	178 - 229 i
Architectural, engineering, and related services	5413	295 i	29	41	15	0 - 47	0 - 5	161 - 212 i
Computer systems design and related services	5415	1,403	54	1,334	9	0 - 8	0 - 5	0
Scientific research and development services	5417	1,350	16	715	586	19	0 - 5	10 - 17
Research and development in biotechnology	541711	420	0	106	303	* i	0	11
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	930	16	609	282	19	0 - 5	0 - 6
Research and development in the social sciences and humanities	541720	*	0	0	0	*	0	0
Other professional, scientific, and technical services	other 54	668	570	73	25	0	0	* i
Health care services	621-23	9 i	0	0	9 i	0	0	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	16 - 1,190	0 - 1,173	17	0 - 30	0	0	0
All companies (number of domestic employees)	-	42,438	23,515	15,775	2,558	248	5	337 i
Small companies								
10-19 ^b	-	231	21	145	38	22	1	5
20-49	-	1,023	649	333	38 i	2	2	* i
Medium companies								
50-99	-	792	140	522	121	* i	*	9
100-249	-	1,993	463	1,457	58	10	1	4
Large companies								

TABLE 45

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: 2018

(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 ^a	Company's parent	Unaffiliated companies			
250–499	–	1,677	352	1,084	233	*	i	8
500–999	–	2,298	798	909	382	*	i	209 i
1,000–4,999	–	9,367	2,016	6,842	493	*	*	15
5,000–9,999	–	2,728 i	1,926 i	359	443	0	0	* i
10,000–24,999	–	9,091 i	4,533 i	3,881	677	0	0	0
25,000 or more	–	13,238	12,617	243	76	214	0	87

* = 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.

^a 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.^b Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 46

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: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total ^a	Basic research ^b	Applied research ^b	Development ^b
All industries	21–23, 31–33, 42–81	23,515	553	2,330	20,632
Manufacturing industries	31–33	16,101	437	1,691	13,972
Food	311	82	7	2	72
Beverage and tobacco products	312	11	1	4	7
Textile, apparel, and leather products	313–16	1	0	0	1
Wood products	321	0	0	0	0
Printing and related support activities	323	0	0	0	0
Chemicals	325	2,697	321	367	2,009
Pharmaceuticals and medicines	3254	2,640	314	351	1,976
Other chemicals	other 325	56	7	15	33
Plastics and rubber products	326	38	3	8	28
Nonmetallic mineral products	327	11	*	5	6
Primary metals	331	3	*	1	2
Fabricated metal products	332	3	*	*	3
Machinery	333	127	3	5	119
Computer and electronic products	334	12,418	63	1,211	11,144
Semiconductor and other electronic components	3344	1,294	28	99	1,167
Navigational, measuring, electromedical, and control instruments	3345	129	4	8	117
Other computer and electronic products	other 334	10,995	31	1,104	9,860
Electrical equipment, appliances, and components	335	111	*	2	108
Transportation equipment	336	104	9	6	88
Aerospace products and parts	3364	16	2	2	13
Other transportation	other 336	87	7	5	75
Furniture and related products	337	6	0	5	1
Miscellaneous manufacturing	322, 324, 339	490	30	75	385
Nonmanufacturing industries	21–23, 42–81	7,414	116	638	6,660
Information	51	4,165	30	358	3,777
Publishing	511	803	4	331	467
Telecommunications	517	24	1	2	21
Data processing, hosting, and related services	518	182	8	12	162
Other information	other 51	3,156	17	12	3,127
Professional, scientific, and technical services	54	669	7	181	481
Architectural, engineering, and related services	5413	29	1	12	17
Computer systems design and related services	5415	54	5	22	27
Scientific research and development services	5417	16	1	1	13
Research and development in biotechnology	541711	0	0	0	0

TABLE 46

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: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total ^a	Basic research ^b	Applied research ^b	Development ^b
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	16	1	1	13
Research and development in the social sciences and humanities	541720	0	0	0	0
Other professional, scientific, and technical services	other 54	570	1	145	424
Other nonmanufacturing	21–23, 42–49, 52, 53, 55–81	2,580	78	99	2,402
All companies (number of domestic employees)	–	23,515	553	2,330	20,632
Small companies					
10–19 ^c	–	21	2	3	16
20–49	–	649	9	204	436
Medium companies					
50–99	–	140	2	48	89
100–249	–	463	101	37	326
Large companies					
250–499	–	352	15	34	303
500–999	–	798	36	48	715
1,000–4,999	–	2,016	55	501	1,461
5,000–9,999	–	1,926	i 4	140	1,783
10,000–24,999	–	4,533	i 86	122	4,325
25,000 or more	–	12,617	245	1,193	11,179

* = 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.

^a 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.^b 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.^c Business 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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 47

Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2018

(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	
				Company's parent	Other				In the United States	Outside the United States
All industries	21-23, 31-33, 42-81	42,668	36,524	1,297	i 3,761	102	8	340	482	155
Manufacturing industries	31-33	39,079	33,476	1,294	i 3,456	91	7	316	390	49
Food	311	232	198	i 0	11	i *	i *	i 15	i 7	i 2
Beverage and tobacco products	312	233	220	0	0	0	0	6	6	0
Textile, apparel, and leather products	313-16	18	16	1	* i	0	0	* i	0 - 3	i 0 - 3
Wood products	321	13	12	0	0	*	*	0	*	0
Paper	322	14	13	*	i *	0	0	* i	1	* i
Printing and related support activities	323	3	3	0	0	0	0	0	*	0
Petroleum and coal products	324	230	128	0	7	5	0	31	52	8
Chemicals	325	31,571	27,938	184	i 3,030	7	*	i 176	217	21
Basic chemicals	3251	72	59	0	4	0	0	7	*	1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	6 - 18	7	0 - 10	* i	0	0	*	0 - 4	0
Pesticide, fertilizer, and other agricultural chemicals	3253	101	i 84	i 1	i 9	i *	i *	i 6	i 1	i *
Pharmaceuticals and medicines	3254	31,078	27,502	175	i 3,012	7	*	i 161	206	16
Soap, cleaning compound, and toilet preparation	3256	271	256	*	i 3	i *	i *	*	8	3
Paint, coating, adhesive, and other chemicals	3255, 3259	33 - 45	30	0 - 10	3	0	*	2	0 - 4	*
Plastics and rubber products	326	68	42	21	2	0	*	i 1	1	* i
Nonmetallic mineral products	327	15	11	*	3	0	0	0	* i	*
Primary metals	331	37	37	*	i *	0	0	*	*	* i
Fabricated metal products	332	85	80	*	i 2	0	0	2	* i	1
Machinery	333	429	369	7	44	0 - 3	0	1	2 - 11	0
Agricultural implement	33311	188	184	0	4	0	0	*	0	0
Semiconductor machinery	333242	1 - 10	2	0	*	0	0	0	0 - 9	0
Engine, turbine, and power transmission equipment	3336	50	45	*	1	0	0	*	2	0
Other machinery	other 333	182 - 191	138	7	39	0 - 3	0	* i	0 - 9	0
Computer and electronic products	334	1,785	1,075	544	113	3	*	i 13	29	i 8
Communications equipment	3342	779	206	540	30	*	i *	i 1	3	* i
Semiconductor and other electronic components	3344	384	332	4	35	3	0	4	7	*

TABLE 47

Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2018

(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		
				Company's parent	Other				In the United States	Outside the United States	
Navigational, measuring, electromedical, and control instruments	3345	359	310	*	24	*	i	0	7	18	i *
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	80	54	0	6	*	i	0	0 - 8	10 - 19	* i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	177 - 186	170	0	8	0		0	0 - 8	0	*
Other measuring and controlling device	other 3345	94 - 103	86	*	9	0		0	*	0 - 9	i * i
Other computer and electronic products	other 334	261	227	*	25	*	i	0	2	*	i 7
Electrical equipment, appliances, and components	335	109	95	1	13	*		0	*	1	0
Transportation equipment	336	3,218	2,388	529	i 143	74		6	48	26	3 i
Motor vehicles, bodies, trailers, and parts	3361-63	2,608	1,877	526	i 134	3		2	38	25	3 i
Aerospace products and parts	3364	555	463	0	6	71		4	9	1	0
Aircraft, aircraft engine, and aircraft parts	336411-13	422	339	0	6	71		4	1	1	0
Guided missile, space vehicle, and related parts	336414-15, 336419	133	125	0	0	0		*	8	0	0
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0		0	0	0	0
Other transportation	other 336	55	47	4	3	0		0	*	0	0
Furniture and related products	337	19	14	*	i 5	0		0	*	i 0 - 2	i 0 - 2 i
Miscellaneous	339	1,003	839	7	83	1 - 4		*	i 23	i 42	5 - 8
Medical equipment and supplies	3391	839	732	7	28	2		*	i 23	i 42	6
Other miscellaneous manufacturing	3399	163	107	i *	i 56	0 - 2	i	0	*	i *	i 0 - 2 i
Nonmanufacturing industries	21-23, 42-81	3,589	3,047	2	305	11		1	24	93	106
Mining, quarrying, oil and gas extraction, and support activities	21	141	116	0	4	0		0	2	19	1
Utilities	22	211	170	0	3	i 0		1	2	35	0
Wholesale trade	42	36	28	i *	i 5	i 0		0	0	3	i 0
Electronic shopping and electronic auctions	454111-12	0 - 131	i 0 - 131	i 0	0	0		0	0	0	0
Transportation and warehousing	48-49	31	26	0	*	0		0	0	4	0
Information	51	2,062	1,874	1	126	0		0	7	14	40
Publishing	511	1,108	983	1	74	0		0	7	13	31
Newspaper, periodical, book, and directory publishers	5111	5	5	i 0	0	0		0	0	0	0
Software publishers	5112	1,103	978	1	74	0		0	7	13	31
Telecommunications	517	352	336	0	15	0		0	0	0	0

TABLE 47

Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2018

(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	
				Company's parent	Other				In the United States	Outside the United States
Data processing, hosting, and related services	518	207	170	0	26	0	0	*	1	9
Other information	other 51	395	385	0	10	0	0	* i	* i	* i
Finance and insurance	52	347	241	* i	106	0	0	0	*	0
Real estate and rental and leasing	53	*	*	i	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	*	i	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	*	*	i	0	0	0	0	0	0
Professional, scientific, and technical services	54	552	410	1	50	11	0	9	7	64 i
Architectural, engineering, and related services	5413	103	101	* i	1	* i	0	1	*	* i
Computer systems design and related services	5415	111	81	0	21	* i	0	1	* i	7 i
Scientific research and development services	5417	238	185	1	27	11	0	7	6	1
Research and development in biotechnology	541711	71	57	1	5	1	0	6	*	0
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	167	128	0	21	10	0	1	6	1
Research and development in the social sciences and humanities	541720	0	0	0	0	0	0	0	0	0
Other professional, scientific, and technical services	other 54	100	43	* i	2	* i	0	* i	*	55 i
Health care services	621-23	80	56	i	0	11 i	0	2 i	11 i	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	3 - 134	0 - 131	1	0	0	0	1	1 i	2
All companies (number of domestic employees)	-	42,668	36,524	1,297	i 3,761	102	8	340	482	155
Small companies										
10-19 ^a	-	415	344	2	34	1 i	0	20	12	3
20-49	-	1,562	1,363	6	127	3	*	37	17	9
Medium companies										
50-99	-	1,836	1,416	19	243	1	* i	37	64	56 i
100-249	-	2,062	1,807	13	203	13	* i	15	8	2
Large companies										
250-499	-	2,352	2,003	27	279	*	*	15	23	4
500-999	-	1,227	889	66	127	* i	*	30	70	46
1,000-4,999	-	5,696	4,844	56	676	3	1	40	65	11 i

TABLE 47

Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2018

(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	
				Company's parent	Other				In the United States	Outside the United States
5,000–9,999	–	6,239	6,102	4	i 79	*	i	*	i 13	37 3
10,000–24,999	–	14,801	12,092	741	1,787	1	i	*	i 39	127 13
25,000 or more	–	6,478	5,664	362	i 206	80		6	92	59 10

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 48

Domestic R&D performance by performer and source of funds, by industry and company size: 2018

(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	441,036	377,806	63,230	52,547	42,668	9,878
Manufacturing industries	31-33	274,075	234,682	39,393	47,321	39,079	8,242
Food	311	4,654	4,412	242	234	232	2
Beverage and tobacco products	312	1,113	1,004	109	234	233	1
Textile, apparel, and leather products	313-16	989	986	4	18	18	*
Wood products	321	203	199	4	13	13	* i
Paper	322	934	932	2	15	14	1
Printing and related support activities	323	242	238	4	3	3	*
Petroleum and coal products	324	1,269	1,246	23	230	230	*
Chemicals	325	84,137	73,584	10,553	35,552	31,571	3,981
Basic chemicals	3251	2,443	2,251	192	72	72	*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,653	1,568	85	6 - 96	6 - 18	0 - 79
Pesticide, fertilizer, and other agricultural chemicals	3253	1,460	1,135 i	326	100 - 107 i	101 i	0 - 7
Pharmaceuticals and medicines	3254	74,592	64,800	9,792	34,981	31,078	3,903
Soap, cleaning compound, and toilet preparation	3256	2,710	2,573	137	270 - 350	271	0 - 79
Paint, coating, adhesive, and other chemicals	3255, 3259	1,278	1,257	21	33 - 123	33 - 45	0 - 79
Plastics and rubber products	326	2,751	2,667	83	115	68	47
Nonmetallic mineral products	327	1,385	1,361	24	15	15	0
Primary metals	331	839	817	22 i	38	37	1
Fabricated metal products	332	2,327	2,222	105	86	85	1
Machinery	333	14,799	13,765	1,034	484	429	55
Agricultural implement	33311	1,872	1,862	10	188	188	*
Semiconductor machinery	333242	4,166	3,623	543	43	1 - 10	32 - 42
Engine, turbine, and power transmission equipment	3336	2,483	2,310	173	49 - 72	50	0 - 21
Other machinery	other 333	6,278	5,970	307	182 - 205	182 - 191	0 - 22
Computer and electronic products	334	83,697	73,922	9,775	2,213	1,785	429
Communications equipment	3342	13,107	11,822	1,285 i	844	779	64 i
Semiconductor and other electronic components	3344	31,052	28,642	2,410	398	384	13
Navigational, measuring, electromedical, and control instruments	3345	16,727	10,864	5,863	701	359	342
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,208	3,046	163	80	80	*
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	8,843	3,388	5,455	504 - 515	177 - 186	328
Other measuring and controlling device	other 3345	4,675	4,430	245	107 - 117	94 - 103	13

TABLE 48

Domestic R&D performance by performer and source of funds, by industry and company size: 2018

(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 computer and electronic products	other 334	22,811	22,594	217	271	261	9
Electrical equipment, appliances, and components	335	4,487	4,222	266	158	109	49
Transportation equipment	336	52,629	35,894	16,735	6,849	3,218	3,631
Motor vehicles, bodies, trailers, and parts	3361-63	25,586	23,080	2,506	2,761 - 2,786	2,608	154 - 177
Aerospace products and parts	3364	24,291	11,160	13,131	4,010	555	3,455
Aircraft, aircraft engine, and aircraft parts	336411-13	22,968	10,746	12,222	3,877	422	3,455
Guided missile, space vehicle, and related parts	336414-15, 336419	1,323	414	909	133	133	0
Military armored vehicle, tank, and tank component	336992	11	6	6	0	0	0
Other transportation	other 336	2,741	1,649	1,092	54 - 78	55	0 - 23
Furniture and related products	337	410	404	5	19 - 20	19	0 - 1
Miscellaneous	339	17,209	16,807	402	1,043 - 1,048	1,003	40 - 46
Medical equipment and supplies	3391	14,531	14,267	264	866	839	27
Other miscellaneous manufacturing	3399	2,678	2,540	138	177 - 182	163	14 - 18
Nonmanufacturing industries	21-23, 42-81	166,961	143,123	23,838	5,226	3,589	1,637
Mining, quarrying, oil and gas extraction, and support activities	21	1,905	1,775	130	141	141	*
Utilities	22	275	224	51	223	211	12
Wholesale trade	42	906	881	25	39	36	4
Electronic shopping and electronic auctions	454111-12	11,652	11,557	94	0 - 131	0 - 131	0
Transportation and warehousing	48-49	942	935	7	31	31	0
Information	51	94,349	93,487	862	2,141	2,062	79
Publishing	511	32,770	32,281	489	1,184	1,108	75
Newspaper, periodical, book, and directory publishers	5111	131	131	*	6	5	1
Software publishers	5112	32,639	32,150	489	1,178	1,103	75
Telecommunications	517	3,696	3,631	65	353	352	2
Data processing, hosting, and related services	518	23,306	23,115	191	209	207	2
Other information	other 51	34,576	34,459	117	395	395	0
Finance and insurance	52	7,471	7,426	45	348	347	1
Real estate and rental and leasing	53	1,022	1,022	0	*	*	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	6	0	*	*	0
Other real estate and rental and leasing	other 53	1,016	1,016	0	*	*	0
Professional, scientific, and technical services	54	44,860	22,374	22,486	2,021	552	1,469
Architectural, engineering, and related services	5413	3,961	2,277	1,684	419	103	316

TABLE 48

Domestic R&D performance by performer and source of funds, by industry and company size: 2018

(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
Computer systems design and related services	5415	15,923	13,633	2,291	140	111	29
Scientific research and development services	5417	20,185	2,424	17,761	1,287	238	1,049
Research and development in biotechnology	541711	5,857	820	5,037	70 - 221	71	0 - 150
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	13,657	1,577	12,080	1,067	167	900
Research and development in the social sciences and humanities	541720	671	27	644	0 - 150	0	0 - 150
Other professional, scientific, and technical services	other 54	4,791	4,041	750	175	100	75
Health care services	621-23	1,476	1,401	75	129 i	80	49 i
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,103	2,041	62	26 - 157	3 - 134	23
All companies (number of domestic employees)	-	441,036	377,806	63,230	52,547	42,668	9,878
Small companies							
10-19 ^a	-	4,390	3,340	1,050	528	415	113
20-49	-	11,252	9,556	1,695	1,958	1,562	396
Medium companies							
50-99	-	12,321	10,446	1,875	2,011	1,836	174
100-249	-	18,547	14,626	3,921	2,723	2,062	661
Large companies							
250-499	-	19,645	16,604	3,041	2,984	2,352	631
500-999	-	17,657	15,561	2,096	1,477	1,227	250
1,000-4,999	-	68,578	58,509	10,068	7,175	5,696	1,479
5,000-9,999	-	45,337	36,274	9,063	6,654	6,239	415
10,000-24,999	-	84,420	74,423	9,997	16,503	14,801	1,702 i
25,000 or more	-	158,889	138,465	20,423	10,535	6,478	4,056

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 49

Domestic R&D performance by source of funds and performer, by industry and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company				Paid for by others							
								R&D performed by the company					
		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)	Total	Paid for by the U.S. government	Paid for by non-U.S. government sources		
All industries	21–23, 31–33, 42–81	420,474	42,668	377,806	73,109		9,878		63,230	24,685		38,545	
Manufacturing industries	31–33	273,761	39,079	234,682	47,634		8,242		39,393	18,980		20,413	
Food	311	4,644	232	4,412	244		2		242	*	i	241	
Beverage and tobacco products	312	1,237	233	1,004	109		1		109	0		109	
Textile, apparel, and leather products	313–16	1,004	18	986	4		*		4	0		4	
Wood products	321	212	13	199	4		*	i	4	*	i	4	
Paper	322	946	14	932	3		1		2	0		2	
Printing and related support activities	323	240	3	238	4		*		4	*	i	4	
Petroleum and coal products	324	1,475	230	1,246	23		*		23	*		23	
Chemicals	325	105,155	31,571	73,584	14,533		3,981		10,553	204		10,348	
Basic chemicals	3251	2,323	72	2,251	193		*		192	1	i	192	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,574 - 1,586	6 - 18	1,568	84 - 164		0 - 79		85	1	i	84	i
Pesticide, fertilizer, and other agricultural chemicals	3253	1,235	101	i 1,135	i 325 - 332		0 - 7		326	3		322	
Pharmaceuticals and medicines	3254	95,879	31,078	64,800	13,694		3,903		9,792	188		9,604	
Soap, cleaning compound, and toilet preparation	3256	2,843	271	2,573	136 - 216		0 - 79		137	*	i	137	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,290 - 1,302	33 - 45	1,257	20 - 100		0 - 79		21	11		10	i
Plastics and rubber products	326	2,735	68	2,667	131		47		83	2		81	
Nonmetallic mineral products	327	1,376	15	1,361	24		0		24	2		22	
Primary metals	331	854	37	817	23		1		22	i	2	i	20
Fabricated metal products	332	2,307	85	2,222	106		1		105	3	i	102	
Machinery	333	14,194	429	13,765	1,089		55		1,034	175		859	
Agricultural implement	33311	2,050	188	1,862	11		*		10	2		8	
Semiconductor machinery	333242	3,624 - 3,633	1 - 10	3,623	576 - 586		32 - 42		543	*	i	543	
Engine, turbine, and power transmission equipment	3336	2,360	50	2,310	172 - 194		0 - 21		173	145		28	

TABLE 49

Domestic R&D performance by source of funds and performer, by industry and company size: 2018

(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 machinery	other 333	6,152 - 6,161	182 - 191	5,970	307 - 330	0 - 22		307	28		280
Computer and electronic products	334	75,707	1,785	73,922	10,204	429		9,775	5,174		4,601
Communications equipment	3342	12,602	779	11,822	1,349	64		1,285	821		463
Semiconductor and other electronic components	3344	29,027	384	28,642	2,424	13		2,410	50		2,361
Navigational, measuring, electromedical, and control instruments	3345	11,223	359	10,864	6,205	342		5,863	4,198		1,665
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,126	80	3,046	163	*		163	1		162
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,564 - 3,575	177 - 186	3,388	5,783	328		5,455	4,152		1,303
Other measuring and controlling device	other 3345	4,523 - 4,534	94 - 103	4,430	259	13		245	46		199
Other computer and electronic products	other 334	22,855	261	22,594	227	9		217	105		112
Electrical equipment, appliances, and components	335	4,330	109	4,222	315	49		266	39		227
Transportation equipment	336	39,112	3,218	35,894	20,366	3,631		16,735	13,321		3,414
Motor vehicles, bodies, trailers, and parts	3361–63	25,688	2,608	23,080	2,659 - 2,683	154 - 177		2,506	64 - 88		2,418 - 2,442
Aerospace products and parts	3364	11,715	555	11,160	16,586	3,455		13,131	12,167		964
Aircraft, aircraft engine, and aircraft parts	336411–13	11,168	422	10,746	15,677	3,455		12,222	11,286		936
Guided missile, space vehicle, and related parts	336414–15, 336419	546	133	414	909	0		909	881		28
Military armored vehicle, tank, and tank component	336992	6	0	6	6	0		6	2 - 6		0 - 4
Other transportation	other 336	1,704	55	1,649	1,091 - 1,115	0 - 23		1,092	1,062 - 1,084		8 - 30
Furniture and related products	337	424	19	404	5 - 6	0 - 1		5	3		3
Miscellaneous	339	17,810	1,003	16,807	442 - 447	40 - 46		402	54		348
Medical equipment and supplies	3391	15,106	839	14,267	291	27		264	47		216
Other miscellaneous manufacturing	3399	2,703	163	2,540	152 - 156	14 - 18		138	6		132

TABLE 49

Domestic R&D performance by source of funds and performer, by industry and company size: 2018

(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
Nonmanufacturing industries	21–23, 42–81	146,712	3,589	143,123	25,475	1,637	23,838	5,705	18,132
Mining, quarrying, oil and gas extraction, and support activities	21	1,916	141	1,775	130	*	130	0	130
Utilities	22	435	211	224	62	12	51	30	21
Wholesale trade	42	916	36	881	29	4	25	0	25
Electronic shopping and electronic auctions	454111–12	11,557 - 11,688	0 - 131	11,557	94	0	94	2	93
Transportation and warehousing	48–49	965	31	935	7	0	7	0	7
Information	51	95,548	2,062	93,487	941	79	862	50	812
Publishing	511	33,389	1,108	32,281	565	75	489	36	453
Newspaper, periodical, book, and directory publishers	5111	136	5	131	1	1	*	*	*
Software publishers	5112	33,253	1,103	32,150	564	75	489	36	453
Telecommunications	517	3,983	352	3,631	67	2	65	8	56
Data processing, hosting, and related services	518	23,322	207	23,115	193	2	191	5	186
Other information	other 51	34,854	395	34,459	117	0	117	1	117
Finance and insurance	52	7,773	347	7,426	46	1	45	0	45
Real estate and rental and leasing	53	1,022	*	1,022	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	*	6	0	0	0	0	0
Other real estate and rental and leasing	other 53	1,016	*	1,016	0	0	0	0	0
Professional, scientific, and technical services	54	22,926	552	22,374	23,955	1,469	22,486	5,620	16,866
Architectural, engineering, and related services	5413	2,380	103	2,277	2,000	316	1,684	875	809
Computer systems design and related services	5415	13,743	111	13,633	2,320	29	2,291	493	1,798
Scientific research and development services	5417	2,661	238	2,424	18,810	1,049	17,761	3,920	13,841
Research and development in biotechnology	541711	891	71	820	5,036 - 5,188	0 - 150	5,037	77	4,960
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	1,744	167	1,577	12,980	900	12,080	3,215 - 3,324	8,756 - 8,864

TABLE 49

Domestic R&D performance by source of funds and performer, by industry and company size: 2018

(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	
Research and development in the social sciences and humanities	541720	27	0	27	643 - 795	0 - 150		644	518 - 627		18 - 126	
Other professional, scientific, and technical services	other 54	4,141	100	4,041	825	75		750	332		418	
Health care services	621–23	1,481	80	1,401	124	49	i	75	4		72 i	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,043 - 2,175	3 - 134	2,041	86	23		62	1 i		62	
All companies (number of domestic employees)	–	420,474	42,668	377,806	73,109	9,878		63,230	24,685		38,545	
Small companies												
10–19 ^a	–	3,755	415	3,340	1,162	113		1,050	462		588	
20–49	–	11,118	1,562	9,556	2,091	396		1,695	759		936	
Medium companies												
50–99	–	12,282	1,836	10,446	2,050	174		1,875	561		1,314	
100–249	–	16,688	2,062	14,626	4,582	661		3,921	1,378		2,544	
Large companies												
250–499	–	18,956	2,352	16,604	3,672	631		3,041	1,016		2,025	
500–999	–	16,788	1,227	15,561	2,346	250		2,096	128		1,968	
1,000–4,999	–	64,205	5,696	58,509	11,547	1,479		10,068	1,462		8,606	
5,000–9,999	–	42,512	6,239	36,274	9,478	415		9,063	1,175		7,888	
10,000–24,999	–	89,224	14,801	74,423	11,700	1,702	i	9,997	2,161		7,836	
25,000 or more	–	144,944	6,478	138,465	24,480	4,056		20,423	15,583		4,841	

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 50

R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2018

(Millions of U.S. dollars)

Location	Total	Paid for by the company	Paid for by others
Total	100,376	90,429	9,947
Puerto Rico ^a	493	476	17
Canada	6,140	5,559	581
Latin America and Other Western Hemisphere	6,436	6,009	427
Argentina	298	180	118
Brazil	1,529	1,402	128
Chile	129	102	27
Mexico	1,532	1,448	84
Other Latin American and Western Hemisphere locations	2,948	2,877	71
Africa	328	223	105
South Africa	236	138	99
Other African locations	92	85	6
Asia and Pacific	33,045	30,826	2,218
Australia	1,953	1,786	168
China	7,867	7,392	475
Hong Kong	347	321	26
India	9,521	9,235	286
Indonesia	28	27	2
Japan	3,986	3,326	660
Malaysia	879	867	12
New Zealand	154	123	31
Singapore	3,889	3,625	264
South Korea	1,381	1,244	137
Taiwan	1,772	1,655	117
Thailand	362	342	19
Other Asian/Pacific locations	905	884	21
Europe	47,805	41,389	6,416
Austria	746	686	60
Belgium	2,549	2,335	214
Czechia	547	474	73
Denmark	641	607	34
Finland	578	535	43
France	3,332	2,783	549
Germany	8,391	7,820	572
Hungary	238	165	73
Ireland	4,043	3,898	146
Italy	1,670	1,385	285
Luxembourg	259	252	8
Netherlands	2,289	1,896	393
Norway	391	380	11
Poland	854	672	182
Russia	450	321	128
Spain	1,168	888	281
Sweden	1,311	1,219	92
Switzerland	4,434	3,888	546
Turkey	109	82	26
United Kingdom	11,278	8,931	2,347
Other European locations	2,527	2,175	352
Middle East	5,353	5,245	107
Israel	5,099	5,004	95

i

TABLE 50
R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2018
(Millions of U.S. dollars)

Location	Total		Paid for by the company		Paid for by others	
Other Middle Eastern locations	253		241		12	
Undistributed	777	i	702	i	75	i

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

^a 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 51-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: 2018 (part A)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Puerto Rico ^a	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	100,376	493	6,140	746	2,549	547	641	578	3,332	8,391	238	4,043	1,670	259	2,289	391	854	450	1,168	1,311	4,434	109	11,278	2,527	
Manufacturing industries	31–33	64,878	481	3,390	608	2,239	184	437	342	2,177	6,564	69	2,232	1,344	172	1,408	290	505	245	716	758	2,771	58	5,299	1,262	
Food	311	864	0 - 170	27	2	6	1	1	*	48	37	1	1	6	0	16	6	16	1	11	2	19	1	70	79	
Chemicals	325	16,749	59 - 95	644	355	1,857	26 - 48	124	44	644	1,142	30	1,242	266	134 - 166	613	40	i 87	84	318	150	1,670	35	1,867	657	
Pharmaceuticals and medicines	3254	13,945	46	547	354	1,694	27	101	38	512	746	28	1,240	238	1	433	34	i 81	78	291	148	1,605	31	1,602	476	
Other chemicals	other 325	2,804	12 - 49	97	2	163	0 - 21	24	i 6	132	396	2	2	28	132 - 165	179	6	i 6	6	27	2	65	4	264	181	
Plastics and rubber products	326	428	0	14	0 - 5	13	2	0	2	40	108	0 - 7	3	40	0 - 15	4	0	4	1	6	3	2	0	16	4	
Nonmetallic mineral products	327	181	i 0	13	0	0	*	1	i 0	11	i 22	i 0	0	0	0	0	0	4	i 3	i 0	0	0	0	1	3	
Fabricated metal products	332	216	0	7	6	2	*	*	*	2	33	*	*	4	0	5	*	*	*	2	*	17	0	36	2	
Machinery	333	4,521	0	103	57	32	7	72	58	435	804	2	14	376	0 - 22	113	27	15	4	37	102	189	0 - 10	291	38	
Computer and electronic products	334	28,322	125 - 423	1,840	131	144	102	215	202	573	2,155	14	694	214	7	269	181	255	84	190	345	376	10	i 1,636	258	
Electrical equipment, appliances, and components	335	1,693	*	268	i 21	11	3	1	4	50	279	2	8	114	0	16	9	22	13	i 6	8	77	2	98	29	
Transportation equipment	336	7,446	0	249	5	i 81	25	3	0	140	1,500	17	4	252	0 - 23	249	0	91	0 - 16	125	58	8	3	963	102	i
Miscellaneous	339	3,270 - 3,274	0 - 247	41 - 230	30	32	0 - 21	i 17	31	170	441	0	268	39	0 - 32	i 115	25	9	i 44	17	84	157	0 - 10	210	32	
Other manufacturing	312–16, 321–24, 331, 337	1,180 - 1,191	0	0 - 179	0 - 5	61	0	2	1	65	43	0 - 7	0	33	0 - 18	8	3	i 2	0 - 16	3	6	256	0 - 10	111	59	
Nonmanufacturing industries	21–23, 42–81	35,498	12	2,751	138	310	363	204	236	1,155	1,827	169	1,811	326	88	i 881	101	349	205	452	553	1,663	51	5,979	1,265	
Wholesale trade	42	32	0	0	0	0	0	0	0	0	6	0	0	0	0	1	0	0	0	0	0	0	0	1	*	
Information	51	17,156	0 - 13	1,588	79	137	202	143	192	442	645	95	742	56	0 - 29	315	79	138	74	161	446	1,038	1 - 26	2,868	687	
Telecommunications	517	131 - 138	0	20	0	*	0	1	0	19	4	0	3	0	*	3	0	0	1	1	0	0	0	19	8	
Data processing, hosting, and related services	518	4,739	0 - 10	315	56	8	103	15	12	132	177	56	334	24	*	89	23	52	29	38	35	46	2	i 524	312	i
Other information	other 51	12,278 - 12,287	0 - 13	1,253	23	128	99	127	179	291	464	39	406	32	0 - 29	223	56	86	43	122	411	992	0 - 25	2,325	366	
Professional, scientific, and technical services	54	13,307	0 - 8	i 899	54	166	134	39	42	627	849	74	441	239	0	355	19	187	130	257	65	512	26	2,524	441	
Architectural, engineering, and related services	5413	56 - 66	i 0	14	0	0	0	*	0	3	i 5	i 0	0	*	0	*	0	0	0	0	0	0	0	*	2	

TABLE 51-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: 2018 (part A)
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside United States	Puerto Rico ^a	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																			
Scientific research and development services	5417	8,370 - 8,379	0 - 8	i	420	46	156	65	33	42	483	516	73	127	199	0		310	i	8	i	156	125	212	58	440		24	2,081	339														
Research and development in biotechnology	541711	2,590	0		78	4	60	24	9	5	142	194	26	23	72	0		45		4		64	33	81	20	394		6	594	111														
Other scientific research and development	other 5417	5,779 - 5,790	0 - 8	i	342	42	96	41	i	24	37	341	323	48	103	127	0		264	i	4	i	92	i	92	131	38	47	1,487	228														
Other professional, scientific, and technical services	other 54	4,871	0		466	8	10	69	6	*	141	328	1	314	40	0		45		11		31	5	45	7	71		2	442	99														
Other nonmanufacturing	21–23, 44–45, 48–49, 52–53, 55–56, 621–24, 71–72, 81	5,002	i	0 - 13	263	i	4	i	8	i	26	22	2	i	86	i	327	i	*	628	i	31	i	59 - 88	i	210		3	i	24	i	2	34	i	42	i	113	i	0 - 25	586	i	138	i	
All companies (number of domestic employees)	–	100,376	493		6,140	746	2,549	547	641	578	3,332	8,391	238	4,043	1,670	259		2,289	391	854	450	1,168	1,311	4,434		109	11,278	2,527																
Small companies																																												
10–19 ^b	–	128	0		4	5	0	2	0	*	2	7	0	2	2	0		1	0	*	0	*	5	10		0	8	6																
20–49	–	569	0		43	44	20	i	*	2	*	15	30	*	3	4	0		5	0	5	6	24	*	3	0	60	58																
Medium companies																																												
50–99	–	692	*		30	i	1	5	13	4	0	20	68	3	1	2	0		13	*	2	5	5	11	4	*	92	26																
100–249	–	1,872	2		87	1	7	8	7	1	36	145	*	59	39	*	20	12	13	10	6	25	332	*	249	31																		
Large companies																																												
250–499	–	2,179	*		162	4	2	3	4	3	40	89	2	154	28	0		72	8	4	7	18	11	72	*	322	79																	
500–999	–	2,557	0		115	9	19	41	24	20	87	151	14	72	29	4		17	18	32	34	37	19	40	8	579	144																	
1,000–4,999	–	15,184	28		2,095	36	214	44	232	121	702	1,335	75	494	204	0 - 43		469	36	101	75	132	324	647		0 - 37	1,286	566																
5,000–9,999	–	15,538	9		886	118	183	148	104	63	i	634	940	62	580	231	2		404	45	i	226	96	i	280	294	579	i	42	1,923	373	i												
10,000–24,999	–	22,356	432		769	372	426	36	87	78	1,049	2,135	40	355	615	120 - 166		770	94	169	78	466	258	695		0 - 37	2,358	646																
25,000 or more	–	39,301	21		1,949	155	1,671	252	178	291	745	3,491	42	2,322	515	89	i	518	177	301	138	199	365	2,052		24	4,400	597																

* = 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.

^a Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.
^b Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 51-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: 2018 (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	100,376	298	1,529	129	1,532	2,948	1,953	7,867	347	9,521	28	3,986	879	154	3,889	1,381	1,772	362	905	5,099	253	236	92	777
Manufacturing industries	31–33	64,878	124	1,169	66	1,357	2,243	1,096	5,678	237	5,008	23	2,653	855	76	3,153	1,087	1,137	283	725	3,429	197	66	29	638
Food	311	864	3	83	4	20	11	38	141	2	12	3	3	2	3	19	3	*	4	5	*	2	3	3	0 - 170
Chemicals	325	16,749	96	369	35	127	302	277	799	98	314	9	1,172	8	12	221	92	88	21	155	236	96	49	19	4 - 40
Pharmaceuticals and medicines	3254	13,945	75	242	24	85	241	260	550	67	269	3	1,040	5	11	115	87	81	15	52	224	88	39	15	5
Other chemicals	other 325	2,804	22	127	11	41	61	17	250	31	44	6	131	3	1	106	6	6	6	103	12	8	10	3	0 - 36
Plastics and rubber products	326	428	3	11	0	37	1	1	57	1	2	*	22	0	*	1	4	*	5	0	0	0	0	0	21
Nonmetallic mineral products	327	181	0	0	0	3	0	*	14	0	1	0	31	0	0	0	45	9	0	0	20	0	0	0	*
Fabricated metal products	332	216	1	*	*	3	*	1	23	0	4	0	50	1	7	1	0	1	*	4	0	1	*	0	1
Machinery	333	4,521	2	113	*	21	5	43	394	4	338	*	169	10	10	112	146	107	1	13	244	3	6	*	2
Computer and electronic products	334	28,322	9	48	*	167	1,814	117	2,765	74	3,937	2	856	829	40	2,648	215	882	212	389	2,752	17	2	*	227 - 525
Electrical equipment, appliances, and components	335	1,693	1	96	*	23	*	2	307	13	45	*	55	1	*	39	26	21	2	12	1	1	1	1	3
Transportation equipment	336	7,446	1	405	0	914	13	465	677	1	210	*	78	0	0	1	516	17	20	106	51	*	3	4	85
Miscellaneous	339	3,270 - 3,274	0 - 12	23	25	21	65	130	380	29	134	9	183	4	4	85	28	12	2	23	125	0 - 81	1	0 - 5	0 - 247
Other manufacturing	312–16, 321–24, 331, 337	1,180 - 1,191	0 - 12	21	2	21	31	22	121	14	11	0	34	*	0	26	13	1	15	18	*	0 - 81	2	0 - 5	0 - 179
Nonmanufacturing industries	21–23, 42–81	35,498	175	361	63	175	705	857	2,189	111	4,513	5	1,333	24	78	736	294	636	79	180	1,670	56	170	63	139
Wholesale trade	42	32	0	0	0	0	0	0	2	9	0	0	1	0	0	0	0	3	0	9	0	0	0	0	1
Information	51	17,156	17	91	31	67	53	382	1,178	38	2,753	3	278	7	40	273	62	486	7	121	1,011	8	42	47	0 - 15
Telecommunications	517	131 - 138	0	0	0	0 - 8	0 - 5	*	8	1	34	0	*	0	0	*	3	0	0	0	0 - 20	0	0	0	0
Data processing, hosting, and related services	518	4,739	2	31	*	60	49	127	338	5	1,297	2	45	2	27	43	12	22	1	29	225	4	32	*	0 - 15
Other information	other 51	12,278 - 12,287	15	61	31	0 - 8	0 - 5	255	832	32	1,422	1	233	5	13	230	47	464	6	92	765 - 787	4	10	47	0 - 15
Professional, scientific, and technical services	54	13,307	157	174	28	91	631	253	710	25	1,109	2	684	12	23	224	140	138	19	29	567	13	97	11	79 - 92
Architectural, engineering, and related services	5413	56 - 66	0	*	0	0	0	1	*	5	2	0	17	0	0	*	*	4	0	0	0	*	0	0	0 - 15
Scientific research and development services	5417	8,370 - 8,379	115	117	26	78	53	158	371	19	262	2	602	12	19	187	136	72	19	20	74	11	96	6	0 - 12
Research and development in biotechnology	541711	2,590	17	21	8	35	13	66	139	6	78	*	88	2	8	16	45	17	4	4	21	0 - 7	9	0	0 - 7

TABLE 51-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: 2018 (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		
Other scientific research and development	other 5417	5,779 - 5,790	97		96	i	18	i	43	i	40	i	92		231		13	i	184		1		514		10		11		171		91		55		15		17		53	i	4 - 12		87		6		0 - 12		
Other professional, scientific, and technical services	other 54	4,871	42	i	57		2		14		577		94		339		*	i	845		0		65		*		4		37		4	i	62		0		9		493		1		1		5		75	i	
Other nonmanufacturing	21–23, 44–45, 48–49, 52–53, 55–56, 621–24, 71–72, 81	5,002	i	1		95	i	3		17	i	21	i	221	i	299	i	39		651	i	*		371	i	5		15	i	238	i	91	i	9	i	53		21	i	92	i	36	i	31	i	5	i	33 - 53	
All companies (number of domestic employees)	–	100,376		298		1,529		129		1,532		2,948		1,953		7,867		347		9,521		28		3,986		879		154		3,889		1,381		1,772		362		905		5,099		253		236		92		777	i
Small companies																																																	
10–19 ^a	–	128		0		*		0		0		1		4		10		*		9		0		5		0		0		0		14		3		0		2		6	i	1	i	*		0		16	i
20–49	–	569		1		*		0		*		4		12		78		2		74		0		5		0		*		5		6		34		0		2		8		*		*	i	0		12	i
Medium companies																																																	
50–99	–	692		1		4		1		1		1		30		51		1		139		*		10		1		3		13		6		24		1		3		83		0		*		1		10	i
100–249	–	1,872		*		3		1		8		33		7		242		36		110		0		2		0		1		74		9		103		1		7		123		3		7		0		8	i
Large companies																																																	
250–499	–	2,179		12		14		1		48	i	7		11		208		28		206		*		37		3		*		97		96		113		1		56		142		2		2		*		12	i
500–999	–	2,557		10		21		2		36		7		41		228		30		163		*		131		56		4		63		14		61		9		9		82		2		2		4		65	
1,000–4,999	–	15,184		51		139		8		95		43		312		1,338		62	i	1,798		7	i	294		57		43		290		78		213		66		157	i	619		7		37		1		232	i
5,000–9,999	–	15,538		103		135		25	i	113	i	1,004	i	212		873	i	61	i	1,275		1		1,122		305	i	19		567		194	i	198	i	211		176	i	366		24		90		6		235	i
10,000–24,999	–	22,356		87		456		30		171		878		287		1,427		44		2,119		13		1,075		18		55		2,194		252		227		18		279		503		52		46		16		2	i
25,000 or more	–	39,301		33		756		61		1,060		970		1,038		3,412		82		3,627		6		1,305		439		28		587		711		797		54		215		3,167		162		52	i	65		184	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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 52

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: 2018

(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	665,199	34,743	659	4,063	16,393	9,659	3,969	
Manufacturing industries	31–33	283,452	18,582	240	3,047	11,541	1,750	2,004	
Food	311	21,261	529	26	123	297	13	69	
Beverage and tobacco products	312	6,552	115	0	49	60	2	4	
Textile, apparel, and leather products	313–16	2,352	86	7	8	28	40	1	
Wood products	321	1,463	9	0	2	7	*	1	
Paper	322	6,233	62	0	*	55	3	4	
Printing and related support activities	323	1,445	20	0	*	5	13	2	
Petroleum and coal products	324	25,679	224	0	6	76	117	25	
Chemicals	325	56,821	5,434	101	1,705	2,690	369	569	
Basic chemicals	3251	15,911	231	14	38	150	2	26	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	3,895	214	*	26	162	3	22	
Pesticide, fertilizer, and other agricultural chemicals	3253	5,117	44	1	16	9	*	18	
Pharmaceuticals and medicines	3254	22,286	4,275	76	1,394	1,972	360	473	
Soap, cleaning compound, and toilet preparation	3256	5,525	241	10	35	184	3	10	
Paint, coating, adhesive, and other chemicals	3255, 3259	4,087	429	0	195	214	*	19	
Plastics and rubber products	326	9,620	326	*	23	227	21	54	
Nonmetallic mineral products	327	4,805	168	0	30	98	1	39	
Primary metals	331	5,784	129	0	15	98	1	15	
Fabricated metal products	332	5,348	239	2	27	94	9	107	
Machinery	333	13,194	1,066	5	228	620	101	112	
Agricultural implement	33311	1,204	60	1	7	34	4	15	
Semiconductor machinery	333242	1,164	504	*	172	275	40	17	
Engine, turbine, and power transmission equipment	3336	1,784	143	2	11	111	3	15	
Other machinery	other 333	9,041	358	2	38	199	54	65	
Computer and electronic products	334	38,527	6,350	25	541	4,729	669	387	
Communications equipment	3342	3,862	788	*	62	662	38	25	
Semiconductor and other electronic components	3344	19,366	2,755	10	96	2,089	338	222	
Navigational, measuring, electromedical, and control instruments	3345	5,833	707	8	137	373	60	128	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1,113	155	4	78	52	5	15	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	2,078	321	0	19	192	50	61	
Other measuring and controlling device	other 3345	2,641	231	5	40	129	5	53	
Other computer and electronic products	other 334	9,467	2,101	6	246	1,604	233	11	

TABLE 52

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: 2018

(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	4,318	404	56		76		159	5	107
Transportation equipment	336	66,386	2,205	17	i	138		1,643	178	229
Motor vehicles, bodies, trailers, and parts	3361-63	52,122	1,571	15	i	102		1,161	142	150
Aerospace products and parts	3364	10,893	492	*		27		398	7	60
Aircraft, aircraft engine, and aircraft parts	336411-13	9,900	369	*		20		284	6	59
Guided missile, space vehicle, and related parts	336414-15, 336419	993	123	0		7		114	1	1
Military armored vehicle, tank, and tank component	336992	13	*	0		*		0	0	*
Other transportation	other 336	3,358	142	2		9		84	i 29	18
Furniture and related products	337	1,092	79	*		29		18	3	28
Miscellaneous	339	12,570	1,136	*		46		636	204	251
Medical equipment and supplies	3391	8,679	714	*		40		365	148	161
Other miscellaneous manufacturing	3399	3,891	i 423	i 0		6	i	271	i 56	i 90
Nonmanufacturing industries	21-23, 42-81	381,747	16,161	419		1,016		4,852	7,908	1,965
Mining, quarrying, oil and gas extraction, and support activities	21	35,207	354	0		6	i	174	152	22
Utilities	22	97,112	88	0		0		5	14	69
Wholesale trade	42	4,857	i 75	i *	i	3	i	29	i 14	i 28
Electronic shopping and electronic auctions	454111-12	8,857	314	i 0		5	i	230	i 74	i 5
Transportation and warehousing	48-49	27,967	611	i 0		33	i	287	i 210	i 81
Information	51	141,471	7,968	413		715		2,691	3,404	745
Publishing	511	17,268	1,316	26		186		584	451	70
Newspaper, periodical, book, and directory publishers	5111	77	20	0		*	i	*	18	i 3
Software publishers	5112	17,191	1,296	26		186		584	433	68
Telecommunications	517	66,906	2,142	382		386		508	459	407
Data processing, hosting, and related services	518	9,345	1,475	3		23		418	866	165
Other information	other 51	47,953	3,034	2	i	120		1,181	1,629	103
Finance and insurance	52	16,534	2,865	0		29		291	2,119	425
Real estate and rental and leasing	53	423	55	0		0		1	54	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	7	*	0		0		*	0	0
Other real estate and rental and leasing	other 53	416	55	0		0		1	54	*
Professional, scientific, and technical services	54	15,422	2,438	5		176		859	854	543
Architectural, engineering, and related services	5413	2,339	111	1		12		64	12	22
Computer systems design and related services	5415	6,508	1,210	4		73		450	357	325
Scientific research and development services	5417	2,647	682	*		88		260	190	144
Research and development in biotechnology	541711	688	225	*		14		89	28	93

TABLE 52

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: 2018

(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
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	1,950	449	*		72		166		159		50
Research and development in the social sciences and humanities	541720	8	8	0		1		4		3		*
Other professional, scientific, and technical services	other 54	3,928	436	*	i	3		86		295		52
Health care services	621–23	2,952	i 278	i *	i	27	i	224	i	22		6 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	30,945	1,114	*	i	21		62	i	990		41
All companies (number of domestic employees)	–	665,199	34,743	659		4,063		16,393		9,659		3,969
Small companies												
10–19 ^a	–	1,136	359	3		42		197		35		82
20–49	–	6,080	1,077	2		84		530		142		319
Medium companies												
50–99	–	7,827	1,043	48		151		476		115		253
100–249	–	16,303	1,328	9		195		667		279		178
Large companies												
250–499	–	11,995	1,795	6		187		831		497		274
500–999	–	16,450	1,505	9	i	137		633		409		318
1,000–4,999	–	76,061	5,562	66		792		2,237		1,868		599
5,000–9,999	–	69,863	3,630	21		501		1,910		998		199
10,000–24,999	–	159,038	6,719	90		894		2,887		2,015		834
25,000 or more	–	300,447	11,724	405		1,081		6,024		3,301		913

* = 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.

^a Business 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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 53

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2018

(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	31,345	2,564	8.2	20,645	1,766	8.6	10,700	797	7.5
Manufacturing industries	31–33	17,394	1,432	8.2	10,013	981	9.8	7,381	450	6.1
Food	311	1,541	37	2.4	1,016	24	2.4	525	13	2.5
Beverage and tobacco products	312	838	9	1.0	441	6	1.4	397	2	0.6
Textile, apparel, and leather products	313–16	466	10	2.1	257	8	3.1	209	2	0.9
Wood products	321	89	3	3.0	81	3	3.2	7	*	0.9
Paper	322	299	7	2.5	192	6	3.0	106	2	1.6
Printing and related support activities	323	133	3	2.6	114	3	3.0	19	*	0.4
Petroleum and coal products	324	179	8	4.7	108	7	6.2	71	2	2.4
Chemicals	325	2,401	268	11.2	1,383	189	13.6	1,018	79	7.8
Basic chemicals	3251	300	18	6.0	195	13	6.5	106	5	5.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	160	13	7.9	82	7	9.1	78	5	6.6
Pesticide, fertilizer, and other agricultural chemicals	3253	109	10	8.9	78	8	10.2	31	2	5.4
Pharmaceuticals and medicines	3254	1,080	191	17.7	624	138	22.1	456	53	11.7
Soap, cleaning compound, and toilet preparation	3256	469	18	3.7	246	12	4.7	223	6	2.7
Paint, coating, adhesive, and other chemicals	3255, 3259	284	19	6.7	158	11	7.0	126	8	6.3
Plastics and rubber products	326	586	29	5.0	423	25	5.9	164	4	2.6
Nonmetallic mineral products	327	243	8	3.1	153	6	4.2	90	1	1.4
Primary metals	331	360	11	3.0	236	9	3.7	124	2	1.6
Fabricated metal products	332	526	30	5.7	384	28	7.4	142	2	1.2
Machinery	333	1,788	142	7.9	902	93	10.3	886	49	5.5
Agricultural implement	33311	180	20	11.2	95	12	12.2	85	9	10.1
Semiconductor machinery	333242	85	18	21.2	32	11	34.4	54	7	13.4
Engine, turbine, and power transmission equipment	3336	255	22	8.6	108	13	11.9	147	9	6.1
Other machinery	other 333	1,267	82	6.5	666	58	8.6	600	24	4.1
Computer and electronic products	334	2,763	463	16.8	1,296	277	21.4	1,468	186	12.7
Communications equipment	3342	282	77	27.5	157	45	28.8	124	32	25.9
Semiconductor and other electronic components	3344	922	179	19.4	358	100	27.9	565	80	14.1
Navigational, measuring, electromedical, and control instruments	3345	890	108	12.1	500	73	14.5	390	35	9.1

TABLE 53

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2018

(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	164	22 i	13.5	89	15 i	16.9	75	7 i	9.6
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	329	40	12.3	220	33	14.8	108	8	7.1
Other measuring and controlling device	other 3345	397	46	11.5	191	25	13.1	207	21	9.9
Other computer and electronic products	other 334	669	98	14.7	281	59	21.0	388	39	10.1
Electrical equipment, appliances, and components	335	732	45	6.2	289	24	8.4	443	21	4.7
Transportation equipment	336	2,940	258	8.8	1,881	197	10.5	1,059	61	5.7
Motor vehicles, bodies, trailers, and parts	3361–63	1,775	160	9.0	957	110	11.5	818	50	6.1
Aerospace products and parts	3364	919	84	9.1	745	75	10.1	174	8	4.8
Aircraft, aircraft engine, and aircraft parts	336411–13	868	76	8.8	708	68 i	9.6	160	8	5.2
Guided missile, space vehicle, and related parts	336414–15, 336419	51	8	15.1	37	8	20.8	14	*	0.2
Military armored vehicle, tank, and tank component	336992	1	*	5.1	1	*	5.1	0	0	NA
Other transportation	other 336	245	14	5.7	178	12	6.6	67	2	3.1
Furniture and related products	337	187	5	2.6	155	4	2.8	32	*	1.3
Miscellaneous	339	1,321	95	7.2	703	71	10.1	618	24	3.9
Medical equipment and supplies	3391	936	75	8.0	468	54	11.5	468	21	4.6
Other miscellaneous manufacturing	3399	385	20	5.2	234	17	7.3	151	3	1.8
Nonmanufacturing industries	21–23, 42–81	13,951	1,132	8.1	10,632	785	7.4	3,319	347	10.4
Mining, quarrying, oil and gas extraction, and support activities	21	376	15	3.9	204	12	6.0	172	2	1.4
Utilities	22	395	2	0.5	385	2	0.5	11	*	1.4
Wholesale trade	42	205 i	12 i	5.9	176 i	12 i	6.6	29	1	1.7
Electronic shopping and electronic auctions	454111–12	71 - 3,847	71 - 99	D	51 - 3,232	52	D	19 - 619	19 - 47	D
Transportation and warehousing	48–49	1,491	6	0.4	1,205	6	0.5	287	*	0.2
Information	51	2,851	493	17.3	2,030	342	16.8	820	151	18.4
Publishing	511	874	184	21.0	567	115	20.4	307	68	22.3
Newspaper, periodical, book, and directory publishers	5111	37 i	1 i	3.5	32 i	1 i	3.4	5 i	* i	3.7
Software publishers	5112	837	183	21.8	535	114	21.4	302	68	22.6
Telecommunications	517	710	23	3.2	633	22	3.4	77	1	1.5

TABLE 53

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2018

(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
Data processing, hosting, and related services	518	735	164	22.3	436	105	24.0	298	60	20.0
Other information	other 51	532	122	23.0	394	100	25.4	138	22	16.0
Finance and insurance	52	1,717	61	3.5	1,394	47	3.3	323	14	4.4
Real estate and rental and leasing	53	28	4	14.1	22	4	16.8	6	*	3.7
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1	*	2.2	1	*	2.2	0	0	NA
Other real estate and rental and leasing	other 53	27	4	14.3	21	4	17.2	6	*	3.7
Professional, scientific, and technical services	54	2,501	405	16.2	1,446	271	18.8	1,054	134	12.7
Architectural, engineering, and related services	5413	421	52	12.3	324	51	15.7	97	1	0.8
Computer systems design and related services	5415	1,025	139	13.6	487	92	18.8	538	48	8.8
Scientific research and development services	5417	404	177	43.8	300	97	32.4	104	80	76.3
Research and development in biotechnology	541711	165	56	34.0	133	31	23.2	32	25	78.9
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	233	116	49.5	161	61	38.0	72	54	75.2
Research and development in the social sciences and humanities	541720	6	5	87.5	6	5	88.1	*	*	56.2
Other professional, scientific, and technical services	other 54	651	38	5.8	336	32	9.4	315	6	2.0
Health care services	621–23	513	6	1.2	511	6	1.2	2	*	6.2
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	31 - 3,807	31 - 59	D	31 - 3,212	32	D	0 - 600	0 - 28	D
All companies (number of domestic employees)	–	31,345	2,564	8.2	20,645	1,766	8.6	10,700	797	7.5
Small companies										
10–19 ^a	–	72	27	37.1	64	25	38.9	8	2	22.9
20–49	–	283	75	26.7	236	68	29.1	47	7	14.8
Medium companies										
50–99	–	381	87	22.9	342	80	23.3	39	7	19.2
100–249	–	995	146	14.7	771	126	16.4	223	20	9.0
Large companies										
250–499	–	991	122	12.3	732	102	13.9	259	20	7.7
500–999	–	1,200	120	10.0	849	91	10.7	350	29	8.4
1,000–4,999	–	4,610	452	9.8	2,816	306	10.9	1,794	146	8.1

TABLE 53

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2018

(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
5,000–9,999	–	3,266	308	9.4	1,713	178	10.4	1,553	130	8.4
10,000–24,999	–	5,993	478	8.0	3,454	304	8.8	2,539	173	6.8
25,000 or more	–	13,555	748	5.5	9,667	486	5.0	3,887	263	6.8

* = 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; NA = not available.

NAICS = 2012 North American Industry Classification System.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 54

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: 2018

(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	541,412	441,036	100,376	2,564	1,766	797	211	250	126
Manufacturing industries	31–33	338,953	274,075	64,878	1,432	981	450	237	279	144
Food	311	5,518	4,654	864	37	24	13	148	191	67
Beverage and tobacco products	312	1,629	1,113	516	9	6	2	186	177	210
Textile, apparel, and leather products	313–16	1,205	989	216	10	8	2	122	123	120
Wood products	321	206	203	3	3	3	*	77	78	40
Paper	322	1,014	934	80	7	6	2	137	163	48
Printing and related support activities	323	246	242	4	3	3	*	71	72	56
Petroleum and coal products	324	1,460 - 1,463	1,269	192 - 194	8	7	2	D	190	D
Chemicals	325	100,886	84,137	16,749	268	189	79	376	446	211
Basic chemicals	3251	3,046	2,443	603	18	13	5	168	192	113
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	2,427 - 2,445	1,653	774 - 792	13	7	5	D	222	D
Pesticide, fertilizer, and other agricultural chemicals	3253	1,788 - 1,797	1,460	328 - 337	10	8	2	D	183	D
Pharmaceuticals and medicines	3254	88,537	74,592	13,945	191	138	53	463	541	261
Soap, cleaning compound, and toilet preparation	3256	3,557	2,710	847	18	12	6	203	234	142
Paint, coating, adhesive, and other chemicals	3255, 3259	1,512 - 1,531	1,278	235 - 252	19	11	8	D	116	D
Plastics and rubber products	326	3,179	2,751	428	29	25	4	109	110	102
Nonmetallic mineral products	327	1,567	1,385	181	8	6	1	205	217	144
Primary metals	331	990	839	151	11	9	2	93	96	76
Fabricated metal products	332	2,544	2,327	216	30	28	2	85	82	127
Machinery	333	19,319	14,799	4,521	142	93	49	136	159	92
Agricultural implement	33311	2,730	1,872	858	20	12	9	135	161	100
Semiconductor machinery	333242	5,077	4,166	911	18	11	7	281	382	127
Engine, turbine, and power transmission equipment	3336	3,418 - 3,440	2,483	935 - 958	22	13	9	D	193	D
Other machinery	other 333	8,071 - 8,095	6,278	1,793 - 1,817	82	58	24	D	109	D
Computer and electronic products	334	112,020	83,697	28,322	463	277	186	242	303	152

TABLE 54

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: 2018

(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
Communications equipment	3342	16,483	13,107	3,376	77	45	32	213	290	105
Semiconductor and other electronic components	3344	45,540	31,052	14,487	179	100	80	254	311	182
Navigational, measuring, electromedical, and control instruments	3345	20,898	16,727	4,172	108	73	35	193	230	118
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,378	3,208	1,169	22	15	7	197	214	162
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	9,997	8,843	1,154	40	33	8	248	272	149
Other measuring and controlling device	other 3345	6,524	4,675	1,849	46	25	21	143	186	90
Other computer and electronic products	other 334	29,099	22,811	6,287	98	59	39	297	387	161
Electrical equipment, appliances, and components	335	6,180	4,487	1,693	45	24	21	137	184	82
Transportation equipment	336	60,075	52,629	7,446	258	197	61	233	267	123
Motor vehicles, bodies, trailers, and parts	3361-63	32,125	25,586	6,540	160	110	50	201	233	131
Aerospace products and parts	3364	24,977 - 25,002	24,291	686 - 711	84	75	8	D	323	D
Aircraft, aircraft engine, and aircraft parts	336411-13	23,654 - 23,679	22,968	685 - 710	76	68	8	D	340	D
Guided missile, space vehicle, and related parts	336414-15, 336419	1,323	1,323	1	8	8	*	172	173	19
Military armored vehicle, tank, and tank component	336992	11	11	0	*	*	0	160	160	NA
Other transportation	other 336	2,936 - 2,961	2,741	195 - 221	14	12	2	D	232	D
Furniture and related products	337	435	410	25	5	4	*	90	93	62
Miscellaneous	339	20,478 - 20,483	17,209	3,270 - 3,274	95	71	24	D	242	D
Medical equipment and supplies	3391	17,415	14,531	2,884	75	54	21	231	269	135
Other miscellaneous manufacturing	3399	3,063 - 3,068	2,678	386 - 390	20	17	3	D	156	D

TABLE 54

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: 2018

(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
Nonmanufacturing industries	21–23, 42–81	202,460	166,961	35,498	1,132	785	347	179	213	102
Mining, quarrying, oil and gas extraction, and support activities	21	2,068	1,905	163	15	12	2	142	157	66
Utilities	22	283	275	8	2	2	*	140	147	58
Wholesale trade	42	938	906	32	12	12	1	78	78	64
Electronic shopping and electronic auctions	454111–12	11,715 - 15,516	11,652	63 - 3,864	71 - 99	52	19 - 47	D	223	D
Transportation and warehousing	48–49	956	942	14	6	6	*	147	156	31
Information	51	111,505	94,349	17,156	493	342	151	226	276	113
Publishing	511	39,965	32,770	7,195	184	115	68	217	284	105
Newspaper, periodical, book, and directory publishers	5111	150	131	19	1	1	*	118	120	108
Software publishers	5112	39,815	32,639	7,175	183	114	68	218	285	105
Telecommunications	517	3,827 - 3,833	3,696	131 - 138	23	22	1	D	170	D
Data processing, hosting, and related services	518	28,045	23,306	4,739	164	105	60	171	223	80
Other information	other 51	39,662 - 39,668	34,576	5,086 - 5,092	122	100	22	D	345	D
Finance and insurance	52	8,356	7,471	885	61	47	14	137	160	62
Real estate and rental and leasing	53	1,073	1,022	51	4	4	*	275	278	237
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6	6	0	*	*	0	441	441	NA
Other real estate and rental and leasing	other 53	1,067	1,016	51	4	4	*	275	277	237
Professional, scientific, and technical services	54	58,168	44,860	13,307	405	271	134	144	165	99
Architectural, engineering, and related services	5413	4,017 - 4,027	3,961	56 - 66	52	51	1	D	78	D
Computer systems design and related services	5415	20,287	15,923	4,364	139	92	48	146	174	92
Scientific research and development services	5417	28,555 - 28,564	20,185	8,370 - 8,379	177	97	80	D	208	D
Research and development in biotechnology	541711	8,447	5,857	2,590	56	31	25	151	190	103

TABLE 54

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: 2018

(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
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	19,435	13,657	5,778	116	61	54	168	223	106
Research and development in the social sciences and humanities	541720	672 - 683	671	1 - 12	5	5	*	D	133	D
Other professional, scientific, and technical services	other 54	5,298	4,791	507	38	32	6	140	152	82
Health care services	621-23	1,498	1,476	22	6	6	*	239	241	141
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,102 - 5,904	2,103	0 - 3,801	31 - 59	32	0 - 28	D	66	D
All companies (number of domestic employees)	-	541,412	441,036	100,376	2,564	1,766	797	211	250	126
Small companies										
10-19 ^a	-	4,518	4,390	128	27	25	2	169	176	71
20-49	-	11,821	11,252	569	75	68	7	157	164	81
Medium companies										
50-99	-	13,013	12,321	692	87	80	7	149	154	93
100-249	-	20,420	18,547	1,872	146	126	20	140	147	93
Large companies										
250-499	-	21,824	19,645	2,179	122	102	20	179	192	110
500-999	-	20,214	17,657	2,557	120	91	29	168	195	87
1,000-4,999	-	83,761	68,578	15,184	452	306	146	185	224	104
5,000-9,999	-	60,875	45,337	15,538	308	178	130	198	254	120
10,000-24,999	-	106,777	84,420	22,356	478	304	173	224	277	129
25,000 or more	-	198,190	158,889	39,301	748	486	263	265	327	150

* = 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; NA = not available.

NAICS = 2012 North American Industry Classification System.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 55

Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2018

(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	2,564	1,846	717	1,766	1,298	468	797	548	249
Manufacturing industries	31–33	1,432	1,068	364	981	737	244	450	330	120
Food	311	37	21	16	24	14	10	13	7	6
Beverage and tobacco products	312	9	5	4	6	4	2	2	1	1
Textile, apparel, and leather products	313–16	10	5	4	8	4	4	2	1	1
Wood products	321	3	2	*	3	2	*	*	*	*
Paper	322	7	6	2	6	4	1	2	1	*
Printing and related support activities	323	3	3	1	3	2	1	*	*	*
Petroleum and coal products	324	8	6	2	7	5	2	2	1	1
Chemicals	325	268	140	128	189	101	88	79	39	41
Basic chemicals	3251	18	12	6	13	9	4	5	3	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	13	9	3	7	5	2	5	4	1
Pesticide, fertilizer, and other agricultural chemicals	3253	10	6	4	8	5	3	2 i	1 i	1 i
Pharmaceuticals and medicines	3254	191	90	101	138	67	70	53	22	31
Soap, cleaning compound, and toilet preparation	3256	18	9	9	12	6	6	6	3	3
Paint, coating, adhesive, and other chemicals	3255, 3259	19	14	5	11	8	3	8	6	2
Plastics and rubber products	326	29	23	6	25	20	5	4	3	1
Nonmetallic mineral products	327	8	7	1	6	6	1	1	1	*
Primary metals	331	11	9	1 i	9	8	1	2	2 i	* i
Fabricated metal products	332	30	26	4	28	25	4	2	1	*
Machinery	333	142	122	20	93	81	12	49	41	8
Agricultural implement	33311	20	18	3	12	10	1	9	7	1
Semiconductor machinery	333242	18	16	3	11	9	2	7	6	1
Engine, turbine, and power transmission equipment	3336	22	19	3	13	11	2	9	8	1
Other machinery	other 333	82	70	12 i	58	50	7 i	24	20 i	5
Computer and electronic products	334	463	372	91	277	224	53	186	148 i	38 i
Communications equipment	3342	77	64	13	45	38	8	32	27	6
Semiconductor and other electronic components	3344	179	145 i	34 i	100	81 i	19 i	80	64 i	15 i
Navigational, measuring, electromedical, and control instruments	3345	108	84	25	73	57	15	35	26	9
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	22 i	15 i	7 i	15 i	10	5 i	7 i	5 i	2 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	40	33	7	33	27	6	8	6	2 i
Other measuring and controlling device	other 3345	46	35	10	25	20	5	21	15	5
Other computer and electronic products	other 334	98	80	19	59	48	11	39	31 i	8 i
Electrical equipment, appliances, and components	335	45	36 i	9 i	24	20	4	21	16 i	5 i
Transportation equipment	336	258	215	42	197	164	33	61	51	10
Motor vehicles, bodies, trailers, and parts	3361–63	160	134	26	110	92	18	50	42	8
Aerospace products and parts	3364	84	71 i	13	75	64 i	12	8	7	1

TABLE 55

Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Aircraft, aircraft engine, and aircraft parts	336411-13	76	65 i	12 i	68 i	57 i	10 i	8	7	1
Guided missile, space vehicle, and related parts	336414-15, 336419	8	6	1	8	6	1	*	*	*
Military armored vehicle, tank, and tank component	336992	*	*	*	*	*	*	0	0	0
Other transportation	other 336	14	11	3	12	9	3	2	2	*
Furniture and related products	337	5	4	1	4	3	1	*	*	*
Miscellaneous	339	95	66	30	71	50	22	24	16	8
Medical equipment and supplies	3391	75	51	25	54	37	17	21	14	7
Other miscellaneous manufacturing	3399	20	15	5	17	13	4	3	2	1
Nonmanufacturing industries	21-23, 42-81	1,132	779	354	785	561	225	347	218	129
Mining, quarrying, oil and gas extraction, and support activities	21	15	12	3	12	10	2	2	2	*
Utilities	22	2	2	*	2	2	*	*	*	*
Wholesale trade	42	12 i	10 i	2 i	12 i	10 i	2 i	1	*	* i
Electronic shopping and electronic auctions	454111-12	71 - 99	66	5 - 34	52	32 - 53	0 - 20	19 - 47	13 - 33	0 - 17
Transportation and warehousing	48-49	6	4	2 i	6	4	2	*	*	*
Information	51	493	371	123	342	260	82	151	110	41
Publishing	511	184	133	51	115	86	29	68	47	22
Newspaper, periodical, book, and directory publishers	5111	1 i	1 i	1 i	1 i	1 i	1 i	* i	* i	* i
Software publishers	5112	183	132	50	114	85	29	68	47	22
Telecommunications	517	23	18 i	5	22	17 i	5	1	1	*
Data processing, hosting, and related services	518	164	124	40	105	79	25	60	45	15
Other information	other 51	122	96	26	100	78	22	22	18	4
Finance and insurance	52	61	36	24	47	28	19	14	9	5
Real estate and rental and leasing	53	4	3	1	4	3	1	*	*	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	*	*	*	*	*	0	0	0
Other real estate and rental and leasing	other 53	4	3	1	4	3	1	*	*	*
Professional, scientific, and technical services	54	405	243	162	271	178	94	134	66	68
Architectural, engineering, and related services	5413	52	38	13	51	38	13	1	1	*
Computer systems design and related services	5415	139	107	32	92	71	20	48	36	12
Scientific research and development services	5417	177	72	104	97	47	50	80	25	54
Research and development in biotechnology	541711	56	20	36	31	12	19	25	9	16
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	116	49	66	61	33	28	54	16	38
Research and development in the social sciences and humanities	541720	5	2 i	3 i	5	2 i	3 i	*	*	*
Other professional, scientific, and technical services	other 54	38	26 i	12 i	32	21	10	6	4 i	2 i
Health care services	621-23	6	3	4	6	3	4	*	*	*

TABLE 55

Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	31 - 59	29	2 - 31	32	9 - 30	2 - 23	0 - 28	0 - 20	0 - 17
All companies (number of domestic employees)	–	2,564	1,846	717	1,766	1,298	468	797	548	249
Small companies										
10–19 ^a	–	27	21	6	25	19	6	2	1	*
20–49	–	75	60	15	68	55	14	7	6	1
Medium companies										
50–99	–	87	69	18	80	63	17	7	6	2
100–249	–	146	112	35	126	97	29	20	14	6
Large companies										
250–499	–	122	92	30	102	77	25	20	15	5
500–999	–	120	91	29	91	69	22	29	22	8
1,000–4,999	–	452	333	118	306	226	79	146	107	39
5,000–9,999	–	308	198	110	178	122	56	130	76	54
10,000–24,999	–	478	319	159	304	207	97	173	112	62
25,000 or more	–	748	552	197	486	362	124	263	189	73

* = 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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 56

Worldwide total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers ^a		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All industries	21–23, 31–33, 42–81	31,345	2,564	1,770	158	562	231
Manufacturing industries	31–33	17,394	1,432	1,034	101	258	140
Food	311	1,541	37	22	2 i	10	5
Beverage and tobacco products	312	838	9	5	1	2	1
Textile, apparel, and leather products	313–16	466	10	4	1	4	2
Wood products	321	89	3	1	*	1	*
Paper	322	299	7	5	*	2	1
Printing and related support activities	323	133	3	2	*	1	1
Petroleum and coal products	324	179	8	2	1	5	1
Chemicals	325	2,401	268	187	42	49	32
Basic chemicals	3251	300	18	10	4	6	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	160	13	8	2	4	1
Pesticide, fertilizer, and other agricultural chemicals	3253	109	10	7	2 i	2	1
Pharmaceuticals and medicines	3254	1,080	191	136	31	29	26
Soap, cleaning compound, and toilet preparation	3256	469	18	14	2	2	2
Paint, coating, adhesive, and other chemicals	3255, 3259	284	19	12	2	6	1
Plastics and rubber products	326	586	29	14	1 i	10	5
Nonmetallic mineral products	327	243	8	4	*	3	1
Primary metals	331	360	11	4 i	*	3	4 i
Fabricated metal products	332	526	30	13	1 i	10	7
Machinery	333	1,788	142	98	5	31	13
Agricultural implement	33311	180	20	14	*	4	2
Semiconductor machinery	333242	85	18	15 i	2	2	*
Engine, turbine, and power transmission equipment	3336	255	22	19	*	2	1
Other machinery	other 333	1,267	82	50	3	23	9
Computer and electronic products	334	2,763	463	382	30 i	49	32
Communications equipment	3342	282	77	64	2 i	8	6
Semiconductor and other electronic components	3344	922	179	158 i	15 i	15	5 i
Navigational, measuring, electromedical, and control instruments	3345	890	108	84	8	17	7
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	164	22 i	16 i	3 i	5 i	1 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	329	40	32	1	5	3
Other measuring and controlling device	other 3345	397	46	36	4	6	3
Other computer and electronic products	other 334	669	98	76	5 i	9 i	13 i
Electrical equipment, appliances, and components	335	732	45	35 i	3	8	2
Transportation equipment	336	2,940	258	190	8 i	44	24
Motor vehicles, bodies, trailers, and parts	3361–63	1,775	160	124	4	24	12
Aerospace products and parts	3364	919	84	58 i	4 i	15 i	10 i
Aircraft, aircraft engine, and aircraft parts	336411–13	868	76	54 i	4 i	14 i	9 i

TABLE 56

Worldwide total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers ^a		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Guided missile, space vehicle, and related parts	336414–15, 336419	51	8	5	i *	2	i 1
Military armored vehicle, tank, and tank component	336992	1	*	*	*	*	0
Other transportation	other 336	245	14	8	* i	4	3
Furniture and related products	337	187	5	2	*	2	1
Miscellaneous	339	1,321	95	62	6	25	9
Medical equipment and supplies	3391	936	75	51	5	19	6
Other miscellaneous manufacturing	3399	385	20	11	i 1	i 6	3 i
Nonmanufacturing industries	21–23, 42–81	13,951	1,132	736	57	i 304	91
Mining, quarrying, oil and gas extraction, and support activities	21	376	15	10	1	4	1
Utilities	22	395	2	1	*	*	1
Wholesale trade	42	205	i 12	i 5	i *	i 4	3 i
Electronic shopping and electronic auctions	454111–12	71 - 3,847	71 - 99	36 - 62	1	i 30	6
Transportation and warehousing	48–49	1,491	6	4	*	1	1 i
Information	51	2,851	493	366	27	i 92	35
Publishing	511	874	184	144	9	i 24	15
Newspaper, periodical, book, and directory publishers	5111	37	i 1	i 1	i *	1	i *
Software publishers	5112	837	183	144	9	i 23	15
Telecommunications	517	710	23	11	i *	i 12	i *
Data processing, hosting, and related services	518	735	164	116	3	i 31	17
Other information	other 51	532	122	95	14	25	3
Finance and insurance	52	1,717	61	35	1	22	4
Real estate and rental and leasing	53	28	4	3	*	i 1	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1	*	*	0	*	*
Other real estate and rental and leasing	other 53	27	4	3	*	i 1	*
Professional, scientific, and technical services	54	2,501	405	233	24	138	34
Architectural, engineering, and related services	5413	421	52	34	2	13	4
Computer systems design and related services	5415	1,025	139	105	7	i 23	11
Scientific research and development services	5417	404	177	71	13	91	i 15
Research and development in biotechnology	541711	165	56	22	3	33	i 1
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	233	116	45	8	57	13
Research and development in the social sciences and humanities	541720	6	5	4	i 1	i *	1 i
Other professional, scientific, and technical services	other 54	651	38	23	2	11	i 4
Health care services	621–23	513	6	3	1	i 2	1
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	31 - 3,807	31 - 59	17 - 43	1	11	4

TABLE 56

Worldwide total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers ^a		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All companies (number of domestic employees)	–	31,345	2,564	1,770	158	562	231
Small companies							
10–19 ^b	–	72	27	18	4	7	2
20–49	–	283	75	49	7	19	7
Medium companies							
50–99	–	381	87	53	6	25	9
100–249	–	995	146	85	9	45	16
Large companies							
250–499	–	991	122	79	8	31	12
500–999	–	1,200	120	75	7	30	15
1,000–4,999	–	4,610	452	325	27 i	85	42
5,000–9,999	–	3,266	308	186	16	89	33
10,000–24,999	–	5,993	478	336	33 i	108 i	33
25,000 or more	–	13,555	748	563	40 i	123	62

* = 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.

^a Researchers include R&D scientists and engineers and their managers.

^b Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 57

Domestic total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers ^a		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All industries	21–23, 31–33, 42–81	20,645	1,766	1,212	129	394	161
Manufacturing industries	31–33	10,013	981	684	80	195	101
Food	311	1,016	24	14	2 i	6	4
Beverage and tobacco products	312	441	6	4	1	2	1
Textile, apparel, and leather products	313–16	257	8	3	1	3	2
Wood products	321	81	3	1	*	1	*
Paper	322	192	6	4	*	1	1
Printing and related support activities	323	114	3	1	*	1	1
Petroleum and coal products	324	108	7	1	*	4	1
Chemicals	325	1,383	189	131	33	36	21
Basic chemicals	3251	195	13	7	3	4	1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	82	7	5	2	2	1
Pesticide, fertilizer, and other agricultural chemicals	3253	78	8	6	2	2	*
Pharmaceuticals and medicines	3254	624	138	98	24	23	17
Soap, cleaning compound, and toilet preparation	3256	246	12	9	1	2	1
Paint, coating, adhesive, and other chemicals	3255, 3259	158	11	7	1	3	1
Plastics and rubber products	326	423	25	12	1 i	9	5
Nonmetallic mineral products	327	153	6	3	*	2	1
Primary metals	331	236	9	3	*	3	3
Fabricated metal products	332	384	28	12	* i	10	7
Machinery	333	902	93	61	4	24	8
Agricultural implement	33311	95	12	7	*	3	1
Semiconductor machinery	333242	32	11	9	1	2	*
Engine, turbine, and power transmission equipment	3336	108	13	11	*	1	*
Other machinery	other 333	666	58	34	2	18	6
Computer and electronic products	334	1,296	277	226	24 i	33	18
Communications equipment	3342	157	45	36	2	6	3
Semiconductor and other electronic components	3344	358	100	86 i	12 i	10	4 i
Navigational, measuring, electromedical, and control instruments	3345	500	73	56	6	12	4
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	89	15 i	11	2 i	3 i	1 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	220	33	26	1	5	2
Other measuring and controlling device	other 3345	191	25	19	3	4	2
Other computer and electronic products	other 334	281	59	47	5 i	5	7
Electrical equipment, appliances, and components	335	289	24	18	2	5	1
Transportation equipment	336	1,881	197	143	8 i	34	20
Motor vehicles, bodies, trailers, and parts	3361–63	957	110	85	4	17	8
Aerospace products and parts	3364	745	75	51 i	4 i	14 i	10 i
Aircraft, aircraft engine, and aircraft parts	336411–13	708	68 i	47 i	4 i	13	8 i

TABLE 57

Domestic total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers ^a		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Guided missile, space vehicle, and related parts	336414–15, 336419	37	8	5	i *	2	i 1
Military armored vehicle, tank, and tank component	336992	1	*	*	*	*	0
Other transportation	other 336	178	12	6	* i	3	2
Furniture and related products	337	155	4	2	*	2	1
Miscellaneous	339	703	71	46	4	18	7
Medical equipment and supplies	3391	468	54	37	4	13	4
Other miscellaneous manufacturing	3399	234	17	9	1 i	5	3
Nonmanufacturing industries	21–23, 42–81	10,632	785	527	48 i	198	60
Mining, quarrying, oil and gas extraction, and support activities	21	204	12	8	1	3	1
Utilities	22	385	2	1	*	*	1
Wholesale trade	42	176	i 12	i 5	i *	i 4	i 3
Electronic shopping and electronic auctions	454111–12	51 - 3,232	52	37	1 i	8 - 16	0 - 7
Transportation and warehousing	48–49	1,205	6	4	*	1	1 i
Information	51	2,030	342	256	23 i	66	20
Publishing	511	567	115	91	7 i	16	9
Newspaper, periodical, book, and directory publishers	5111	32	i 1	i 1	i *	* i	* i
Software publishers	5112	535	114	91	7 i	15	8
Telecommunications	517	633	22	10 i	* i	11 i	*
Data processing, hosting, and related services	518	436	105	75	3 i	20	9
Other information	other 51	394	100	79	12	19	2
Finance and insurance	52	1,394	47	24	1	19	3
Real estate and rental and leasing	53	22	4	3	* i	1	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1	*	*	0	*	*
Other real estate and rental and leasing	other 53	21	4	3	* i	1	*
Professional, scientific, and technical services	54	1,446	271	168	20 i	81	23
Architectural, engineering, and related services	5413	324	51	33	2	13	4
Computer systems design and related services	5415	487	92	67	6 i	19	6
Scientific research and development services	5417	300	97	49	10	39	i 10
Research and development in biotechnology	541711	133	31	13	2	17	i 1
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	161	61	32	6	21	8
Research and development in the social sciences and humanities	541720	6	5	4 i	1 i	*	1 i
Other professional, scientific, and technical services	other 54	336	32	19	2	10	i 3
Health care services	621–23	511	6	3	1 i	2	1
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	31 - 3,212	32	18	1	8 - 12	1 - 5

TABLE 57

Domestic total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers ^a		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All companies (number of domestic employees)	–	20,645	1,766	1,212	129	394	161
Small companies							
10–19 ^b	–	64	25	17	4	6	2
20–49	–	236	68	45	7	18	6
Medium companies							
50–99	–	342	80	47	6	24	9
100–249	–	771	126	70	8	42	14
Large companies							
250–499	–	732	102	63	7	28	11
500–999	–	849	91	56	6	22	12
1,000–4,999	–	2,816	306	216	22 i	61	29
5,000–9,999	–	1,713	178	115	12	42	21
10,000–24,999	–	3,454	304	216	25 i	69	20
25,000 or more	–	9,667	486	366	32 i	82	38

* = 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.

^a Researchers include R&D scientists and engineers and their managers.

^b Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 58

Foreign total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers ^a		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All industries	21–23, 31–33, 42–81	10,700	797	558	29	169	70
Manufacturing industries	31–33	7,381	450	349	21	63	38
Food	311	525	13	8	i *	4	1 i
Beverage and tobacco products	312	397	2	2	*	*	*
Textile, apparel, and leather products	313–16	209	2	1	*	1	*
Wood products	321	7	*	*	* i	*	*
Paper	322	106	2	1	*	*	*
Printing and related support activities	323	19	*	*	0	*	*
Petroleum and coal products	324	71	2	1	* i	1	*
Chemicals	325	1,018	79	56	9	13	11
Basic chemicals	3251	106	5	3	1	2	*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	78	5	3	1	1	*
Pesticide, fertilizer, and other agricultural chemicals	3253	31	2	i 1 i	* i	* i	*
Pharmaceuticals and medicines	3254	456	53	39	7	6	9
Soap, cleaning compound, and toilet preparation	3256	223	6	5	1	*	*
Paint, coating, adhesive, and other chemicals	3255, 3259	126	8	5	*	2	*
Plastics and rubber products	326	164	4	2	* i	1	*
Nonmetallic mineral products	327	90	1	* i	*	1	*
Primary metals	331	124	2	2	i *	* i	* i
Fabricated metal products	332	142	2	1	* i	*	*
Machinery	333	886	49	37	1	7	4
Agricultural implement	33311	85	9	7	*	1	*
Semiconductor machinery	333242	54	7	7	i *	* i	* i
Engine, turbine, and power transmission equipment	3336	147	9	8	*	*	1
Other machinery	other 333	600	24	16	i 1	5	3
Computer and electronic products	334	1,468	186	157	6 i	16 i	14 i
Communications equipment	3342	124	32	28	* i	1	3
Semiconductor and other electronic components	3344	565	80	72	3 i	5	2 i
Navigational, measuring, electromedical, and control instruments	3345	390	35	27	2 i	5 i	3 i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	75	7	i 4 i	1 i	2 i	1 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	108	8	6	*	1	1 i
Other measuring and controlling device	other 3345	207	21	17	1	2	1
Other computer and electronic products	other 334	388	39	29	i 1 i	4 i	6 i
Electrical equipment, appliances, and components	335	443	21	18	i 1	2	1
Transportation equipment	336	1,059	61	47	1	9	4
Motor vehicles, bodies, trailers, and parts	3361–63	818	50	39	*	8	4
Aerospace products and parts	3364	174	8	7	*	1	*
Aircraft, aircraft engine, and aircraft parts	336411–13	160	8	7	*	1	*

TABLE 58

Foreign total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers ^a		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Guided missile, space vehicle, and related parts	336414–15, 336419	14	*	*	0	*	*
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0
Other transportation	other 336	67	2	1	*	*	*
Furniture and related products	337	32	*	*	0	*	*
Miscellaneous	339	618	24	16	1	6	2
Medical equipment and supplies	3391	468	21	14	1	6	1
Other miscellaneous manufacturing	3399	151	3	2	i	*	i
Nonmanufacturing industries	21–23, 42–81	3,319	347	209	9	106	32
Mining, quarrying, oil and gas extraction, and support activities	21	172	2	1	*	1	*
Utilities	22	11	*	*	*	*	*
Wholesale trade	42	29	1	*	i	*	i
Electronic shopping and electronic auctions	454111–12	19 - 619	19 - 47	0 - 25	*	13 - 22	0 - 7
Transportation and warehousing	48–49	287	*	*	*	*	i
Information	51	820	151	110	4	25	15
Publishing	511	307	68	53	2	8	7
Newspaper, periodical, book, and directory publishers	5111	5	i	*	0	*	i
Software publishers	5112	302	68	53	2	8	7
Telecommunications	517	77	1	1	*	*	*
Data processing, hosting, and related services	518	298	60	40	*	11	8
Other information	other 51	138	22	16	2	6	1
Finance and insurance	52	323	14	10	*	3	1
Real estate and rental and leasing	53	6	*	*	0	*	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	6	*	*	0	*	*
Professional, scientific, and technical services	54	1,054	134	65	4	57	i
Architectural, engineering, and related services	5413	97	1	1	*	*	*
Computer systems design and related services	5415	538	48	38	1	4	i
Scientific research and development services	5417	104	80	22	3	52	i
Research and development in biotechnology	541711	32	25	10	1	15	i
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	72	54	12	2	37	5
Research and development in the social sciences and humanities	541720	*	*	*	*	*	i
Other professional, scientific, and technical services	other 54	315	i	4	i	1	i
Health care services	621–23	2	*	*	*	*	*
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	0 - 600	0 - 28	0 - 25	*	0 - 3	0 - 3
All companies (number of domestic employees)	–	10,700	797	558	29	169	70
Small companies							
10–19 ^b	–	8	2	1	*	1	*

TABLE 58

Foreign total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers ^a		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
20–49	–	47	7	5	*	1	1
Medium companies							
50–99	–	39	7	6	*	1	*
100–249	–	223	20	15	1	4	2
Large companies							
250–499	–	259	20	15	1	3	2
500–999	–	350	29	19	1 i	7	3
1,000–4,999	–	1,794	146	109	5	24	13
5,000–9,999	–	1,553	130	71	4	47	12
10,000–24,999	–	2,539	173	120	8 i	39 i	13
25,000 or more	–	3,887	263	197	8	41	24

* = 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.

^a Researchers include R&D scientists and engineers and their managers.^b Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 59

Domestic full-time equivalent R&D employees and researchers, by work status, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	FTE R&D employees ^a					FTE R&D scientists and engineers ^b				
		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	1,619	1,367	236	16		1,127	987	131	9	
Manufacturing industries	31–33	899	783	106	10		640	579	56	5	i
Food	311	20	17	3	*	i	12	10	1	i	*
Beverage and tobacco products	312	5	5	1	*	i	3	3	*	i	*
Textile, apparel, and leather products	313–16	6	4	2	*		3	2	1		*
Wood products	321	2	1	1	*		1	1	*		0
Paper	322	5	4	1	*		3	3	1	i	*
Printing and related support activities	323	2	1	1	*		1	1	*		*
Petroleum and coal products	324	6	6	*	*		1	1	*		*
Chemicals	325	185	178	6	1		127	123	3		1
Basic chemicals	3251	12	11	1	*		7	6	*		*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	7	7	*	*		5	5	*		*
Pesticide, fertilizer, and other agricultural chemicals	3253	8	7	1	*		5	5	*	i	*
Pharmaceuticals and medicines	3254	137	133	3	1		94	92	2		*
Soap, cleaning compound, and toilet preparation	3256	11	11	1	*		9	8	*		*
Paint, coating, adhesive, and other chemicals	3255, 3259	10	10	1	*		7	7	*		*
Plastics and rubber products	326	19	14	5	*		10	8	2		*
Nonmetallic mineral products	327	4	3	1	*		2	2	1		*
Primary metals	331	7	3	4	*		2	2	1		*
Fabricated metal products	332	18	10	8	*		9	6	3		*
Machinery	333	82	58	23	1		55	41	13		*
Agricultural implement	33311	10	9	1	*		7	6	*		*
Semiconductor machinery	333242	11	10	*	*		9	8	*	i	*
Engine, turbine, and power transmission equipment	3336	12	6	6	*		11	5	5		*
Other machinery	other 333	49	33	16	*		29	21	8	i	*
Computer and electronic products	334	267	246	18	i	3	218	203	13	i	2
Communications equipment	3342	44	43	1	*	i	35	34	1		*
Semiconductor and other electronic components	3344	96	89	6	i	2	83	78	4	i	1
Navigational, measuring, electromedical, and control instruments	3345	68	57	10	i	1	53	44	8	i	1

TABLE 59

Domestic full-time equivalent R&D employees and researchers, by work status, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	FTE R&D employees ^a								FTE R&D scientists and engineers ^b							
		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	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	15	i	13	i	1	i	*	i	11	i	10	i	1	i	*	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	30	i	22		7	i	1		24	i	17		6	i	*	
Other measuring and controlling device	other 3345	23		21		2		*		18		16		1		*	
Other computer and electronic products	other 334	59		58		1	i	*		47		46		*	i	*	
Electrical equipment, appliances, and components	335	21		19		3		*	i	16		14		2	i	*	i
Transportation equipment	336	176		152		22		2		130		118		11		1	i
Motor vehicles, bodies, trailers, and parts	3361–63	104		94		9		1		82		76		5		*	
Aerospace products and parts	3364	61	i	50	i	11		1	i	43	i	37	i	5		1	i
Aircraft, aircraft engine, and aircraft parts	336411–13	58	i	48	i	9		1	i	41	i	36	i	4		1	i
Guided missile, space vehicle, and related parts	336414–15, 336419	3		1	i	1	i	*	i	2	i	1	i	1	i	*	i
Military armored vehicle, tank, and tank component	336992	*		*		*		0		*		*		*		0	
Other transportation	other 336	11	i	8		3	i	*		6		4		1	i	*	
Furniture and related products	337	4		3		1		*		2		1		*		*	
Miscellaneous	339	67		61		6		1		44		41		3		*	
Medical equipment and supplies	3391	52		49		3		1		36		34		2		*	
Other miscellaneous manufacturing	3399	15		12		3		*		8	i	7	i	1	i	*	i
Nonmanufacturing industries	21–23, 42–81	720		583		130		7		487		408		76		4	
Mining, quarrying, oil and gas extraction, and support activities	21	11		10		1		*		8		8		*		*	
Utilities	22	1		1		*		*		*		*		*		*	
Wholesale trade	42	8	i	3	i	4	i	*		4	i	2	i	2	i	*	
Electronic shopping and electronic auctions	454111–12	51		13		39		0		36		12		25		0	
Transportation and warehousing	48–49	6		5		1		*		4		3		*		*	
Information	51	332		299		31		2		247		230		16	i	1	
Publishing	511	111		105		6		1		87		84		3		*	
Newspaper, periodical, book, and directory publishers	5111	1	i	1	i	*	i	*		*	i	*	i	*	i	0	
Software publishers	5112	110		104		6		1		87		84		3		*	
Telecommunications	517	21		8		13		*		10	i	3		6	i	*	

TABLE 59

Domestic full-time equivalent R&D employees and researchers, by work status, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	FTE R&D employees ^a				FTE R&D scientists and engineers ^b			
		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
Data processing, hosting, and related services	518	100	92	8	1	73	68	4	*
Other information	other 51	99	95	4	i	77	74	3	i
Finance and insurance	52	37	31	5	*	22	21	1	i
Real estate and rental and leasing	53	3	3	*	*	3	3	*	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	*	i	*	0	0	*	0
Other real estate and rental and leasing	other 53	3	3	*	*	3	3	*	*
Professional, scientific, and technical services	54	243	205	34	4	146	122	21	2
Architectural, engineering, and related services	5413	35	19	15	1	23	13	10	*
Computer systems design and related services	5415	87	75	11	1	62	54	7	1
Scientific research and development services	5417	95	90	3	2	44	42	2	i
Research and development in biotechnology	541711	30	30	*	*	10	10	*	*
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	59	55	2	1	31	29	1	i
Research and development in the social sciences and humanities	541720	5	i	5	i	4	i	3	i
Other professional, scientific, and technical services	other 54	27	21	6	*	17	13	i	4
Health care services	621–23	6	5	*	*	3	i	3	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	23	8	14	1	14	5	9	*
All companies (number of domestic employees)	–	1,619	1,367	236	16	1,127	987	131	9
Small companies									
10–19 ^c	–	22	17	4	1	15	12	3	*
20–49	–	59	45	13	2	40	32	7	1
Medium companies									
50–99	–	68	47	20	1	42	33	9	*
100–249	–	106	77	28	1	62	50	12	1
Large companies									
250–499	–	85	68	17	1	55	46	8	1
500–999	–	76	58	16	1	50	42	7	*

TABLE 59

Domestic full-time equivalent R&D employees and researchers, by work status, industry, and company size: 2018

(Thousands)

Industry and company size	NAICS code	FTE R&D employees ^a						FTE R&D scientists and engineers ^b					
		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		
1,000–4,999	–	275	243	29		3		196	178	17	i	1	i
5,000–9,999	–	166	148	16	i	1	i	109	100	8	i	1	i
10,000–24,999	–	289	269	19		2	i	202	188	13		1	i
25,000 or more	–	473	395	74		3		356	306	47		2	i

* = 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.

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

^b Includes scientists and engineers and their managers.

^c Business 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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 60

Domestic employment and R&D employment, by state: 2018

(Thousands)

State	Employees	
	Total	R&D
All states	20,645	1,766
Alabama	232	15
Alaska	25	*
Arizona	336	24
Arkansas	135	4
California	2,226	399
Colorado	330	30
Connecticut	164	18
Delaware	57	5
District of Columbia	45	2
Florida	672	34
Georgia	526	26
Hawaii	38	1
Idaho	81	5
Illinois	925	63
Indiana	440	38
Iowa	266	20
Kansas	205	15
Kentucky	215	12
Louisiana	137	4
Maine	47	2
Maryland	242	27
Massachusetts	417	81
Michigan	737	101
Minnesota	373	39
Mississippi	102	3
Missouri	332	21
Montana	28	2
Nebraska	149	5
Nevada	86	5
New Hampshire	71	11
New Jersey	506	61
New Mexico	51	3
New York	648	73
North Carolina	507	53
North Dakota	43	3
Ohio	729	56
Oklahoma	144	8
Oregon	214	31
Pennsylvania	681	58
Rhode Island	43	3
South Carolina	222	10
South Dakota	47	2
Tennessee	356	11
Texas	1,378	97
Utah	182	19
Vermont	23	1
Virginia	411	31
Washington	568	111
West Virginia	64	2

TABLE 60
Domestic employment and R&D employment, by state: 2018
(Thousands)

State	Employees			
	Total		R&D	
Wisconsin	485		43	
Wyoming	76		1	
Undistributed ^a	3,627		77	

* = amount < 500 employees.

^a 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 61

Foreign employment and R&D employment, by location: 2018

(Thousands)

Location	Employees	
	Total	R&D
Total	10,700	797
Puerto Rico ^a	46	1
Canada	457	40
Latin America and Other Western Hemisphere	1,673	38
Argentina	72	4
Brazil	344	12
Chile	55	1
Mexico	899	17
Other Latin American and Western Hemisphere locations	303	4
Africa	182	5
South Africa	49	3
Other African locations	132	2
Asia and Pacific	3,008	336
Australia	152	12
China	881	73
Hong Kong	43	2
India	867	173
Indonesia	99	*
Japan	200	22
Malaysia	101	7
New Zealand	14	1
Singapore	144	11
South Korea	79	9
Taiwan	73	13
Thailand	107	3
Other Asian/Pacific locations	249	11
Europe	2,896	268
Austria	29	3
Belgium	84	11
Czechia	77	6
Denmark	22	3
Finland	18	3
France	263	21
Germany	454	47
Hungary	49	3
Ireland	116	14
Italy	152	13
Luxembourg	11	2
Netherlands	116	11
Norway	26	2
Poland	169	10
Russia	102	6
Spain	109	10
Sweden	40	6
Switzerland	71	10
Turkey	44	1
United Kingdom	695	68
Other European locations	249	18
Middle East	161	25
Israel	57	23

TABLE 61

Foreign employment and R&D employment, by location: 2018

(Thousands)

Location	Employees			
	Total		R&D	
Other Middle Eastern locations	104		2	
Undistributed ^b	2,277	i	85	i

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

^a Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.

^b 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 62

U.S. patent applications and patents issued to companies located in the United States that performed or funded R&D, by industry and company size: 2018

(Number)

Industry and company size	NAICS code	Applications					Patents issued ^c
		Total	Nonprovisional utility patents				
			Total	To foreign jurisdictions ^a	From within organized R&D activity ^b		
All industries	21–23, 31–33, 42–81	163,866	117,393	53,969		86,635	105,854
Manufacturing industries	31–33	115,551	78,960	42,077		60,820	67,608
Food	311	2,330	1,231	257		1,174	1,050
Beverage and tobacco products	312	485	356	290		324	349
Textile, apparel, and leather products	313–16	971	669	355		415	286
Wood products	321	86	47	14		45	18
Paper	322	572	450	155		292	265
Printing and related support activities	323	363	191	69		174	107
Petroleum and coal products	324	707	622	441		573	516
Chemicals	325	20,067	11,512	8,484		10,439	9,303
Basic chemicals	3251	1,745	1,070	771		958	790
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	2,568	1,730	1,394		1,632 - 1,731	1,242
Pesticide, fertilizer, and other agricultural chemicals	3253	494	378	163		366	303
Pharmaceuticals and medicines	3254	12,080	6,293	4,854		5,749	5,190
Soap, cleaning compound, and toilet preparation	3256	1,935	1,197	725		888	1,154
Paint, coating, adhesive, and other chemicals	3255, 3259	1,245	843	578		745 - 844	625
Plastics and rubber products	326	2,006	1,227	748		1,161	952
Nonmetallic mineral products	327	1,788	1,542	1,130		1,521	898
Primary metals	331	538	296	176		237	273
Fabricated metal products	332	1,788	899	387		785	794
Machinery	333	9,890	6,007	3,716		5,185	5,817
Agricultural implement	33311	1,170	670	449		635	632
Semiconductor machinery	333242	2,210	1,239	860		1,070	1,188
Engine, turbine, and power transmission equipment	3336	958	673	438		650	993
Other machinery	other 333	5,551	3,424	1,970		2,830	3,004
Computer and electronic products	334	40,447	29,853	12,793		24,103	27,969
Communications equipment	3342	4,530	3,205	1,270		2,845	3,283
Semiconductor and other electronic components	3344	19,178	14,046	6,462		10,024	13,261
Navigational, measuring, electromedical, and control instruments	3345	6,132	4,306	2,808		3,631	4,131
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1,379	725	481		687	629
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	2,467	1,969	1,146		1,727	1,871
Other measuring and controlling device	other 3345	2,285	1,612	1,180		1,216	1,631
Other computer and electronic products	other 334	10,608	8,295	2,253		7,603	7,294
Electrical equipment, appliances, and components	335	5,086	3,650	2,087		3,272	2,719
Transportation equipment	336	15,826	13,285	5,725		4,961	8,199
Motor vehicles, bodies, trailers, and parts	3361–63	11,508	9,643	4,127		2,891	5,180
Aerospace products and parts	3364	3,706	3,244	1,299		1,685	2,788
Aircraft, aircraft engine, and aircraft parts	336411–13	3,567	3,160	1,252		1,605	2,733
Guided missile, space vehicle, and related parts	336414–15, 336419	139	85	47		81	56
Military armored vehicle, tank, and tank component	336992	0 - 217	0	0		0	0

TABLE 62

U.S. patent applications and patents issued to companies located in the United States that performed or funded R&D, by industry and company size: 2018

(Number)

Industry and company size	NAICS code	Applications					Patents issued ^c
		Total	Nonprovisional utility patents				
			Total	To foreign jurisdictions ^a	From within organized R&D activity ^b		
Other transportation	other 336	396 - 614	397	299	i	384	231
Furniture and related products	337	492	279	147		177	240
Miscellaneous	339	12,109	6,845	5,103		5,983	7,854
Medical equipment and supplies	3391	9,430	5,448	4,346		4,923	6,638
Other miscellaneous manufacturing	3399	2,680	1,397	757		1,060	1,216
Nonmanufacturing industries	21–23, 42–81	48,315	38,433	11,892		25,815	38,246
Mining, quarrying, oil and gas extraction, and support activities	21	1,957	1,397	1,149		1,343	2,331
Utilities	22	75	32	14		24	17
Wholesale trade	42	1,107	525	227		435	398
Electronic shopping and electronic auctions	454111–12	0 - 2,679	0 - 1,788	0 - 381		0 - 1,788	0 - 2,526
Transportation and warehousing	48–49	140	82	27		78	61
Information	51	21,376	16,920	6,031		12,071	16,911
Publishing	511	9,501	8,050	4,019		4,809	7,804
Newspaper, periodical, book, and directory publishers	5111	3	2	i 0		0	0
Software publishers	5112	9,497	8,048	4,019		4,809	7,804
Telecommunications	517	2,922	1,870	260		971	3,060
Data processing, hosting, and related services	518	3,825	3,086	473		2,749	2,067
Other information	other 51	5,128	3,914	1,279		3,543	3,980
Finance and insurance	52	3,025	2,101	259		1,105	1,526
Real estate and rental and leasing	53	309	180	0 - 181		171	0 - 2,526
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1	0	0		0	0
Other real estate and rental and leasing	other 53	308	180	0 - 181		171	0 - 2,526
Professional, scientific, and technical services	54	17,203	15,124	3,670		8,558	14,201
Architectural, engineering, and related services	5413	599	269	119		237	203
Computer systems design and related services	5415	13,402	12,879	2,670		6,607	12,641
Scientific research and development services	5417	2,766	1,680	777		1,471	1,077
Research and development in biotechnology	541711	334 - 739	334 - 397	292		335	241
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	2,028	1,284	485		1,136	832
Research and development in the social sciences and humanities	541720	0 - 405	0 - 63	0		0	4
Other professional, scientific, and technical services	other 54	436	296	105		243	280
Health care services	621–23	449	i 279	i 139	i	247	i 280
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	0 - 2,679	0 - 1,798	0 - 381		0 - 1,788	0 - 2,526
All companies (number of domestic employees)	–	163,866	117,393	53,969		86,635	105,854
Small companies							

TABLE 62

U.S. patent applications and patents issued to companies located in the United States that performed or funded R&D, by industry and company size: 2018

(Number)

Industry and company size	NAICS code	Applications							Patents issued ^c
		Total	Nonprovisional utility patents						
			Total	To foreign jurisdictions ^a	From within organized R&D activity ^b				
10–19 ^d	–	2,756	1,680	670		1,491		991	
20–49	–	5,647	3,143	1,780		2,860		1,943	
Medium companies									
50–99	–	6,092	3,923	1,679		3,284		2,650	
100–249	–	7,396	4,455	2,390		3,737		3,535	
Large companies									
250–499	–	7,692	4,799	2,389		4,110		3,718	
500–999	–	6,780	4,191	2,171		3,807		3,897	
1,000–4,999	–	21,860	14,712	7,960		12,828		13,316	
5,000–9,999	–	17,159	13,088	7,208		9,051		11,441	
10,000–24,999	–	36,970	27,140	13,968		20,659		19,077	
25,000 or more	–	51,514	40,260	13,754		24,806		45,287	

i = > 50% of the estimate is imputation to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

^a Also includes patent applications that company planned to apply for in foreign jurisdictions.^b Includes patent applications in which the named inventor(s) were R&D employees.^c For a small number of companies issued more than 100 patents by the U.S. Patent and Trademark Office (USPTO), counts from USPTO.gov were used to supplement survey data.^d Business 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. 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 63

Total patent licensing revenue of companies located in the United States that performed or funded R&D, by industry and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Revenue ^a
All industries	21–23, 31–33, 42–81	21,472
Manufacturing industries	31–33	19,387
Food	311	52
Beverage and tobacco products	312	2
Textile, apparel, and leather products	313–16	36
Wood products	321	*
Paper	322	7
Printing and related support activities	323	1
Petroleum and coal products	324	169
Chemicals	325	7,200
Basic chemicals	3251	91
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	0 - 699
Pesticide, fertilizer, and other agricultural chemicals	3253	51
Pharmaceuticals and medicines	3254	6,359
Soap, cleaning compound, and toilet preparation	3256	3
Paint, coating, adhesive, and other chemicals	3255, 3259	0 - 699
Plastics and rubber products	326	99
Nonmetallic mineral products	327	46
Primary metals	331	2
Fabricated metal products	332	255
Machinery	333	521 i
Agricultural implement	33311	3
Semiconductor machinery	333242	0 - 511
Engine, turbine, and power transmission equipment	3336	9
Other machinery	other 333	0 - 511 i
Computer and electronic products	334	9,477
Communications equipment	3342	0 - 1,474
Semiconductor and other electronic components	3344	6,546
Navigational, measuring, electromedical, and control instruments	3345	1,459
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	56
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	0 - 1,404
Other measuring and controlling device	other 3345	0 - 1,404
Other computer and electronic products	other 334	0 - 1,474
Electrical equipment, appliances, and components	335	474
Transportation equipment	336	436 i
Motor vehicles, bodies, trailers, and parts	3361–63	426 i
Aerospace products and parts	3364	8
Aircraft, aircraft engine, and aircraft parts	336411–13	8
Guided missile, space vehicle, and related parts	336414–15, 336419	*
Military armored vehicle, tank, and tank component	336992	0
Other transportation	other 336	2
Furniture and related products	337	1
Miscellaneous	339	611
Medical equipment and supplies	3391	495
Other miscellaneous manufacturing	3399	115
Nonmanufacturing industries	21–23, 42–81	2,085
Mining, quarrying, oil and gas extraction, and support activities	21	153 i

TABLE 63

Total patent licensing revenue of companies located in the United States that performed or funded R&D, by industry and company size: 2018

(Millions of U.S. dollars)

Industry and company size	NAICS code	Revenue ^a
Utilities	22	*
Wholesale trade	42	6
Electronic shopping and electronic auctions	454111-12	0
Transportation and warehousing	48-49	0
Information	51	1,208
Publishing	511	489
Newspaper, periodical, book, and directory publishers	5111	0
Software publishers	5112	489
Telecommunications	517	0 - 382
Data processing, hosting, and related services	518	339
Other information	other 51	0 - 382
Finance and insurance	52	221 i
Real estate and rental and leasing	53	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0
Other real estate and rental and leasing	other 53	*
Professional, scientific, and technical services	54	496
Architectural, engineering, and related services	5413	*
Computer systems design and related services	5415	382
Scientific research and development services	5417	98
Research and development in biotechnology	541711	18
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	80
Research and development in the social sciences and humanities	541720	0
Other professional, scientific, and technical services	other 54	16
Health care services	621-23	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1
All companies (number of domestic employees)	-	21,472
Small companies		
10-19 ^b	-	212
20-49	-	351
Medium companies		
50-99	-	236
100-249	-	941
Large companies		
250-499	-	724
500-999	-	503
1,000-4,999	-	2,966
5,000-9,999	-	1,502
10,000-24,999	-	10,977
25,000 or more	-	3,062

* = 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.

^a Amounts received from all patent licensing activities during 2018.^b Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 64

Companies located in the United States that performed or funded R&D and engaged in intellectual property transfer activities, by type of activity and industrial sector: 2018

(Number)

Type of intellectual property (IP) transfer activity	Industrial sector		
	All	Manufacturing	Nonmanufacturing
Transferred IP to others not owned by your company through participation in technical assistance or "know how" agreements	882	553	329
Received IP from others not owned by your company through participation in technical assistance or "know how" agreements	1,179	768	411
Transferred IP to a spin-off or spin-out of your company	199	106	93
Received IP from a parent company as part of a spin-off or spin-out	45	31	14
Acquired more than 50% ownership in another company for the primary purpose of acquiring its IP	244	129	115
Acquired any financial interest in another company in order to gain access to its IP	210	143	68
Participated in cross-licensing agreements—the agreements in which two or more parties grant a license to each other for the use of the subject matter claimed in one or more of the patents owned by each party	688	462	225
Allowed free use of patents or other IP owned by your company (e.g., allowing free use of software patents by the open-source community)	765	306	459
Made use of open-source patents or other freely available IP not owned by your company	2,571	957	1,613

Note(s):

Detail may not add to total because of rounding. Industrial sector 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.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 65
Importance of types of intellectual property protections to companies located in the United States that performed or funded R&D, by industry and company size: 2018
(Percent)

Industry and company size	NAICS code	Utility patents			Design patents			Trademarks			Copyrights			Trade secrets			Mask works		
		Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important
All industries	21–23, 31–33, 42–81	31.3	18.1	50.5	20.3	23.1	56.6	39.8	29.4	30.8	27.8	29.5	42.7	51.7	24.5	23.8	7.2	10.1	82.7
Manufacturing industries	31–33	34.8	19.2	46.1	22.6	23.9	53.4	41.3	29.5	29.2	25.1	29.2	45.7	54.0	24.5	21.4	8.1	10.3	81.6
Food	311	11.1	13.6	75.3	9.1	12.1	78.8	45.7	27.4	26.9	22.3	23.5	54.1	52.6	28.0	19.3	6.4	3.2	90.4
Beverage and tobacco products	312	5.9	10.2	83.9	5.6	8.1	86.3	48.0	31.3	20.7	17.4	14.6	68.1	57.7	36.0	6.3	D	D	96.1
Textile, apparel, and leather products	313–316	40.2	18.5	41.2	34.7	29.6	35.7	55.8	26.3	17.9	26.8	34.6	38.7	44.5	35.5	20.0	3.4	5.5	91.1
Wood products	321	7.3	41.9	50.8	4.9	49.6	45.5	13.8	71.7	14.5	40.1	33.4	26.4	71.9	18.2	9.8	D	D	61.9
Paper	322	25.0	27.4	47.6	14.1	33.8	52.1	31.9	30.5	37.5	12.8	30.0	57.2	48.9	27.1	24.0	D	D	87.4
Printing and related support activities	323	19.0	22.3	58.7	13.3	26.2	60.4	23.6	36.5	39.9	20.0	30.9	49.1	37.9	37.3	24.8	D	D	87.2
Petroleum and coal products	324	25.4	17.7	56.9	20.5	18.1	61.4	50.8	22.7	26.6	32.1	24.0	43.9	65.2	23.4	11.4	D	D	83.0
Chemicals	325	36.6	18.9	44.4	12.9	19.5	67.5	40.0	32.5	27.6	22.6	29.4	48.1	63.3	17.1	19.6	3.5	7.3	89.2
Basic chemicals	3251	33.4	16.6	50.0	18.1	13.2	68.7	47.6	32.4	20.1	20.8	30.4	48.9	64.7	26.1	9.2	3.5	4.4	92.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	19.1	6.4	74.6	4.5	7.2	88.3	24.2	31.8	44.1	7.8	23.6	68.7	51.1	24.9	24.0	D	D	82.8
Pesticide, fertilizer, and other agricultural chemicals	3253	55.4	10.2	34.4	7.3	18.9	73.9	73.4	17.4	9.1	39.3	19.2	41.5	79.9	16.1	4.0	D	D	95.4
Pharmaceuticals and medicines	3254	47.1	21.2	31.8	13.3	25.8	60.8	37.9	39.3	22.8	23.5	30.9	45.6	62.6	16.6	20.8	3.4	6.8	89.8
Soap, cleaning compound, and toilet preparation	3256	26.2	28.8	45.0	15.5	20.2	64.3	47.1	22.5	30.3	28.4	22.3	49.3	63.3	13.1	23.6	6.2	13.7	80.1
Paint, coating, adhesive, and other chemicals	3255, 3259	18.9	14.8	66.3	10.9	11.1	78.0	34.7	23.3	42.1	19.3	32.7	48.0	65.1	12.2	22.7	3.2	5.1	91.7
Plastics and rubber products	326	33.1	14.7	52.2	19.9	22.7	57.4	39.0	25.6	35.4	23.7	24.5	51.8	50.5	23.8	25.7	3.0	5.1	91.9
Nonmetallic mineral products	327	19.5	13.8	66.7	8.7	15.3	76.0	26.7	49.4	23.9	8.9	19.9	71.2	66.8	14.8	18.4	2.0	5.5	92.6
Primary metals	331	21.0	23.2	55.8	10.9	26.1	63.0	19.9	29.9	50.2	10.9	24.0	65.1	44.9	31.4	23.8	3.1	7.1	89.8
Fabricated metal products	332	29.5	9.7	60.8	24.3	15.8	59.9	32.4	19.6	48.0	19.5	19.2	61.2	40.3	22.9	36.8	9.8	5.0	85.2
Machinery	333	37.2	22.7	40.1	27.2	24.9	47.9	43.0	27.0	30.1	23.9	28.5	47.5	49.6	28.1	22.3	6.0	9.7	84.3
Agricultural implement	33311	47.7	22.0	30.3	38.3	27.4	34.3	49.7	24.6	25.7	28.2	38.5	33.3	42.3	29.7	28.0	6.0	9.3	84.7
Semiconductor machinery	333242	60.7	12.3	27.0	19.7	23.8	56.6	45.8	32.8	21.4	37.5	32.8	29.6	59.0	D	D	29.5	21.4	49.1
Engine, turbine, and power transmission equipment	3336	49.8	20.5	29.6	15.7	27.9	56.4	54.7	27.6	17.7	25.1	25.7	49.2	60.5	16.7	22.8	6.1	6.0	87.9
Other machinery	other 333	34.6	23.2	42.2	26.3	24.4	49.2	41.4	27.2	31.4	22.9	27.1	49.9	49.9	28.1	22.0	5.4	9.6	85.0
Computer and electronic products	334	42.5	18.6	39.0	27.3	26.5	46.2	42.8	31.5	25.7	32.7	32.3	35.1	63.2	21.4	15.5	18.7	19.0	62.3
Communications equipment	3342	38.8	24.8	36.5	28.4	30.8	40.8	43.8	30.0	26.2	32.9	29.3	37.8	53.6	22.0	24.4	18.2	21.3	60.5
Semiconductor and other electronic components	3344	49.3	10.6	40.1	27.4	24.6	48.0	39.9	22.8	37.2	28.1	21.1	50.8	56.9	19.3	23.8	36.6	21.3	42.1
Navigational, measuring, electromedical, and control instruments	3345	38.4	23.4	38.2	23.8	28.3	47.9	40.8	39.7	19.5	32.3	42.3	25.4	69.9	21.4	8.7	7.6	17.1	75.3
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	47.9	27.2	24.9	34.5	35.9	29.6	43.3	32.2	24.5	31.6	39.1	29.4	74.6	19.6	5.8	6.6	22.9	70.5
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	45.4	23.4	31.2	26.9	38.7	34.4	49.0	25.1	26.0	50.4	20.2	29.3	83.0	6.8	10.2	13.3	14.1	72.7
Other measuring and controlling device	other 3345	34.4	22.2	43.3	20.1	24.5	55.4	38.9	44.0	17.1	30.2	46.1	23.7	66.9	23.7	9.4	7.2	15.8	77.0
Other computer and electronic products	other 334	48.4	9.1	42.5	41.6	18.8	39.7	58.0	17.1	24.9	45.8	16.9	37.3	57.9	25.6	16.6	24.3	18.9	56.8
Electrical equipment, appliances, and components	335	45.2	21.8	32.9	33.0	24.8	42.3	49.9	25.2	24.9	31.0	24.2	44.8	50.4	26.4	23.2	16.1	10.2	73.7

TABLE 65
Importance of types of intellectual property protections to companies located in the United States that performed or funded R&D, by industry and company size: 2018
(Percent)

Industry and company size	NAICS code	Utility patents			Design patents			Trademarks			Copyrights			Trade secrets			Mask works		
		Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important
Transportation equipment	336	32.2	29.0	38.8	24.8	32.2	43.0	36.1	31.7	32.3	22.3	38.9	38.8	45.8	30.6	23.7	5.5	19.6	74.9
Motor vehicles, bodies, trailers, and parts	3361, 3362, 3363	27.1	33.2	39.7	22.0	33.6	44.3	34.0	32.1	33.9	17.5	43.5	39.0	39.1	33.3	27.6	5.8	24.8	69.4
Aerospace products and parts	3364	30.5	24.4	45.1	16.1	32.4	51.5	24.6	35.4	39.9	17.6	35.5	46.9	46.8	33.3	19.9	3.5	17.8	78.7
Aircraft, aircraft engine, and aircraft parts	336411–13	31.6	19.8	48.7	18.1	32.3	49.5	25.3	37.0	37.7	18.0	38.9	43.1	47.6	35.3	17.2	2.9	20.8	76.3
Guided missile, space vehicle, and related parts	336414–15, 336419	25.2	47.2	27.6	D	D	61.2	21.4	28.0	50.6	15.9	18.9	65.3	42.9	23.5	33.5	D	D	90.3
Military armored vehicle, tank, and tank component	336992	D	D	D	D	D	D	0.0	D	D	0.0	D	D	D	D	D	0.0	D	D
Other transportation	other 336	54.1	20.8	25.1	48.3	27.2	24.5	62.4	24.3	13.3	48.8	26.4	24.8	68.7	16.1	15.2	7.6	2.7	89.8
Furniture and related products	337	30.8	18.8	50.4	25.1	44.6	30.4	29.6	43.3	27.1	18.4	44.6	37.0	24.5	38.4	37.1	6.8	11.8	81.3
Miscellaneous	339	49.4	20.2	30.4	38.0	30.6	31.4	60.0	27.0	13.0	34.3	37.7	28.0	60.8	26.5	12.7	10.8	6.3	82.8
Medical equipment and supplies	3391	58.5	19.8	21.8	41.1	29.2	29.7	60.7	27.9	11.3	35.5	42.8	21.7	62.6	27.6	9.9	12.3	5.7	82.0
Other miscellaneous manufacturing	3399	37.7	20.8	41.5	34.2	32.4	33.5	59.1	25.8	15.1	32.7	31.1	36.1	58.5	25.2	16.4	8.8	7.2	84.0
Nonmanufacturing industries	21–23, 42–81	26.5	16.7	56.8	17.1	21.9	61.0	37.6	29.3	33.1	31.5	30.1	38.4	48.4	24.3	27.3	6.0	9.8	84.2
Mining, quarrying, oil and gas extraction, and support activities	21	61.9	13.8	24.3	34.4	20.2	45.4	36.0	24.4	39.7	30.3	18.6	51.1	62.3	21.0	16.7	D	D	76.7
Utilities	22	27.0	49.8	23.2	13.1	54.3	32.6	41.1	43.4	15.5	16.5	65.9	17.6	33.5	47.1	19.4	9.3	47.1	43.7
Wholesale trade	42	20.3	21.1	58.7	23.1	25.3	51.6	45.9	23.5	30.6	31.0	29.3	39.7	47.9	23.9	28.2	3.8	12.7	83.6
Electronic shopping and electronic auctions	454111–12	12.5	28.1	59.4	16.3	14.7	69.0	47.5	D	D	25.1	68.6	6.3	31.5	57.3	11.2	D	D	94.0
Transportation and warehousing	48–49	17.8	20.4	61.8	35.0	22.0	43.1	32.8	18.5	48.7	15.7	24.7	59.6	29.8	49.7	20.5	D	D	87.6
Information	51	31.0	16.7	52.2	18.0	20.5	61.5	50.1	29.7	20.1	44.4	29.2	26.4	53.8	23.0	23.2	7.2	8.6	84.2
Publishing	511	24.7	14.9	60.4	16.0	18.8	65.2	47.8	27.3	25.0	45.3	22.5	32.2	53.1	16.1	30.8	2.2	11.2	86.6
Newspaper, periodical, book, and directory publishers	5111	D	D	85.9	D	D	62.9	35.9	D	D	60.2	20.8	19.0	30.9	23.4	45.7	D	D	D
Software publishers	5112	25.5	15.1	59.5	16.3	18.4	65.3	48.2	26.3	25.5	44.8	22.5	32.7	54.0	15.8	30.2	2.1	11.4	86.4
Telecommunications	517	43.2	16.3	40.6	30.4	24.2	45.4	35.6	43.7	20.7	27.5	45.6	26.9	56.0	24.4	19.7	27.8	9.6	62.6
Data processing, hosting, and related services	518	32.5	17.8	49.7	20.0	20.5	59.5	50.6	33.5	15.9	43.6	34.6	21.8	53.3	30.7	15.9	8.8	7.4	83.8
Other information	other 51	39.5	19.3	41.3	8.5	24.4	67.1	66.4	12.5	21.1	55.8	19.8	24.5	56.6	13.6	29.8	4.0	4.0	92.1
Finance and insurance	52	7.3	11.3	81.4	2.7	12.9	84.4	31.3	42.1	26.6	21.6	42.4	36.0	57.9	11.7	30.4	D	D	94.0
Real estate and rental and leasing	53	30.5	14.4	55.1	33.6	19.0	47.3	62.3	D	D	39.4	20.7	39.9	61.8	13.3	24.9	D	0.0	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	D	0.0	D	D	D	D	D	0.0	D	D	0.0	D	D	0.0	D	0.0	0.0	100.0
Other real estate and rental and leasing	other 53	33.2	18.4	48.4	29.9	17.0	53.1	59.1	D	D	29.9	26.5	43.6	58.5	17.0	24.5	D	0.0	D
Professional, scientific, and technical services	54	26.6	16.7	56.7	16.1	23.2	60.6	31.6	30.1	38.3	28.3	30.2	41.5	47.8	24.3	27.9	6.0	10.6	83.4
Architectural, engineering, and related services	5413	14.8	19.8	65.4	11.6	23.5	64.9	19.6	29.5	50.9	17.3	31.9	50.8	36.7	27.3	36.0	4.0	11.1	84.9
Computer systems design and related services	5415	26.6	18.4	55.1	18.4	22.9	58.7	34.7	34.3	31.0	32.6	32.7	34.7	49.3	21.6	29.1	7.4	12.4	80.1
Scientific research and development services	5417	41.3	14.4	44.2	15.4	25.7	58.9	31.9	30.9	37.2	27.2	26.6	46.2	60.4	17.3	22.3	7.2	8.2	84.6
Research and development in biotechnology	541711	51.2	17.1	31.8	17.0	20.1	63.0	27.5	37.0	35.5	19.1	28.5	52.3	59.1	18.9	22.0	4.9	5.1	90.0
Research and development in the physical, engineering, and life sciences (except biotechnology)	541712	38.9	13.7	47.4	15.2	27.5	57.3	33.4	29.2	37.4	29.8	25.8	44.5	61.6	16.7	21.7	8.0	9.0	83.0

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Importance of types of intellectual property protections to companies located in the United States that performed or funded R&D, by industry and company size: 2018
(Percent)

Industry and company size	NAICS code	Utility patents			Design patents			Trademarks			Copyrights			Trade secrets			Mask works																				
		Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important	Very important	Somewhat important	Not important																		
Research and development in the social sciences and humanities	541720	18.7		D		D		D		76.6		17.8		30.9		51.4		17.8		37.5		44.8		24.3		24.3		51.4		0.0		16.8		83.2			
Other professional, scientific, and technical services	other 54	23.6		11.0		65.4		16.9		20.8		62.3		39.1		18.6		42.2		32.7		26.0		41.3		42.9		36.2		20.9		3.0		8.1		88.9	
Health care services	621–23	16.7		11.3		72.0		9.3		13.0		77.7		26.7		18.7		54.6		18.2		18.7		63.2		28.9		14.3		56.8		7.3		3.4		89.3	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	18.5		10.0		71.5		15.0		14.9		70.1		34.4		26.9		38.6		22.3		27.6		50.1		38.4		29.2		32.4		3.8		5.3		90.9	
All companies (number of domestic employees)	–	31.3		18.1		50.5		20.3		23.1		56.6		39.8		29.4		30.8		27.8		29.5		42.7		51.7		24.5		23.8		7.2		10.1		82.7	
Small companies																																					
10–19 ^a	–	29.0		19.2		51.9		17.5		22.0		60.4		38.4		33.0		28.6		29.0		31.0		40.1		51.9		25.8		22.3		7.8		13.4		78.8	
20–49	–	27.7		15.0		57.3		17.1		20.4		62.5		34.3		28.0		37.7		24.7		27.8		47.5		53.9		21.7		24.4		6.8		8.5		84.7	
Medium companies																																					
50–99	–	30.4		18.5		51.1		24.7		20.1		55.3		39.6		28.9		31.5		29.6		26.8		43.6		49.0		27.6		23.4		6.7		9.4		83.9	
100–249	–	30.6		20.5		48.9		21.1		26.3		52.6		39.6		31.5		28.9		26.8		30.6		42.6		48.9		23.6		27.5		8.4		9.9		81.7	
Large companies																																					
250–499	–	35.2		18.4		46.4		21.6		24.7		53.7		41.3		30.7		28.0		26.6		30.3		43.1		48.9		27.8		23.3		8.4		8.4		83.2	
500–999	–	34.8		22.6		42.6		20.4		30.9		48.7		47.6		27.6		24.8		31.5		30.5		38.1		48.6		28.0		23.4		5.6		9.8		84.6	
1,000–4,999	–	46.8		19.0		34.2		24.7		28.1		47.2		55.1		24.3		20.6		31.6		36.1		32.3		57.3		22.7		20.0		5.2		12.3		82.6	
5,000–9,999	–	57.8		19.7		22.5		27.7		30.2		42.1		67.9		20.8		11.2		35.8		38.8		25.4		67.0		18.0		15.0		9.8		10.9		79.3	
10,000–24,999	–	67.5		17.2		15.3		34.8		33.9		31.2		78.8		16.3		4.9		48.7		33.5		17.8		82.5		11.8		5.7		8.0		14.2		77.8	
25,000 or more	–	60.5		15.2		24.3		28.3		37.5		34.2		86.3		7.3		6.4		48.8		39.5		11.7		69.8		22.8		7.4		5.2		12.6		82.3	

D = data withheld to avoid disclosing operations of individual companies.

NAICS = 2012 North American Industry Classification System.

^a Business 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. These statistics are also not comparable to estimates prior to 2012 as those estimates are representative of all companies in the United States.

Source(s):
National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 66

R&D costs paid for by the company and others projected for 2019, by industry and company size: 2018

(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 company	Paid for by others	Paid for by 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	558,974	88,631	452,151	43,137	409,013	71,163	28,899	42,264	106,823		
Manufacturing industries	31–33	359,136	53,657	283,524	39,112	244,412	45,446	22,543	22,903	75,613		
Food	311	5,679	261	4,765	244	4,521	249	1	248	915		
Beverage and tobacco products	312	1,990	121	1,262	209	1,054	121	0	121	728		
Textile, apparel, and leather products	313–16	1,261	5	1,043	14	1,029	4	0	4	218		
Wood products	321	207	5	204	8	197	5	*	5	3		
Paper	322	1,056	2	961	4	957	1	0	1	95		
Printing and related support activities	323	261	3	257	2	255	3	*	3	5		
Petroleum and coal products	324	1,607	23	1,371	198	1,173	23	*	23	236		
Chemicals	325	137,537	16,734	111,673	31,110	80,562	12,498	251	12,248	25,865		
Basic chemicals	3251	3,091	192	2,409	52	2,357	190	1	189	682		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,826	136	1,227	98	1,129	82 - 103	0 - 20	83	599		
Pesticide, fertilizer, and other agricultural chemicals	3253	1,345	338	1,036	123	914	337	2	335	308		
Pharmaceuticals and medicines	3254	125,902	15,873	102,827	30,507	72,320	11,728	230	11,498	23,075		
Soap, cleaning compound, and toilet preparation	3256	3,902	168	2,901	286	2,615	134 - 155	0 - 20	135	1,001		
Paint, coating, adhesive, and other chemicals	3255, 3259	1,471	28	1,272	45	1,227	6 - 27	0 - 20	7	198		
Plastics and rubber products	326	3,418	160	2,918	82	2,835	131	6	125	500		
Nonmetallic mineral products	327	1,828	25	1,569	13	1,556	25	2	24	259		
Primary metals	331	923	21	767	20	746	20	4	16	156		
Fabricated metal products	332	2,502	78	2,310	39	2,271	69	2	67	192		
Machinery	333	17,982	1,261	13,378	343	13,034	1,154	188	967	4,604		
Agricultural implement	33311	3,190	10	2,021	52	1,969	8	1	8	1,169		
Semiconductor machinery	333242	4,500	686	3,526	2	3,524	674	2	671	975		
Engine, turbine, and power transmission equipment	3336	3,426	176	2,448	74	2,374	160	134	26	978		
Other machinery	other 333	6,865	388	5,383	215	5,167	312	51	261	1,483		
Computer and electronic products	334	110,085	11,632	80,608	1,941	78,668	10,510	5,663	4,847	29,477		
Communications equipment	3342	16,598	1,700	13,052	818	12,233	1,517	855	662	3,547		
Semiconductor and other electronic components	3344	45,298	2,505	30,518	470	30,048	2,287	77	2,210	14,780		

TABLE 66

R&D costs paid for by the company and others projected for 2019, by industry and company size: 2018

(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 company	Paid for by others	Paid for by 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	16,329	7,208	11,928	400	11,529	6,516	4,624	1,892	i	4,401	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	4,672	i 181	3,399	86	3,313	178	1	i 177		1,273	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,876	i 6,724	3,758	i 207	3,551	i 6,084	4,504	1,579	i	1,119	i
Other measuring and controlling device	other 3345	6,781	303	4,771	106	4,665	255	120	135		2,009	
Other computer and electronic products	other 334	31,860	220	25,110	253	i 24,858	i 190	107	i 83		6,749	i
Electrical equipment, appliances, and components	335	6,418	319	4,602	125	4,477	179	48	131		1,816	i
Transportation equipment	336	44,545	22,540	i 37,496	3,705	33,791	20,066	16,313	i 3,753		7,049	
Motor vehicles, bodies, trailers, and parts	3361-63	30,210	3,091	23,822	2,934	20,888	2,644	66 - 1,151	1,493 - 2,577		6,388	
Aerospace products and parts	3364	12,316	18,335	i 11,851	735	11,116	16,338	i 15,162	i 1,177		465	
Aircraft, aircraft engine, and aircraft parts	336411-13	11,714	17,365	i 11,249	575	10,674	15,368	i 14,224	i 1,145		465	
Guided missile, space vehicle, and related parts	336414-15, 336419	602	970	i 601	159	442	970	i 938	i 32	i	1	
Military armored vehicle, tank, and tank component	336992	4	2	4	0	4	2	2	*		0	
Other transportation	other 336	2,015	1,112	1,819	37	1,782	1,082	0 - 1,083	0 - 1,083		196	
Furniture and related products	337	404	8	i 379	10	i 368	6	i 3	i 3		25	
Miscellaneous	339	21,434	458	17,962	1,044	16,918	380	62	319		3,472	
Medical equipment and supplies	3391	18,179	290	15,146	895	14,251	219	48	171		3,033	
Other miscellaneous manufacturing	3399	3,255	169	2,817	150	i 2,667	161	13	148		438	
Nonmanufacturing industries	21-23, 42-81	199,837	34,974	168,627	4,026	164,601	25,717	6,356	19,360		31,210	i
Mining, quarrying, oil and gas extraction, and support activities	21	2,184	181	i 1,934	193	i 1,740	i 179	0	179	i	250	
Utilities	22	453	97	i 446	211	235	96	i 42	54	i	7	
Wholesale trade	42	1,290	i 31	i 1,139	i 91	i 1,048	i 29	0	29	i	151	i
Electronic shopping and electronic auctions	454111-12	6 - 21,485	i 121	6 - 16,746	i 7	i 0 - 16,739	i 121	121	0		0 - 4,744	i
Transportation and warehousing	48-49	1,282	8	1,227	24	1,204	8	4	4		55	
Information	51	130,594	992	110,831	2,139	108,692	913	79	834		19,763	
Publishing	511	44,112	574	36,415	1,126	35,289	515	67	449		7,697	

R&D costs paid for by the company and others projected for 2019, by industry and company size: 2018

[illegible]

TABLE 66

R&D costs paid for by the company and others projected for 2019, by industry and company size: 2018

(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 company				Paid for by others			
		Paid for by 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			
50–99	–	15,290	2,266	14,116	1,664	12,453	2,019	703	1,316	1,174		
100–249	–	20,447	4,928	18,377	2,074	16,303	4,435	1,636	2,799	2,070		
Large companies												
250–499	–	23,478	4,052	20,363	2,528	17,835	3,402	1,002	2,401	3,114		
500–999	–	20,573	2,971	18,038	1,122	i 16,916	2,306	182	i 2,124	2,535		
1,000–4,999	–	86,469	12,425	69,180	5,324	63,857	10,705	1,498	i 9,207	17,289		
5,000–9,999	–	56,781	14,576	i 45,683	6,595	i 39,088	9,715	i 1,281	i 8,434	11,098		
10,000–24,999	–	120,509	14,899	94,443	14,188	i 80,255	i 11,300	i 2,271	i 9,029	26,066	i	
25,000 or more	–	196,719	i 29,132	154,704	6,960	147,744	i 24,360	18,931	5,429	42,015	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.

^a Business 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TABLE 67

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–18

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	541,412
Manufacturing industries	31–33	236,858	243,611	253,821	261,697	276,110	285,661	287,895	303,044	314,167	338,953
Food	311	4,916	D	5,589	5,163	6,335	6,136	6,058 i	5,824	5,424	5,518
Beverage and tobacco products	312	933	D	D	D	1,358	1,423	1,529	1,076 - 1,654	1,769	1,629
Textile, apparel, and leather products	313–16	519	522	656	605	759	734	818	1,247 i	1,131	1,205
Wood products	321	283	254	211	282	222	341 i	198	166 - 751	174	206
Paper	322	NA	1,665	769	858	1,022	880	867	943	1,594	1,014
Printing and related support activities	323	217	269	212	291 i	258 i	238	198 i	223 i	236	246
Petroleum and coal products	324	NA	D	1,281	D	327	298	252	312	377	1,460 - 1,463
Chemicals	325	64,442	72,610	72,068	70,218	74,551	79,428	80,961	84,612	90,236	100,886
Basic chemicals	3251	NA	2,671	5,166	3,400	3,336	3,633	3,677	536 - 5,694	3,101	3,046
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	2,427 - 2,445
Pesticide, fertilizer, and other agricultural chemicals	3253	NA	D	2,049	D	1,966 i	2,042 i	3,405	0 - 5,157	1,864	1,788 - 1,797
Pharmaceuticals and medicines	3254	53,456	60,537	58,866	58,920	62,480	66,731	D	73,193	79,004	88,537
Soap, cleaning compound, and toilet preparation	3256	NA	3,285	3,386	3,212	3,358	3,501	D	3,589	3,699	3,557
Paint, coating, adhesive, and other chemicals	3255, 3259	NA	D	1,485	D	1,617	1,679 i	1,664	1,806 - 1,830	1,764	1,512 - 1,531
Plastics and rubber products	326	2,982	2,515	2,640	4,446	4,576	4,519	2,906	4,583	4,626	3,179
Nonmetallic mineral products	327	1,153 i	1,596	1,428	1,588 i	1,578	1,599	1,487	1,474	1,485	1,567 i
Primary metals	331	993	802	763	818	700	770	711	662	862	990
Fabricated metal products	332	2,174	1,818	1,993	1,949 i	2,303 i	2,329	2,467 i	2,273	2,405	2,544
Machinery	333	11,156	12,403	18,312	17,462	15,420	15,089	16,827	15,958	16,626	19,319
Agricultural implement	33311	NA	D	1,570	2,142	2,243	D	2,152	2,189	2,132	2,730
Semiconductor machinery	333242	NA	2,469	2,727	1,357	3,645	3,434	3,812	4,138	4,530	5,077
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
Other machinery	other 333	NA	6,566	D	D	7,736	D	7,943	7,147	7,387	8,071 - 8,095
Computer and electronic products	334	68,772	75,345	79,145	87,406	90,114	94,199	92,860	98,319	101,910	112,020
Communications equipment	3342	NA	17,069	15,197	18,877	20,392	22,048	23,049	16,124	15,568	16,483
Semiconductor and other electronic components	3344	26,082	29,354	32,146	38,300	40,611	42,028	40,348	41,789	41,362	45,540

TABLE 67

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–18

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	20,898
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	NA	4,548	4,987	4,999	2,837	5,049	3,599	3,553	3,702	4,378 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	9,997
Other measuring and controlling device	other 3345	NA	4,588	4,615	5,329	6,456	5,458	5,387	6,187	5,916	6,524
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
Electrical equipment, appliances, and components	335	4,475	4,767	5,319	4,140	5,738	5,705	5,710	6,207	6,154	6,180
Transportation equipment	336	56,183	51,362	49,030	50,415	51,547	56,597	57,698	60,161	59,432	60,075
Motor vehicles, bodies, trailers, and parts	3361–63	NA	17,764	D	D	23,610	D	25,735	6,671 - 54,230	30,069	32,125
Aerospace products and parts	3364	36,409	31,627	26,858	D	25,684	D	29,113	3,240 - 50,799	26,189	24,977 - 25,002
Aircraft, aircraft engine, and aircraft parts	336411–13	NA	D	D	D	D	D	27,463	1,812 - 49,371	24,666	23,654 - 23,679
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
Military armored vehicle, tank, and tank component	336992	NA	D	52	D	9 i	D	16	3 - 38	9	11
Other transportation	other 336	NA	D	D	D	2,245	D	2,834	2,653 - 2,690 i	3,164	2,936 - 2,961
Furniture and related products	337	433	407	347	383	401	422	477	381	470	435
Miscellaneous	339	NA	9,528	D	D	18,900	14,951	15,869	18,045	19,257	20,478 - 20,483
Medical equipment and supplies	3391	NA	7,461	D	10,311	15,938	12,091	13,166	15,387 - 15,400	16,470	17,415
Other miscellaneous manufacturing	3399	NA	2,066	D	D	2,962	2,860	2,703 i	2,646 - 2,657 i	2,788	3,063 - 3,068
Nonmanufacturing industries	21–23, 42–81	99,713	94,840	105,669	113,220	120,242	130,682	141,279	154,547	170,574	202,460
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	2,068
Utilities	22	NA	442	396	368	317	314	483	353	336	283
Wholesale trade	42	NA	1,145	1,697 i	2,165 i	459 i	D	1,723 i	489 i	0 - 12,105	938 i
Electronic shopping and electronic auctions	454111–12	NA	D	D	D	1,845	D	D	0 - 14,624	0 - 12,105	11,715 - 15,516 i
Transportation and warehousing	48–49	NA	124	159	186	D	692	416	495	1,221	956

TABLE 67

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–18

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Information	51	43,197	45,099	52,341	56,815	68,375	78,013	77,965	84,400	94,412	111,505
Publishing	511	33,171	33,883	36,310	36,947	43,821	46,806	42,190	42,156	42,368	39,965
Newspaper, periodical, book, and directory publishers	5111	NA	826	401	221	348	92	107	84	72	150
Software publishers	5112	NA	33,058	35,910	36,726	43,473	46,714	42,083	42,073	42,296	39,815
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
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	28,045
Other information	other 51	5,410	6,278	8,313	11,506	13,654	17,022	21,526	24,530	29,323	39,662 - 39,668
Finance and insurance	52	NA	2,568	3,943	4,159	4,999	4,748	6,359	8,468	8,582	8,356
Real estate and rental and leasing	53	NA	367	D	400	202	268	313	477	892	1,073
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	365	379	D	58	D	27	77	6
Other real estate and rental and leasing	other 53	NA	NA	D	21	D	210	D	450	814	1,067
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	58,168
Architectural, engineering, and related services	5413	3,384	4,156	D	2,541	3,173	3,374	4,158	56 - 9,557	2,575	4,017 - 4,027
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	20,287
Scientific research and development services	5417	19,307	16,408	19,295	20,225	18,478	17,870	20,630	20,194	22,635	28,555 - 28,564
Research and development in biotechnology	541711	8,492	6,266	7,985	8,364	5,889	4,898	7,114	6,062	6,076	8,447
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	19,435
Research and development in the social sciences and humanities	541720	686	551	613	600	795	682	709	723	879	672 - 683
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	5,298
Health care services	621–23	NA	D	D	708	535	501	771	1,002	1,132	1,498
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	1,665	2,102 - 5,904
All companies (number of domestic employees)	–	336,571	338,451	359,490	374,916	396,352	416,343	429,174	457,591	484,740	541,412

TABLE 67

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–18

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Micro companies											
5–9 ^a	–	NA	3,792	4,143	3,025 i	3,442 i	3,409 i	3,101 i	1,728 i	NA	NA
Small companies											
10–19	–	NA	NA	NA	NA	NA	NA	5,750 i	5,031 i	3,532	4,518
20–49	–	NA	NA	NA	NA	NA	NA	10,654 i	9,972	9,513	11,821
Medium companies											
50–99	–	13,785	9,470	9,834	9,728	9,289	10,677	11,946	9,639	10,635	13,013
100–249	–	14,365	12,989	13,354	13,665	14,980	15,081	14,964	16,160	18,584	20,420
Large companies											
250–499	–	12,315	11,439	14,573	12,693	13,379	13,675	14,837	14,751	16,522	21,824
500–999	–	12,124	11,794	11,388	12,955	13,663	15,422	17,442	16,601	20,173	20,214
1,000–4,999	–	54,600	60,782	63,801	62,729	69,212	71,679	71,259	79,017	79,494	83,761
5,000–9,999	–	27,461	34,453	32,578	41,006	43,087	51,305	48,399	49,479	54,572	60,875
10,000–24,999	–	61,681	50,710	61,593	60,544	60,844	63,818	70,864	81,547	87,965	106,777
25,000 or more	–	118,424	125,067	132,719	144,097	152,547	155,180	159,959	173,666	183,750	198,190

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.

^a Business Research and Development Survey did not include companies with fewer than five domestic employees from 2009–16 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 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 U.S. Census Bureau, Business Research and Development Survey.

TABLE 68

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008-18

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	441,036
Manufacturing industries	31–33	203,755	196,441	199,147	202,363	208,577	222,718	231,705	236,170	249,999	255,602	274,075
Food	311	2,100	4,099	D	4,393	4,087	5,021	4,854 i	4,828	4,830	4,588	4,654
Beverage and tobacco products	312	780	477	D	D	D	827	920	1,006	1,076 - 1,099	1,098	1,113
Textile, apparel, and leather products	313–16	815	439	482	608	553	662	631	748	1,166 i	959	989
Wood products	321	273	280	252	211	280	220	336 i	195	166 - 204	173	203
Paper	322	NA	NA	1,341	676	752	920	723	766	854	1,327	934
Printing and related support activities	323	349	210	231	181	256 i	252 i	234	196 i	219 i	231	242
Petroleum and coal products	324	NA	NA	D	D	888	281	234	214	268	324	1,269
Chemicals	325	58,250	54,753	58,343	55,853	56,748	62,086	66,134	68,032	71,803	75,733	84,137
Basic chemicals	3251	NA	NA	1,810	D	2,705	2,620	2,849	3,042	0 - 5,157	2,544	2,443
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	1,653
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
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	74,592
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	2,710
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	1,278
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	2,751
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
Primary metals	331	695	863	681	655	741	618	677	625	592	747	839
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	2,327
Machinery	333	10,104	9,226	10,260	14,725	13,752	12,586	12,106	13,539	12,718	13,341	14,799
Agricultural implement	33311	NA	NA	1,345	1,277	1,546	1,597	1,578	1,531	1,565	1,565	1,872
Semiconductor machinery	333242	NA	NA	2,173	2,351	1,291	3,194	2,941	3,214	3,411	3,737	4,166
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
Other machinery	other 333	NA	NA	5,312	6,824	6,579	6,347	5,229	6,280	5,683	5,459 - 7,388	6,278
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	83,697
Communications equipment	3342	NA	NA	13,875	12,335	14,352	15,663	18,345	19,424	13,156	12,492	13,107

TABLE 68

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008-18

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	31,052
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	16,727
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	3,208
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	8,843
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	4,675
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
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
Transportation equipment	336	50,552	48,209	42,940	41,094	42,340	43,648	46,977	49,286	51,569	50,698	52,629
Motor vehicles, bodies, trailers, and parts	3361-63	NA	NA	D	D	D	16,733	18,518	19,113	0 - 47,558	23,542	25,586
Aerospace products and parts	3364	36,941	34,563	29,857	26,086	24,874	24,783	26,292	27,440	1,423 - 48,982	24,154	24,291
Aircraft, aircraft engine, and aircraft parts	336411-13	NA	NA	24,777	24,839	23,454	D	25,002	25,793	0 - 47,558	22,629 - 24,155	22,968
Guided missile, space vehicle, and related parts	336414-15, 336419	NA	NA	5,080	1,247	1,420	D	1,290	1,647	1,424	0 - 1,524	1,323
Military armored vehicle, tank, and tank component	336992	NA	NA	D	51	D	9	18	16	3 - 38	9	11
Other transportation	other 336	NA	NA	D	D	D	2,124	2,148	2,716	2,549 - 2,586	2,993	2,741
Furniture and related products	337	477	395	374	319	360	374	377	452	359	430	410
Miscellaneous	339	NA	NA	D	D	D	15,292	12,757	13,662	14,988	16,370	17,209
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	14,531
Other miscellaneous manufacturing	3399	NA	NA	D	D	D	2,551	2,449	2,309	2,329 - 2,340	2,439	2,678
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	166,961
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	1,905
Utilities	22	NA	NA	425	358	348	294	313	480	351	326	275

TABLE 68

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008-18

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Wholesale trade	42	NA	NA	1,092	1,556	i 2,053	i 452	i 339	i 1,698	i 467	i 0 - 9,599	i 906
Electronic shopping and electronic auctions	454111-12	NA	NA	D	949	i 1,353	i 1,356	i 1,388	D	0 - 9,499	i 0 - 9,599	i 11,652
Transportation and warehousing	48-49	NA	NA	95	132	178	D	679	403	488	1,214	942
Information	51	37,695	35,953	37,088	42,697	46,900	56,608	64,277	65,457	70,946	80,120	94,349
Publishing	511	28,427	26,838	26,957	28,411	29,067	34,365	36,621	33,348	33,459	33,868	32,770
Newspaper, periodical, book, and directory publishers	5111	NA	NA	770	372	219	i 342	i 88	i 98	i 79	i 66	131
Software publishers	5112	NA	NA	26,187	28,039	28,848	34,023	36,533	33,250	33,379	33,802	32,639
Telecommunications	517	1,684	1,523	1,912	2,169	2,729	i 3,049	3,768	3,607	3,568 - 3,611	i 3,733	3,696
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	23,306
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	34,576
Finance and insurance	52	NA	NA	2,101	3,447	3,530	4,412	4,122	5,409	7,331	7,611	7,471
Real estate and rental and leasing	53	NA	NA	330	343	363	191	262	300	475	772 - 852	1,022
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	324	342	58	i 55	68	27	0 - 79	6
Other real estate and rental and leasing	other 53	NA	NA	NA	19	21	i 133	207	232	448	773	1,016
Professional, scientific, and technical services	54	37,954	42,380	31,798	33,307	34,121	30,926	31,461	i 38,601	33,839 - 43,338	36,024	44,860
Architectural, engineering, and related services	5413	3,422	3,258	4,008	3,114	2,483	i 3,132	3,309	4,100	i 0 - 9,499	2,525	3,961
Computer systems design and related services	5415	12,146	13,351	10,359	10,938	11,006	i 9,241	i 11,053	i 14,334	15,484	13,702	15,923
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	20,185
Research and development in biotechnology	541711	NA	7,809	5,537	7,043	7,387	4,492	3,459	5,594	i 4,445	4,207	5,857
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	13,657
Research and development in the social sciences and humanities	541720	NA	676	547	612	598	792	678	705	719	876	671
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	4,791
Health care services	621-23	NA	NA	1,049	542	672	i 528	i 501	i 758	i 848	921	1,476

TABLE 68

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008-18

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	1,055 i	1,503	2,103
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	441,036
Micro companies												
5-9 ^a	-	NA	NA	3,614	4,060	2,926 i	3,390 i	3,314 i	2,983 i	1,583 i	NA	NA
Small companies												
10-19	-	NA	NA	NA	NA	NA	NA	NA	5,674 i	4,930 i	3,390	4,390
20-49	-	NA	NA	NA	NA	NA	NA	NA	10,281 i	9,635 i	9,084	11,252
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	12,321
100-249	-	14,662	12,791	11,631	12,303	12,454	13,704	13,606	13,586	14,860	17,205	18,547
Large companies												
250-499	-	10,219	11,330	10,194	13,013	11,387	12,021	12,228	13,686	12,978	14,312	19,645
500-999	-	11,886	10,131	10,053	9,993	11,499	12,013	13,129	15,005	14,441	17,736	17,657
1,000-4,999	-	46,336	44,197	49,108	51,110	50,311	55,974	57,336	57,998	63,431	64,838	68,578
5,000-9,999	-	24,764	21,769	27,546	24,452	30,708	31,657	38,327	38,858	40,530	40,340	45,337
10,000-24,999	-	48,737	51,239	41,853	49,107	50,226	51,103	54,452	59,330	66,032	73,540	84,420
25,000 or more	-	100,820	97,056	99,291	102,222	110,042	119,493	122,533	126,732	140,895	146,369	158,889

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.

^a Business 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 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 U.S. Census Bureau, Business Research and Development Survey.

TABLE 69

Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–18

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	100,376
Manufacturing industries	31–33	46,572	40,417	44,464	51,458	53,120	53,392	53,955	51,725	53,045	58,565	64,878
Food	311	596	817	1,006	1,195	1,076	1,315	1,282	1,231	994	835	864
Beverage and tobacco products	312	123	455	783	599	532	531	503	523	0 - 555	671	516
Textile, apparel, and leather products	313–16	367	80	39	49	52	98	103	70	81	172	216
Wood products	321	4	2	3	1	2	2	5	3	0 - 555	1	3
Paper	322	274	257	324	93	106	103	158	102	89	267	80
Printing and related support activities	323	9	7	38	30	35	6	3	2	4	5	4
Petroleum and coal products	324	D	156	D	D	D	46	64	38	44	53	192 - 194
Chemicals	325	13,990	9,689	14,267	16,215	13,470	12,464	13,294	12,929	12,809	14,503	16,749
Basic chemicals	3251	1,198	797	861	D	695	716	784	636	537	557	603
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	224	260	255	319	D	597	688	579	333	264	774 - 792
Pesticide, fertilizer, and other agricultural chemicals	3253	371	D	D	D	D	275	299	D	0 - 5,157	396	328 - 337
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	13,945
Soap, cleaning compound, and toilet preparation	3256	965	873	884	910	870	924	952	D	789	839	847
Paint, coating, adhesive, and other chemicals	3255, 3259	370	D	D	195	210	263	321	D	307	314	235 - 252
Plastics and rubber products	326	341	595	386	362	861	929	905	358	831	904	428
Nonmetallic mineral products	327	106	54	282	253	261	249	155	228	185	181	181
Primary metals	331	114	130	121	108	77	82	94	86	69	116	151
Fabricated metal products	332	188	117	91	135	122	109	222	194	179	171	216
Machinery	333	1,929	1,930	2,143	3,587	3,710	2,833	2,984	3,288	3,239	3,285	4,521
Agricultural implement	33311	399	391	D	293	596	646	D	621	625	566	858
Semiconductor machinery	333242	366	285	296	376	66	451	493	599	727	793	911
Engine, turbine, and power transmission equipment	3336	92	83	D	D	D	347	537	405	424	0 - 1,928	935 - 958
Other machinery	other 333	1,072	1,170	1,254	D	D	1,389	D	1,664	1,464	0 - 1,928	1,793 - 1,817
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	28,322
Communications equipment	3342	2,951	2,862	3,194	2,863	4,525	4,730	3,702	3,625	2,967	3,076	3,376
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	14,487
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	4,172

TABLE 69

Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–18

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	838	522	360	557	586	202	1,073	923	922	1,069	1,169 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	D	508	475	575	578	647	625	673	840	968	1,154
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	1,849
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
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	1,693
Transportation equipment	336	10,267	7,974	8,422	7,936	8,075	7,899	9,621	8,412	8,592	8,734	7,446
Motor vehicles, bodies, trailers, and parts	3361–63	8,448	6,023	D	D	D	6,877	D	6,622	6,672	6,527	6,540
Aerospace products and parts	3364	1,816	1,846	1,770	772	D	901	D	1,672	1,817	2,035	686 - 711
Aircraft, aircraft engine, and aircraft parts	336411–13	1,742	1,760	D	D	D	D	D	1,670	1,813	511 - 2,036	685 - 710
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
Other transportation	other 336	3	D	D	D	D	121	D	118	104	171	195 - 221
Furniture and related products	337	27	38	33	28	23	28	45	25	22	40	25
Miscellaneous	339	D	4,044	D	D	D	3,608	2,194	2,207	3,057	2,888	3,270 - 3,274
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
Other miscellaneous manufacturing	3399	D	231	D	D	D	411	412	394 i	317 i	348	386 - 390
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	35,498
Mining, quarrying, oil and gas extraction, and support activities	21	D	D	239	232	D	452	D	336	308	355 i	163
Utilities	22	6	13	17	38	21	23	1	3	1	10	8
Wholesale trade	42	509	D	53	141 i	112 i	7	D	25 i	21 i	0 - 2,590	32
Electronic shopping and electronic auctions	454111–12	NA	NA	D	D	D	490	D	D	0 - 5,132 i	0 - 2,590	63 - 3,864 i
Transportation and warehousing	48–49	2	1	29	28 i	8 i	D	13	13	7	7	14
Information	51	7,657	7,243	8,011	9,644	9,915	11,767	13,736	12,508	13,454	14,292	17,156
Publishing	511	6,301	6,332	6,926	7,899	7,880	9,456	10,185	8,842	8,698	8,500	7,195
Newspaper, periodical, book, and directory publishers	5111	27	47	55	29	2 i	6 i	4 i	9	4	6	19
Software publishers	5112	6,274	6,285	6,871	7,870	7,878	9,450	10,181	8,833	8,693	8,494	7,175
Telecommunications	517	175	86	131	98	59	63	61	41	49	96	131 - 138

Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–18

[illegible]

TABLE 69

Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–18

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
50–99	–	976	509	688	i 539	628	351	547	407	364	471	692
100–249	–	1,735	1,574	1,358	i 1,051	1,212	1,276	1,475	1,378	1,300	1,379	1,872
Large companies												
250–499	–	1,178	985	1,245	1,561	1,306	1,359	1,446	1,151	1,773	2,210	2,179
500–999	–	1,753	1,992	1,741	1,396	1,455	1,650	2,293	2,437	2,159	2,437	2,557
1,000–4,999	–	11,350	10,403	11,674	12,691	12,419	13,238	14,343	13,261	15,587	14,656	15,184
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
10,000–24,999	–	11,785	10,442	8,856	12,485	10,317	9,741	9,366	11,534	15,515	14,425	22,356
25,000 or more	–	24,671	21,368	25,777	30,497	34,056	33,054	32,647	33,226	32,771	37,381	39,301

* = 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.

^a Business 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 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 U.S. Census Bureau, Business Research and Development Survey.

TABLE 70

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	521,611
Oil and gas extraction	21100	1,215	1,223	1,268	1,379	D	1,487	1,308	1,486	1,089	986	964
Mining	21200	NA	D	75	128	92	114	56	71	63	170	114
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
Utilities	22100	NA	1,607	903	639	686	615	549	726	515	501	443
Construction	23000	NA	198	918	269	393 i	307	297	700	276	501	656
Food manufacturing	31100	2,983	4,039	4,478	4,970	4,635	7,028	6,842	5,892	6,073	5,827	5,864
Beverage manufacturing	31210	605	564	926	668	641	772	753	728	787 i	851	762
Tobacco manufacturing	31220	D	792	800	717	662	668	672	681	731	853	722
Textile, apparel, and leather products manufacturing	31990	NA	673	658	712	759	787	780	847	1,333	1,093	1,137
Wood products manufacturing	32100	264	304	239	208	D	244	336 i	251	0 - 7,094	263	297
Paper manufacturing	32200	1,130	1,144	1,231	1,156	1,362	1,588	1,614	D	1,555	1,743	1,594
Printing and related support activities	32300	297	241	244	265	356 i	391	390	321	340	286	359
Petroleum refineries	32401	NA	NA	708	591	807	558	617	526	625	567	640
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	35	39	45	123	78	75	93	137	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
Basic chemicals manufacturing	32510	3,806	2,978	3,133	3,614	4,271	4,136	4,036	3,505	3,579	3,576	3,588
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	1,745
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
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing ^c	32541	70,016	68,588	71,603	67,688	69,473	68,318	68,846	63,606	69,518	71,762	77,646
In vitro diagnostic substances manufacturing ^c	32542	1,988	1,159	1,207	1,544	1,371 i	1,066	1,159	972	1,286	1,567	1,381
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	35,688

TABLE 70

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	3,370
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	1,668
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	3,653
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
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	738	555	522	590	621	618 i	800	601	652	443	446
Primary metal manufacturing	33100	NA	840	933	783	882	792	853	719	0 - 7,094	714	808
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	2,809
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
Construction machinery manufacturing	33312	581	653	682	875	816	1,693	1,729	1,556	1,462	1,588	1,880 i
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
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
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,191	853	806	1,128	1,031	1,006	1,237	1,181	893	1,222	1,124
Photographic and photocopying equipment manufacturing	33331	NA	852	270	757	25 i	108	25	114	59	52	58
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	2,262
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	33	587 i	519	571	274
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	2,757
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	3,009
Computers and peripheral equipment manufacturing and magnetic and optical media ^d	33412	NA	13,094	12,672	13,319	14,716	15,113	13,437	16,547	23,130	27,553	27,805
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
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	2,609

TABLE 70

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	2,151
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
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	43,956
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	4,827
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	3,052
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	5,473
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
Motor vehicles manufacturing	33610	18,296	13,165	14,524	17,011	18,362	17,743	18,984	18,357	20,573	22,481	23,882
Motor vehicle body and trailer manufacturing	33620	70	96	190	73	98 i	107 i	104	160	118	47	99
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	8,841
Aircraft manufacturing	33641	4,053	7,390	4,430	4,512	4,716 i	4,373	4,221	4,859	5,639	4,671	6,458
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	1,760
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	2,037
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	1,211
Railroad rolling stock manufacturing	33651	195	83	177	165	237	224	363	310	224	251	213
Ship and boat building	33660	151	616 i	608 i	154	143 i	192	489	251	618	157	144
Motorcycle, bicycle, and parts manufacturing	33691	199	194	186	234	197	231	283	320	335	355	429
Military armored vehicle, tank, and tank components manufacturing	33692	107	228	182	118	135	90	159	202	130	367 i	491 i
All other transportation equipment manufacturing	33699	176	135	232	367	437	425	361	430	478	505	521
Furniture and related products manufacturing	33700	511	495	402	344	431	433	455	509	411	479	467
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	16,801

TABLE 70

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	3,409
Merchant wholesalers, durable goods	42300	449	923	714	711	1,277	589	516	1,551	637	448	826
Merchant wholesalers, nondurable goods	42400	257	365	348	605	699	327	209	484	219	273	322
Wholesale electronic markets and agents and brokers (business to business)	42500	14	43	19	70	173	18	D	35	24	0 - 12,866	89
Retail trade (except electronic shopping and electronic auctions)	44000	NA	50	164	74	100	120	65	D	120	119	264
Electronic shopping and electronic auctions	45411	NA	NA	753	D	1,749	1,284	D	D	8,200	0 - 12,866	0 - 13,324
Transportation	48000	NA	319	211	111	199	377	412	229	123	722	473
Couriers, messengers, and express delivery services	49200	D	14	6	D	D	90	348	D	394	425	452
Warehousing and storage	49300	26	17	19	16	17	4	3	D	0	82	79
Newspaper, periodical, book, and directory publishers (except Internet)	51110	180	748	853	408	257	339	103	117	87	99	175
Software publishers (except Internet) ^e	51120	31,369	26,362	28,457	29,992	31,209	35,047	41,052	36,040	34,699	31,400	32,921
Motion picture and sound recording (except Internet)	51200	104	135	93	67	67	38	83	12	20	42	155
Broadcasting (except Internet)	51500	NA	89	100	115	165	179	206	306	347	460	424
Wired telecommunications carriers	51710	673	D	1,499	1,685	1,631	1,012	1,166	1,269	1,180	1,027	476
Wireless telecommunications carriers (except satellite)	51720	532	186	724	815	860	1,732	2,500	1,192	1,458	1,969	2,439
Satellite telecommunications	51740	153	108	229	114	163	176	134	705	746	625	474
Other telecommunications (not listed elsewhere)	51790	501	351	338	462	399	377	330	536	362	381	741
Data processing, hosting, and related services ^e	51800	NA	2,889	3,051	5,293	4,406	4,381	5,402	6,895	7,040	6,975	7,709
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	4,344	6,730	6,801	11,913	19,581	24,408
Other information services, including Internet publishing, broadcasting, and Web search portals ^e	51910	NA	5,519	7,270	9,456	12,998	15,433	17,443	25,330	27,524	32,484	43,243
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
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

TABLE 70

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Insurance carriers and related activities	52400	NA	798	611	872	1,429	1,772	1,069	1,573	1,444	1,430	2,147
Real estate	53100	20	32	3	13	27	105	199	288	440	253	380
Rental and leasing services	53200	NA	129	146	51	59	94	80	80	106	571	699
Lessors of nonfinancial intangible assets, including patent licensing	53300	80	259	268	369	437	100	97	104	45	97	24
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	505	705	535	696	1,128	1,587	1,052	1,130	1,440
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	2,551
Specialized design services	54140	75	76	65	283	157	81	42	13	26	133	285
Computer systems design and related services ^e	54150	11,476	12,292	11,528	13,673	13,909	12,577	13,288	14,090	14,864	13,998	18,118
Management, scientific, and technical consulting services	54160	1,110	2,246	1,380	1,618	2,066	1,428	1,681	1,531	1,668	1,591	2,425
Research and development services in social sciences and humanities	54172	NA	96	8	19	64	36	47	15	0 - 7,094	348	27
Research and development services in biotechnology ^c	54173	NA	6,850	2,601	6,238	6,294	1,723	1,344	2,387	1,176	930	1,123
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	2,319
Advertising and related services	54180	37	1,950	422	97	375	390	424	452	373	412	1,164
Professional, scientific, and technical services (not listed elsewhere)	54190	439	1,036	543	1,242	1,199	1,627	810	944	622	695	870
Management of companies and enterprises	55100	11	40	23	43	18	76	43	D	20	71	0 - 13,324
Administrative and support services	56100	NA	419	640	348	609	589	459	375	588	1,558	2,673
Waste management and remediation services	56200	NA	15	684	20	D	23	D	D	8	0 - 12,866	0 - 3,913
Offices of physicians	62110	40	37	371	36	42	43	39	28	70	102	113
Medical and diagnostic laboratories	62150	903	246	409	287	364	347	410	424	0 - 7,094	855	1,739
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	47	145	15	45	52	37	39	23	70	48
Hospitals and nursing care facilities	62200	NA	62	68	2	2	2	2	4	6	18	0 - 13,324
Social assistance services	62400	NA	D	15	13	36	47	17	2	2	6	13
Arts, entertainment, and recreation	71000	NA	161	137	85	70	29	103	50	45	42	45

TABLE 70

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Accommodation and food services	72000	NA	50	119	84	149	163	D	106	76	62	126
Other services (not listed elsewhere)	81000	NA	89	465	345	484	405	550	669	0 - 7,094	0 - 12,866	458 - 4,352
Undistributed	–	10,660	14,175	5,373	D	491	359	69	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.

NAICS = 2012 North American Industry Classification System.

^a 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.

^b Business codes and descriptions are based on 2012 NAICS industry definitions.

^c 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).

^d 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.

^e 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 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 U.S. Census Bureau, Business Research and Development Survey.

TABLE 71

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	14,458,452
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
Mining	21200	NA	D	38,302	57,661	43,857	54,531	D	D	29,976	23,057	44,894
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	84,371
Utilities	22100	NA	317,243	310,768	348,763	318,893	324,150	356,225	346,925	309,116	407,052	333,570
Construction	23000	NA	42,287	93,305	107,286	107,685	94,057	91,507	64,463	52,363	69,900	88,086
Food manufacturing	31100	475,588	630,500	694,763	690,698	688,804	941,309	844,673	744,318	705,021	789,784	718,232
Beverage manufacturing	31210	143,008	129,396	141,259	180,153	167,003	164,270	166,544	170,059	155,459	146,561	138,526
Tobacco manufacturing	31220	28,970	134,972	133,993	140,998	130,759	69,191	D	D	64,978	72,291	67,551
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	84,253
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	41,022
Paper manufacturing	32200	139,953	110,534	136,302	144,064	142,335	146,748	148,797	D	129,369	146,927	155,504
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	36,023
Petroleum refineries	32401	NA	NA	837,945	954,108	911,784	968,046	787,825	512,224	415,433	325,034 - 733,821	586,677
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	17,795
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
Basic chemicals manufacturing	32510	273,809	179,494	243,193	299,476	473,666	278,661	270,287	212,951	264,935	231,673	262,008

TABLE 71

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	128,125
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	83,309
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing ^c	32541	582,910	438,687	471,763	577,607	594,394	577,930	569,968	564,398	608,453	636,157	681,423
In vitro diagnostic substances manufacturing ^c	32542	22,317	16,940	20,637	25,005	27,022	13,871	25,365	14,159	7,892 - 171,885	15,915	17,051
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	102,259
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	192,097
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	131,775
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	228,046
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	48,541

TABLE 71

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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
Primary metal manufacturing	33100	NA	124,478	197,315	179,318	176,544	161,443	128,532	103,093	121,321	100,279	158,601
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	204,748
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	67,226
Construction machinery manufacturing	33312	32,109	23,195	30,685	42,974	43,355	63,344	65,348	56,090	49,267	60,563	74,103
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	86,490
Semiconductor machinery manufacturing	33321	20,019	10,505	21,588	25,960	9,973	24,420	27,333	24,653	30,749	38,320	47,009
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	44,608
Photographic and photocopying equipment manufacturing	33331	NA	7,471	D	D	307 i	7,502	9,162	8,602	6,775 - 170,768	6,849	9,492
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	115,891
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D	5,579 i	5,947 i	2,086

TABLE 71

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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 i	95,174
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	124,837
Computers and peripheral equipment manufacturing and magnetic and optical media ^d	33412	NA	273,429	330,020	342,416	304,309	307,523	297,193	282,890	414,641	452,483	479,862
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 i	76,218	74,054	80,805
Radio, television, and wireless communication equipment manufacturing	33422	76,167	64,808	79,675	92,884	136,470	148,680	168,774 i	D	39,937 - 203,930	37,092	34,720
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	16,542
Audio and video equipment manufacturing	33430	13,212	15,041	22,242	11,476	17,926	19,596	18,333	38,954 i	35,473	3,724 - 417,696	11,671
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	399,809

TABLE 71

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	54,121 i
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 i	71,425
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	80,672
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	189,130
Motor vehicles manufacturing	33610	521,541	399,125	476,726	539,595	541,730	615,136	539,139	646,110	693,548	616,741	706,303
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	26,379
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	285,825
Aircraft manufacturing	33641	97,635	75,960	89,235	121,480	97,484 i	154,241	139,924	148,986	136,497	128,861	190,552
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	60,580
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	67,859
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	51,007

TABLE 71

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Railroad rolling stock manufacturing	33651	7,248	3,639	9,075 i	8,870	14,255	12,639	19,679	19,353	14,852	13,416	14,083
Ship and boat building	33660	16,461	37,439 i	D	D	23,966 i	16,927 i	39,049	15,426	33,496 - 134,100	22,538	16,294
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	11,412
Military armored vehicle, tank, and tank components manufacturing	33692	13,341	10,136	D	6,239	4,893	4,354 i	7,502	D	77 - 229,474	11,306 i	18,531 i
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	21,079
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	49,009
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	271,160
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	170,861
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	248,170
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	634,620
Wholesale electronic markets and agents and brokers (business to business)	42500	2,600	8,684	3,347	4,722 i	115,452 i	53,497	86,215	41,905	60,197	50,155	5,490

TABLE 71

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	538,965
Electronic shopping and electronic auctions	45411	NA	NA	D	D	88,213	96,577	D	130,399	110,617 - 274,610	198,755	191,588 - 272,515
Transportation	48000	NA	D	182,535	109,842	139,615	95,821	117,267	D	0 - 373,524	278,263	264,546
Couriers, messengers, and express delivery services	49200	D	D	47,619	D	D	D	170,934	D	187,345	136,436	91,333
Warehousing and storage	49300	31,235	1,536	24,457	22,885	3,983	13,530	2,585	D	4,652	15,714	11,361
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	9,489
Software publishers (except Internet) ^e	51120	210,186	195,833	214,359	230,898	237,602	266,587	278,159	272,944	256,293	231,880	245,769
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	37,342
Broadcasting (except Internet)	51500	NA	39,734	53,313	44,029	67,429	81,499	D	74,473	84,879	88,160	151,282
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
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
Satellite telecommunications	51740	19,330	12,662	16,021	2,783	3,056	D	3,581	44,400	61,927	57,588	53,289
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	16,300

TABLE 71

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Data processing, hosting, and related services ^e	51800	NA	36,196	38,523	60,641	95,872 i	58,502	81,059	79,017	76,345	77,859	141,375
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	27,442	D	33,792	57,770	98,224	166,306
Other information services, including Internet publishing, broadcasting, and Web search portals ^e	51910	NA	41,660	77,319	39,551	45,729	65,134	102,254	94,541	113,123	160,826	190,606
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	536,596
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	119,259
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	467,238
Real estate	53100	D	7,738	D	D	D	D	D	8,537	9,292	10,114	11,565
Rental and leasing services	53200	NA	32,231	36,299	23,830	29,033	35,488	21,986	29,238	14,235	21,642	13,487
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	1,900 - 82,827
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	24,693
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	101,367

TABLE 71

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Specialized design services	54140	D	6,504	3,976	2,581	3,646 i	3,614	2,165	D	706	4,584 i	26,260
Computer systems design and related services ^e	54150	210,916	216,477	224,026	377,919 i	272,065	249,600	272,937	243,790	249,430	223,281	250,286
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	68,839
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
Research and development services in biotechnology ^c	54173	NA	22,354 i	8,493	8,657	11,316	12,390	17,543	10,962	9,026	9,340	13,423
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	41,792
Advertising and related services	54180	D	48,883	12,992 i	D	52,764	D	D	D	44,669 - 208,661	107,640	140,299
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	21,508
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
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	67,113
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	88,601
Offices of physicians	62110	7,492	25,752	24,133	23,844	35,513	36,233	19,041	36,724	40,586	61,118	50,988

TABLE 71

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	39,529 i
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	10,100
Hospitals and nursing care facilities	62200	NA	D	D	D	D	D	26,866	27,616	32,896	32,276	35,131
Social assistance services	62400	D	286	448	326	249	1,065	1,338	63	77	112	1,826
Arts, entertainment, and recreation	71000	NA	17,339	16,089	16,023	18,344	D	D	18,677	17,509 - 181,502	24,540	34,740
Accommodation and food services	72000	NA	D	69,474	39,421	88,878 i	107,255	46,228	76,898	66,849	26,196	54,778
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	95,526
Less: intersegment eliminations	–	381,031	237,743	234,289	281,460	309,288	301,615	316,930	240,217	226,993	196,040	262,685
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

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.

^a 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.^b Business codes and descriptions are based on 2012 NAICS industry definitions.^c 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).^d 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.^e 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 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 U.S. Census Bureau, Business Research and Development Survey.

TABLE 72

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	10,698,764
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
Mining	21200	NA	D	33,072	38,109	24,837	38,270	22,962	37,589	i 19,449	17,583	25,850
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	54,537
Utilities	22100	NA	D	301,613	337,871	309,573	316,082	347,997	336,457	304,643	400,104	328,791
Construction	23000	NA	27,180	81,641	88,626	64,402	60,516	66,835	49,892	45,660	64,968	80,353
Food manufacturing	31100	394,404	503,047	501,332	494,683	503,915	693,438	608,765	541,557	520,546	617,230	527,388
Beverage manufacturing	31210	83,691	78,740	84,764	95,236	83,774	106,580	109,397	D	111,431	96,676	92,213
Tobacco manufacturing	31220	28,680	32,431	31,357	29,645	27,706	35,864	36,177	31,715	34,196	35,945	35,613
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	58,770
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	34,873
Paper manufacturing	32200	100,057	80,030	99,820	103,867	101,033	106,399	106,178	108,659	95,481	110,534	118,476
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	31,028
Petroleum refineries	32401	NA	NA	540,612	581,297	578,075	639,569	521,504	336,271	245,323	325,035	332,549
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
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
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	181,047
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	76,867
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

TABLE 72

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing ^c	32541	445,985	309,750	324,266	414,284	428,486	415,199	414,154	410,983	463,633	486,877	521,549
In vitro diagnostic substances manufacturing ^c	32542	15,353	9,805	12,835	13,735	14,646	8,141	14,006	6,219	7,893	9,215	8,120
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	89,145
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	107,730
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	86,085
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	172,355
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	29,703
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	36,062
Primary metal manufacturing	33100	NA	97,493	161,558	148,670	153,926	137,000	104,419	90,956	105,884	82,674	124,786
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	151,435
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	37,210
Construction machinery manufacturing	33312	18,228	13,180	19,480	25,854	31,853	42,912	41,256	35,668	34,984	39,464	44,659

TABLE 72

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	46,295
Semiconductor machinery manufacturing	33321	9,091	4,765	11,918	15,018	6,839	10,807	11,067	8,215	15,676	20,114	21,686
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	31,875
Photographic and photocopying equipment manufacturing	33331	NA	5,392	3,927 i	4,791 i	D	6,885	7,246	7,124	6,776	5,993	7,883
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	77,434
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D	0 - 5,580 i	1,423	1,658
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	49,461
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	86,415
Computers and peripheral equipment manufacturing and magnetic and optical media ^d	33412	NA	136,666	167,290	174,898	143,492	180,146	165,617	153,211	211,415	196,854	214,870
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 i	44,009	41,110	44,162

TABLE 72

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Radio, television, and wireless communication equipment manufacturing	33422	46,641	46,769	61,641	55,217	82,027	94,606 i	96,564 i	D	39,938 i	31,253	28,199
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	0 - 229,395	11,789	14,860
Audio and video equipment manufacturing	33430	10,969	10,929	19,142	7,296	14,633	14,832	13,162	D	25,739 i	0 - 413,972	6,362
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	210,206
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	31,296
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 i	62,360
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	52,493
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	115,089
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	584,674
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	25,775
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	202,295
Aircraft manufacturing	33641	97,973	69,001 i	81,666	111,748	91,545 i	145,641	132,472	139,909	130,676	121,866	181,676

TABLE 72

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	35,596
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	56,031
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	46,742
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
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
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	7,159
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	15,853 i
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	17,787
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	44,571
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	184,756
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	104,915
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	225,622
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	455,596
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	5,054
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	482,991

TABLE 72

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Electronic shopping and electronic auctions	45411	NA	NA	32,624	40,254	53,712	59,174	43,787	D	110,618	0 - 198,757	191,589
Transportation	48000	NA	D	95,591	83,912	107,212	87,113	111,576	D	0 - 229,395	223,375	210,354
Couriers, messengers, and express delivery services	49200	D	D	36,420	D	D	D	123,456	D	141,429	103,001	69,200
Warehousing and storage	49300	28,723	1,296	23,982	21,910	3,157	12,235	1,971	2,305	3,358	9,877	6,057
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	7,263	4,383	7,423
Software publishers (except Internet) ^e	51120	121,028	118,001	129,649	132,970	136,905	154,237	163,059	159,688	155,068	133,983	149,358
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	32,886
Broadcasting (except Internet)	51500	NA	34,110	45,779	39,563	59,926	73,283	59,724	64,390	70,169	71,335	126,166
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
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
Satellite telecommunications	51740	14,005	6,743	i 15,845	2,430	2,822	3,143	3,518	43,812	61,622	57,292	53,217
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	12,512
Data processing, hosting, and related services ^e	51800	NA	29,903	31,417	51,197	82,997	i 49,201	67,167	64,916	59,491	57,183	114,517
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	19,455	26,461	26,654	44,759	77,556	130,568

TABLE 72

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Other information services, including Internet publishing, broadcasting, and Web search portals ^e	51910	NA	27,907	47,397	28,424	28,760	36,613	57,405	53,823	75,332	100,436	113,585
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	480,076
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	98,369
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	443,129
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
Rental and leasing services	53200	NA	D	27,719	18,597	21,801	26,614	15,330	23,848	0 - 14,237	13,623	9,879
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	1,901
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	21,735
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	83,802
Specialized design services	54140	3,325	D	3,522	2,353	3,301	i 2,714	1,487	769	638	2,356	i 7,649
Computer systems design and related services ^e	54150	124,832	140,234	143,787	224,144	167,759	158,858	168,793	165,417	176,418	152,680	154,122
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	49,138
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

TABLE 72

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Research and development services in biotechnology ^c	54173	NA	18,691 i	7,194	7,388	9,769	10,689	15,872	9,381	6,548	6,476	9,647
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	31,645
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	72,990
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
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
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	38,604
Waste management and remediation services	56200	NA	D	13,971	7,223	6,080	5,650	4,152	23,159	25,561	21,206	84,236
Offices of physicians	62110	7,492	25,751	24,133	23,844	35,513	36,233	19,041	36,724	40,586	61,117	50,988
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	35,208
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	9,923
Hospitals and nursing care facilities	62200	NA	D	7,831	16,084	870 i	1,227	26,866	27,485	32,609	32,276	35,130
Social assistance services	62400	D	D	448	326	249	1,036	1,336	63	77	112	1,826
Arts, entertainment, and recreation	71000	NA	14,265	12,920	12,727	15,248	13,180	12,903	16,137	17,510	18,945	26,599
Accommodation and food services	72000	NA	D	37,218	27,476	54,266 i	57,908	31,664	44,505	32,404	21,272	33,862
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	69,952
Less: intersegment eliminations	–	219,384	110,499	132,754	117,417	136,579	136,540	160,374	126,960	129,858	131,717	160,370
Undistributed	–	756,553	1,137,705	412,892	450,613 i	108,244 i	D	1,945	D	0	0	8 i

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.

^a 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.

^b Business codes and descriptions are based on 2012 NAICS industry definitions.

^c 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).

^d 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.

^e 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 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 U.S. Census Bureau, Business Research and Development Survey.

TABLE 73

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	3,759,688
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
Mining	21200	NA	D	5,230	19,552	19,020	16,261	D	D	10,528	5,473	19,044
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	29,834
Utilities	22100	NA	D	9,155	10,892	9,320	8,068	8,229	10,468	4,473	6,948	4,779
Construction	23000	NA	15,107	11,664	18,660	43,283	33,541	24,672	14,571	6,703	4,932	7,733
Food manufacturing	31100	81,184	127,453	193,432	196,015	184,889	247,871	235,909	202,761	184,474	172,554	190,844
Beverage manufacturing	31210	59,317	50,655	56,495	84,916	83,229	57,690	57,147	D	44,029	49,885	46,313
Tobacco manufacturing	31220	290	102,541	102,636	111,353	103,052	33,327	D	D	30,782	36,346	31,938
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	25,483
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	6,148
Paper manufacturing	32200	39,895	30,504	36,481	40,196	41,303	40,349	42,619	D	33,888	36,393	37,028
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
Petroleum refineries	32401	NA	NA	297,333	372,811	333,710	328,477	266,321	175,953	170,110	0 - 408,784	254,128
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	17	91	74 i	1,244	2,278	630	3,234	3,312	6,369
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
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
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	51,258
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	30,224

TABLE 73

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing ^c	32541	136,925	128,937	147,497	163,323	165,908	162,730	155,814	153,415	144,820	149,280	159,874
In vitro diagnostic substances manufacturing ^c	32542	6,964	7,135	7,802	11,270	12,376	5,730	11,359	7,940	0 - 163,991	6,700	8,931 i
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	13,114
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	84,367
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	45,690
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	55,691
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
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	5,505
Primary metal manufacturing	33100	NA	26,985	35,756	30,648	22,619	24,443	24,114	12,138	15,437	17,605	33,815
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	53,313
Agricultural machinery and equipment manufacturing	33311	20,642	21,025	24,042 i	14,152	23,984	23,076	26,760	21,505	21,684	21,146	30,016
Construction machinery manufacturing	33312	13,881	10,015	11,205	17,120	11,502	20,431	24,092	20,423	14,283	21,099	29,444
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	40,195

TABLE 73

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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
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	12,733
Photographic and photocopying equipment manufacturing	33331	NA	2,080	D	D	D	618	1,915	1,477	0 - 163,991	857	1,609
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	38,457
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	0	D	0 - 5,580	4,524	427
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	45,713
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	38,422
Computers and peripheral equipment manufacturing and magnetic and optical media ^d	33412	NA	136,763	162,729	167,518	160,818	127,377	131,576	129,679	203,226	255,629	264,991
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
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	6,520
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	1,683
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

TABLE 73

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	189,603
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	22,825 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	9,066
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	28,179
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	74,041
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	121,629
Motor vehicle body and trailer manufacturing	33620	D	504	937	903	2,302	187	573	145	384	763	604
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	83,530
Aircraft manufacturing	33641	S	6,959	7,569	9,732 i	5,939	8,600 i	7,452	9,077	5,821	6,995	8,876
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	24,984
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	11,828
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
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
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
Motorcycle, bicycle, and parts manufacturing	33691	345	395	565	1,526	762	926	1,365	1,381	3,231 i	3,684	4,254

TABLE 73

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Military armored vehicle, tank, and tank components manufacturing	33692	249	462	D	484	224	164	2,608	D	78	1,644 i	2,678
All other transportation equipment manufacturing	33699	2,382	895	1,929	2,349	2,212	13,125	D	3,093	2,495	3,104	3,292
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
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	86,404
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 i	38,962	65,945 i
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	22,549
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	179,024
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
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	55,973
Electronic shopping and electronic auctions	45411	NA	NA	D	D	34,500	37,403	D	D	0 - 163,991	0 - 198,757	0 - 80,926 i
Transportation	48000	NA	D	86,945	25,930	32,403	8,708	5,691	D	0 - 163,991	54,889	54,192
Couriers, messengers, and express delivery services	49200	D	D	11,199	D	0	30,192	47,478	D	45,916	33,435	22,133
Warehousing and storage	49300	2,512	240	474	975	826	1,295	614	D	1,294	5,837	5,305
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	2,066
Software publishers (except Internet) ^e	51120	89,158	77,832	84,710	97,929	100,697	112,350	115,101	113,255	101,226	97,898	96,411

TABLE 73

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	4,456
Broadcasting (except Internet)	51500	NA	5,624	7,533	4,466	7,504 i	8,215	D	10,083	14,710	16,825	25,116
Wired telecommunications carriers	51710	D	D	1,214	6,862	7,093	865	2,852	2,667	2,665	2,349	2,328
Wireless telecommunications carriers (except satellite)	51720	1,085	745	6	171	154 i	D	45	D	59	84	3 i
Satellite telecommunications	51740	5,325	5,919 i	176	353 i	234	D	63	587	305	296	72
Other telecommunications (not listed elsewhere)	51790	1,230	1,015	515	2,875	3,193 i	2,179	534	893	840	1,898	3,788
Data processing, hosting, and related services ^e	51800	NA	6,292	7,107	9,443	12,874	9,301	13,891	14,101	16,853	20,676	26,858
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	7,987 i	D	7,138	13,012	20,668	35,738
Other information services, including Internet publishing, broadcasting, and Web search portals ^e	51910	NA	13,753	29,921	11,126	16,969	28,521	44,849 i	40,718	37,792	60,390	77,022
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	56,520
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
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	24,109 i
Real estate	53100	D	D	D	D	D	D	D	88	57	0 - 10,116	583
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
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	352	225	359	764	640	517	168	82	729	0 - 80,926 i

TABLE 73

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	2,959
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	17,565
Specialized design services	54140	D	D	454	228	345	900	678	D	68	2,229 i	18,610
Computer systems design and related services ^e	54150	86,084	76,243	80,239	153,776 i	104,306	90,742	104,143	78,373	73,013	70,600	96,164
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	19,701
Research and development services in social sciences and humanities	54172	NA	2	2	7	D	4	22	D	7	5	7
Research and development services in biotechnology ^c	54173	NA	3,663 i	1,299	1,269	1,547	1,701	1,671	1,581	2,478 i	2,864	3,776
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	10,147 i
Advertising and related services	54180	D	D	1,656	D	25,263	D	D	D	0 - 163,991	54,756	67,309
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	4,835
Management of companies and enterprises	55100	76	23	266	5,428	1,304	887	716	D	622	1,592	1,726
Administrative and support services	56100	NA	6,821	19,476	10,588	11,810	17,023	29,314	26,456	28,098	22,603	28,509
Waste management and remediation services	56200	NA	D	201	959	484	595	614	1,827	1,910	1,402	4,365
Offices of physicians	62110	0	* i	0	0	0	0	0	0	0	1	0
Medical and diagnostic laboratories	62150	1,037	857	1,662	1,269	1,383	887	895	1,488 i	1,925 i	1,275	4,322 i

TABLE 73

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	D	154	D	27	0	0	0	0	455	177
Hospitals and nursing care facilities	62200	NA	0	D	D	D	D	0	131	287	0	1 i
Social assistance services	62400	D	D	0	0	0	29	2	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	8,141
Accommodation and food services	72000	NA	9,891	32,256	11,945	34,612	49,347	14,564	32,394	34,445	4,924	20,916
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	25,574
Less: intersegment eliminations	–	161,647	127,244	101,536	164,044	172,709	165,075	156,556	113,257	97,136	64,324	102,316
Undistributed	–	335,723	452,404	103,862	147,756 i	58,997 i	D	2,657	D	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; S = negative value due to intersegment elimination; NA = not available.

NAICS = 2012 North American Industry Classification System.

^a 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.

^b Business codes and descriptions are based on 2012 NAICS industry definitions.

^c 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).

^d 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.

^e 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 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 U.S. Census Bureau, Business Research and Development Survey.

TABLE 74

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2011	2012	2013	2014	2015	2016	2017	2018
All business activities	21100–81000	290,240	302,759	323,107	340,539	355,671	378,590	396,979	441,036
Oil and gas extraction	21100	D	D	D	1,108	D	867	0 - 11,355 i	770
Mining	21200	83	88	80	54	68	58	121	92
Support activities for mining, including oil and gas	21300	D	1,860	1,871	2,349	2,076	1,544	1,599 i	836 i
Utilities	22100	298	434	343	343	485	349	323 i	272
Construction	23000	752	756	244 i	204 i	521	258 i	507	659
Food manufacturing	31100	3,769	3,565	5,156	4,934 i	4,388 i	4,966	4,809	4,737
Beverage manufacturing	31210	D	D	628	D	664	0 - 28,354 i	734	702
Tobacco manufacturing	31220	D	140	163	D	153	153	175	196
Textile, apparel, and leather products manufacturing	31990	623	688	687	662 i	794	1,244 i	904	918
Wood products manufacturing	32100	202	278	234	322 i	227	238	236	261
Paper manufacturing	32200	755	982	1,166	1,028	D	1,165	1,411	1,303
Printing and related support activities	32300	244	305 i	389	363	287	304	265	321
Petroleum refineries	32401	D	596	438	D	443	441	396	491
Asphalt paving, roofing, and saturated materials manufacturing	32402	38	41	117 i	66	52 i	75	124	107
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	285	218	312 i	279 i	268	202	223	133
Basic chemicals manufacturing	32510	3,099	3,228	2,925	3,144	3,071	2,946	2,897	2,945
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	815	1,093	999	1,054	1,213	930	825	1,264
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	D	1,951	2,114 i	2,057 i	D	1,900 i	1,977	2,384 i
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing ^c	32541	42,381	43,672	42,456	43,748	40,540	43,964	45,846	48,462
In vitro diagnostic substances manufacturing ^c	32542	1,110	1,044 i	831	729	801	987	1,308	1,151
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	7,118	10,337	14,071	16,440	18,629	23,411
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,344	2,261	2,286	2,365	2,451	2,550	2,492	2,524
Paint, adhesive, and other chemical manufacturing	32592	1,552	1,630	1,489	1,562 i	D	0 - 28,354	1,636	1,363
Plastics and rubber products manufacturing	32600	2,669	3,277	3,010	3,072 i	2,910	3,396	3,264	3,136
Clay and glass products manufacturing	32710	801 i	987 i	973 i	1,003 i	948	987	1,199	1,333

TABLE 74

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2011	2012	2013	2014	2015	2016	2017	2018
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	303	367	458 i	564 i	393 i	374	378	331
Primary metal manufacturing	33100	552	750	644	703	596 i	0 - 28,354	608	707
Fabricated metal products manufacturing	33200	D	2,236	2,535 i	2,280	2,541	2,321	2,650	2,468 - 3,872
Agricultural machinery and equipment manufacturing	33311	989	1,175	1,193	1,230	1,172	1,194	1,224	1,529
Construction machinery manufacturing	33312	655	675	1,340	1,309	1,210	1,209	1,203	1,316 i
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
Semiconductor machinery manufacturing	33321	2,207	1,308 i	3,146	2,979	3,218	3,374	3,707	4,131
Industrial machinery manufacturing (except semiconductor machinery)	33322	945	850	878	1,158	1,143	900	1,049	976
Photographic and photocopying equipment manufacturing	33331	656	23 i	458	79	133	92	61	50 i
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	1,665
Digital cameras manufacturing	33333	NA	NA	NA	25	491 i	421 i	475	230
Engine, turbine, and power transmission equipment manufacturing	33360	3,257	3,603	2,373	1,847	2,304	2,365	2,543	2,275
Metalworking and other general purpose machinery manufacturing	33390	1,832	1,607	1,780	2,089	2,292	2,139	2,039	2,481
Computers and peripheral equipment manufacturing and magnetic and optical media ^d	33412	10,311	10,893	11,162	9,651	10,997	18,321	20,751	21,768
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
Radio, television, and wireless communication equipment manufacturing	33422	4,182	5,851	7,664	6,325 i	3,387 i	4,108 i	3,942 i	3,218 i
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	871	1,937	1,729	1,687	1,695 i	1,798	1,536	1,749
Audio and video equipment manufacturing	33430	798	865	876	1,018	1,071 i	972	1,058	1,084
Semiconductor and other electronic components manufacturing	33440	24,580	28,983	30,792	31,986	30,805	31,428	30,858	30,982
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	2,787	2,868 i	3,178 i	3,670	3,409	3,417 i	3,094	4,087

TABLE 74

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2011	2012	2013	2014	2015	2016	2017	2018
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	7,714
Measuring and control instruments manufacturing (not listed elsewhere)	33459	3,191	3,465	3,901	4,045	4,201	4,222	3,885	3,892
Electrical equipment, appliances, and components manufacturing	33500	3,007	3,391	4,208	4,461	4,378	4,805	4,512	4,362
Motor vehicles manufacturing	33610	9,320	11,314	11,696	12,134	12,502	15,095	16,308	17,587
Motor vehicle body and trailer manufacturing	33620	69	91 i	98 i	96	156 i	113	44	94
Motor vehicle parts manufacturing	33630	3,010	D	4,554	6,022	6,158	6,401	6,946	7,777
Aircraft manufacturing	33641	5,853	15,380 i	16,607 i	15,632 i	14,757 i	0 - 28,354 i	9,704 i	14,483 i
Aircraft engine and engine parts manufacturing	33642	1,636	1,296	1,758	2,294 i	1,580	1,738	1,850	2,227
Other aircraft parts and auxiliary equipment manufacturing	33643	1,896	2,655	3,446	4,443	4,919	3,817	4,453	1,881
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
Railroad rolling stock manufacturing	33651	136	177	183	295	240	187	0 - 11,355	148
Ship and boat building	33660	D	D	1,106	1,568 i	D	0 - 28,354 i	1,289	135 - 1,539
Motorcycle, bicycle, and parts manufacturing	33691	212 i	176 i	214 i	251	282	286	0 - 11,355	372
Military armored vehicle, tank, and tank components manufacturing	33692	D	122	215	358	335	392	653 i	664 i
All other transportation equipment manufacturing	33699	415	D	362	428	D	368	564	465
Furniture and related products manufacturing	33700	300	382	383	389	458	364	438	429
Medical equipment and supplies manufacturing	33910	10,141	10,703	11,797	10,987	11,336	12,024	13,299	13,182
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	2,854
Merchant wholesalers, durable goods	42300	505	1,461 i	449 i	414 i	1,507 i	551 i	364	785 i
Merchant wholesalers, nondurable goods	42400	429	651 i	272 i	D	546 i	153 i	207	272 i
Wholesale electronic markets and agents and brokers (business to business)	42500	54	182 i	D	139	D	23	41 i	94 i
Retail trade (except electronic shopping and electronic auctions)	44000	52	101 i	96 i	58 i	87	149	69	191
Electronic shopping and electronic auctions	45411	940 i	1,239	993	1,051	1,543 i	0 - 28,354 i	0 - 11,355	93 - 9,629 i
Transportation	48000	123	D	D	388	205 i	100	691	438

TABLE 74

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2011	2012	2013	2014	2015	2016	2017	2018
Couriers, messengers, and express delivery services	49200	D	D	D	344	D	394	421	447
Warehousing and storage	49300	15	15	15	3	3	0	90	76
Newspaper, periodical, book, and directory publishers (except Internet)	51110	345 i	229 i	316 i	89 i	99 i	80 i	83	151
Software publishers (except Internet) ^e	51120	22,635	23,803	26,661	31,392	29,887 i	26,685	24,362	25,785
Motion picture and sound recording (except Internet)	51200	61	73 i	86	71 i	10	16	27 i	148
Broadcasting (except Internet)	51500	94	36	53	70 i	101 i	0 - 28,354 i	0 - 11,355	186
Wired telecommunications carriers	51710	867	1,482 i	951 i	945 i	1,229 i	1,067 i	924	469
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
Satellite telecommunications	51740	D	195	106	107	681 i	699 i	593	449
Other telecommunications (not listed elsewhere)	51790	495	383	322	255	459	448	413	687
Data processing, hosting, and related services ^e	51800	4,922	3,997	4,009	4,754	5,839	6,295	6,217	6,817
Cloud computing applications and Internet-based software services	51801	NA	NA	3,727 i	5,718	5,783	9,981	16,812	20,427
Other information services, including Internet publishing, broadcasting, and Web search portals ^e	51910	D	11,397	13,485	15,306	21,534	23,962	28,445	37,393
Finance: banking and credit intermediation	52200	1,365	1,601	1,834	2,451	2,708	4,474	4,819	4,309
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
Insurance carriers and related activities	52400	D	1,141	1,573	887	1,364	1,216	1,127	1,720
Real estate	53100	13	26 i	100	193	280	438	251	377
Rental and leasing services	53200	27	D	69	59	D	97 i	536 i	640
Lessors of nonfinancial intangible assets, including patent licensing	53300	319	369	74	78	79	40	58	23
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	578 i	417 i	514 i	826 i	1,283	892	875	1,159
Architectural, engineering, and related services	54130	2,028	4,206 i	3,398	3,392	4,143 i	3,259	2,664	4,256
Specialized design services	54140	271	207 i	101	97	83	77	198 i	276
Computer systems design and related services ^e	54150	11,129	12,390 i	11,472 i	13,216 i	13,647	14,159	12,607	15,681
Management, scientific, and technical consulting services	54160	1,745	2,280	2,030	1,958	1,761	2,137 i	1,903	2,778
Research and development services in social sciences and humanities	54172	D	601	792	745	756	0 - 28,354	1,124	674

TABLE 74

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–18

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2011	2012	2013	2014	2015	2016	2017	2018
Research and development services in biotechnology ^c	54173	6,030	7,146	4,145	3,083 i	5,178 i	3,911 i	3,610	5,391
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	14,852
Advertising and related services	54180	80	377 i	450 i	435	424	344	381	1,035 i
Professional, scientific, and technical services (not listed elsewhere)	54190	1,316	2,463 i	1,786	1,020	1,228	874	1,113	1,162
Management of companies and enterprises	55100	20	40	68	25 i	D	28	70	3 - 9,539
Administrative and support services	56100	338	436	556 i	401 i	202 i	418	1,405	2,305
Waste management and remediation services	56200	19 i	D	39 i	31	24 i	25	20	20
Offices of physicians	62110	24	73 i	74 i	88 i	79 i	106 i	190	156
Medical and diagnostic laboratories	62150	764	1,027	959	965	1,204	0 - 28,354 i	1,210	2,050
Other ambulatory health care services (ambulance, dental, home health care)	62199	11	41 i	51 i	35 i	42 i	24 i	65	46
Hospitals and nursing care facilities	62200	2	2 i	2	7 i	7	9	0 - 11,355	0 - 10,879
Social assistance services	62400	7	36	38	16	2	2	0 - 11,355	0 - 14
Arts, entertainment, and recreation	71000	105	108	31	91 i	D	44	48	44
Accommodation and food services	72000	74	131 i	123 i	57	87	61	49	120
Other services (not listed elsewhere)	81000	366	553	366	576	682	0 - 28,354	0 - 11,355	458 - 1,862
Undistributed	–	28,583 i	1,689 i	336 i	63	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.

NAICS = 2012 North American Industry Classification System.

^a 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.

^b Business codes and descriptions are based on 2012 NAICS industry definitions.

^c 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).

^d 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.

^e 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 2011–13, 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 U.S. Census Bureau, Business Research and Development Survey.

Technical Notes

Survey Overview

Purpose. The Business Research and Development Survey (BRDS), successor to the 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 BRDS 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 U.S. 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 was 0607-0912 and expired on 29 February 2020.

Survey sponsors. BRDS is co-sponsored by the National Center for Science and Engineering Statistics (NCSES) and the U.S. Census Bureau.

Survey collection and tabulation agent. The survey is conducted annually by the U.S. Census Bureau in accordance with an interagency agreement with NCSES within NSF.

Key Survey Information

Frequency. Annual.

Initial survey year. 2017. BRDIS collected data for 2008–16 and SIRD collected data for 1953–2007.

Reference period. Calendar year 2018.

Response unit. Company.

Sample or census. Sample.

Population size. 1,115,834 companies.^[1]

Sample size. 45,690 companies.^[2] The actual number of companies that remained within the scope of the survey between sample selection and tabulation was 42,426.

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. BRDS 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, intellectual property, and technology transfer.

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 BRDS 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 U.S. Census Bureau compilation that contains information on more than 6.8 million establishments with paid employees, serves as the primary input to the sampling frame from which the BRDS 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

Typically, creation of the BRDS frame would begin once the most recent BR files were finalized. The 2018 BRDS would have utilized the final 2017 BR files. However, due to a later closeout of the BR processing for this cycle, the final 2017 BR files were available several months later than usual. Advance notice of this later closeout was given, allowing BRDS staff to research various options to deal with this issue. Four options were considered:

1. Use the 2017 BRDS frame for 2018 BRDS.
2. Use incomplete 2017 BR files as input for frame creation.
3. Delay the 2018 BRDS mailout and use the final BR files for frame creation.
4. Do a split mailing for 2018 BRDS. Mail the known positive sample cases (discussed in the section "**Stratification of the Sampling Frame**") on schedule and delay the rest of the mailout until a frame and sample could be drawn using the final 2017 BR.

Option 2 was chosen, using incomplete 2017 BR files as inputs for frame creation. This would not require changes to the 2018 BRDS mailout or processing schedule. However, an incomplete BR meant that active companies may not yet be classified as out-of-business, new companies (births) may not be present, establishments within the same company may not be associated yet (missing linkages), and there could be missing employment and payroll data for some multiunit companies. A comparison between BRDS frames created from incomplete 2016 BR files and from the final 2016 BR showed a change in company counts of less than 1%. For the issue of multiunit companies with missing employment or payroll data, the company's prior year employment or payroll was used as a proxy.

The scope of the 2018 BRDS 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 2017; (4) have at least one establishment that is physically located in the United States and is in business at the end of calendar year 2018 (using the incomplete 2017 BR files, as noted above); and (5) are not federally funded R&D centers.

Single-unit company records were extracted from the 2017 BR if the company had at least 10 paid employees in 2017 or, if employment information was unavailable, if the company's 2017 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 2017 BR if the given establishment's 2017 payroll was greater than zero or if the establishment employed at least one person in 2017. 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 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 2017 from the BR.

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 five years (2013–16 BRDIS and 2017 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 BR 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 3-digit NAICS code that accounted for the highest percentage of its annual payroll within the economic sector. Next, the company was assigned a 4-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 6-digit NAICS code within the 4-digit NAICS code, based on the highest percentage of its aggregated annual payroll within the 4-digit NAICS code. Companies with an assigned 6-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 2018, there were 33,215 companies in the first group, 34,158 companies in the second group, and 1,048,461 companies in the third group, for a total of 1,115,834 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 typically used within each industry stratum, though simple random sampling was used 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 strata had a certainty and noncertainty portion (table A-2). Companies in select industries or those that exhibited characteristics of large R&D companies, including those with the largest amounts of R&D or 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 the known zero R&D group, the probability of selection for other companies 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 random 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 BRDS methodology report available from the NCSES project officer.

Sample Size

With the sample design parameters detailed above, a total of 45,690 companies were selected, of which 20,115 companies were in the known positive R&D group, 2,265 companies were in the known zero R&D group, and 23,310 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 BRDS methodology report available from the NCSES project officer.

During the survey's annual contact update procedures, 116 large R&D performers from the 2017 sample were found that were not included on the 2018 sampling frame. The primary reasons for this are mergers, acquisitions, or other company structure changes that cause a difference between a company's current BR ID and its prior year survey ID—in this case, its ID in the 2017 BRDS file. To follow up with these companies, they were added to the 2018 sample with certainty, and 111 companies were mailed a form (the other 5 were inactive based on BR data). Because it was expected that many of these records would not contribute to 2018 BRDS 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 U.S. 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** and **table A-7**). 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 U.S. 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-8**).

Because of the potential compartmentalization of organizational knowledge within companies (particularly in larger companies), the BRDS 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 data.

Section 2. R&D paid for by your company. Includes 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 nature of the company's R&D and how the R&D is being performed. 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. Intellectual property and technology transfer. Includes questions on the company's production, use, acquisition, and disposition of intellectual property related to science and technology with a focus on patents.

For specific differences among the BRDS questionnaires, see section "Data Comparability (Changes)."

Response Rates

Unit Response Rates

Of the companies surveyed for the 2018 survey, 26.0% did not submit any response, and an additional 1.2% 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 U.S. Census Bureau to measure unit response to BRDS 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. BRDS 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 2018 BRDS, the check-in rate was 74.0%, and the URR was 72.8%. The coverage rate for the 2018 BRDS was 90.5% for the known positive R&D group, 71.6% for the unknown R&D group, and 80.3% for the known zero R&D group (table A-9 and table A-10).

Item Response Rates

BRDS 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 2018 was 78.3%.

Total quantity nonresponse rate (TQNR). For a given published estimate, TQNR, defined as 100% minus TQRR, is calculated for each tabulation cell from BRDS, 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 BRDS estimate. TQNR tables giving imputation rates corresponding to each data table are available from the NCSES project officer. Also see section “Item Nonresponse.”

Response by Mode

Overall, 1.4% of checked-in cases responded to BRDS by mailing in the paper form, and 98.6% responded using the online version of the survey. Lastly, 99.8% 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 BRDS, many survey responses included errors that required correction or unusual patterns that required validation. Several hundred automated edit checks were programmed to improve the efficiency of analyst data review and correction (**table A-11**).

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 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 BRDS 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

Unit nonresponse is handled by adjusting weighted reported data and imputed data as follows. Each company’s sampling weight is multiplied 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 BRDS. 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 2018 BRDS (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, an arbitrary value of 1 was assigned as the measure of size so that the records would be subjected to further examination. Beginning in survey year 2018, this unit nonresponse was also applied to counts, patents, patent licensing agreements, and intellectual property protection. 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 as 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 NCSES's and the U.S. 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 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 NCSES project officer.

Estimation

The general methodology used to produce estimates from BRDS 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 BRDS 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 BRDS 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 BRDS 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 data, if available for the current survey year, were 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)

CBSA-level estimates of business R&D are modeled using BRDS data reported by companies on the address of each of their largest R&D locations and administrative data from the Census BR 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 BRDS 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 BRDS tables.

R&D estimates for core-based statistical areas 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 State

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. However, as described in the section “**Weighting**,” the weighted estimator described above is not used to produce estimates of counts, such as estimates of the number of R&D performers, by state.

R&D estimates for 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, BRDS 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 BRDS for companies to use to categorize their business operations. The list of business codes for the 2018 cycle of BRDS 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 2016 or 2017 BRDIS, the most recent business codes reported by the company were used to provide the business codes. For companies that did not report to the 2016 or 2017 BRDIS, establishment payroll data from the BR were used to provide the business codes.

Company Counts

The company count estimates for 2018 are not comparable with those for 2017. Beginning in survey year 2018, a weight adjustment to account for unit nonresponse was implemented for company counts.

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 2018 estimates, they would have contributed approximately \$90 million to overall R&D expenditures and would have added approximately 6,000 companies to the estimated count of U.S. companies with R&D expenditures.

Survey Quality Measures

Sampling and Nonsampling Errors

The estimates produced from BRDS 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 BRDS, 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, 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 BRDS. 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 BRDS, which cannot be predicted accurately for all companies when the sample is designed. However, the largest companies known to perform 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 BRDS.

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 0.21% in 2018.

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 all types of 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)

Differences between the 2017 BRDS and 2018 BRDS Questionnaires

The following changes were made to the 2018 BRDS from the 2017 BRDS:

- Question on land acquisition capital expenditures for R&D operations was added.
- Questions related to R&D on artificial intelligence 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 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 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 BRDS 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, BRDS 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 & 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 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 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. Involves the cost of R&D funded by the company itself 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. Involves the cost of R&D funded by the company itself 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 BRDS 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 BRDS 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, and BRDS can only be accessed at the U.S. 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/about/adrm/fsrdc.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.

BRDS uses cell suppression 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 2018 tabular statistics, the approval IDs are the following:

- CBDRB-FY20-153, approved on 10 February 2020
- CBDRB-FY20-176, approved on 2 March 2020
- CBDRB-FY20-243, approved on 20 April 2020
- CBDRB-FY20-291, approved on 1 June 2020
- CBDRB-FY20-314, approved on 17 June 2020

Technical Tables

Table Title

A-1	Target population counts, by frame partition: 2008–18
A-2	Companies in the target population and selected for the sample, by industry and company size: 2018
A-3	Sample size, by frame partition: 2008–18
A-4	Companies sampled, by sampling stratum: 2018
A-5	Companies included in the survey that were not in the original sampling frame: 2008–18
A-6	Number and type of survey forms mailed: 2008–18
A-7	Survey forms mailed, by sampling stratum: 2018
A-8	Survey forms mailed to multiple units in companies that requested subcompany reporting, by sampling stratum: 2018
A-9	Response measures: 2008–18
A-10	Unit response rates, by industry and company size: 2018
A-11	Companies that required an analyst action, by sampling stratum: 2018

TECHNICAL TABLE A-1

Target population counts, by frame partition: 2008–18

(Number of companies)

Year	Total ^a	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

^a 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):

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 U.S. Census Bureau, Business Research and Development Survey.

TECHNICAL TABLE A-2

Companies in the target population and selected for the sample, by industry and company size: 2018

(Number of companies)

Industry and company size	NAICS code	Companies in target population ^a	Companies selected for the sample		
			All companies	Noncertainties	Certainties
All industries	21–23, 31–33, 42–81	1,115,834	45,690	22,945	22,745
Manufacturing industries	31–33	97,714	17,478	8,187	9,291
Food	311	9,265	1,043	676	367
Beverages and tobacco products	312	2,887	394	267	127
Textiles, apparel, and leather products	313–16	4,075	576	389	187
Wood products	321	4,977	414	216	198
Paper	322	1,529	372	217	155
Printing and related support activities	323	6,115	1,040	666	374
Petroleum and coal products ^b	324	371	150	20	130
Chemicals	325	4,968	1,994	455	1,539
Basic chemicals	3251	696	298	97	201
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	559	189	47	142
Pesticides, fertilizers, and other agricultural chemicals	3253	288	124	27	97
Pharmaceuticals and medicines	3254	1,449	774	60	714
Soaps, cleaning compounds, and toilet preparations	3256	769	240	67	173
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,207	369	157	212
Plastics and rubber products	326	4,900	987	529	458
Nonmetallic mineral products	327	4,019	429	204	225
Primary metals	331	1,799	432	196	236
Fabricated metal products	332	20,107	1,989	1,097	892
Machinery	333	9,533	1,836	723	1,113
Agricultural implements	33311	522	153	44	109
Semiconductor machinery	333242	79	65	0	65
Engines, turbines, and power transmission equipment	3336	386	137	36	101
Other machinery	other 333	8,546	1,481	643	838
Computer and electronic products	334	4,928	1,772	545	1,227
Communications equipment	3342	582	252	40	212
Semiconductors and other electronic components	3344	1,829	505	191	314
Navigational, measuring, electromedical, and control instruments	3345	1,846	757	266	491
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	307	176	39	137
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	240	122	20	102
Other measuring and controlling devices	other 3345	1,299	459	207	252
Other computer and electronic products	other 334	671	258	48	210
Electrical equipment, appliances, and components	335	2,275	632	313	319
Transportation equipment	336	4,705	1,037	392	645
Motor vehicles, bodies, trailers, and parts	3361–63	2,942	574	231	343
Aerospace products and parts	3364	824	245	66	179
Aircraft, aircraft engines, and aircraft parts	336411–13	782	212	66	146
Guided missiles, space vehicles, and related parts	336414, 336415, 336419	42	33	0	33
Military armored vehicles, tanks, and tank components	336992	25	14	0	14

TECHNICAL TABLE A-2

Companies in the target population and selected for the sample, by industry and company size: 2018

(Number of companies)

Industry and company size	NAICS code	Companies in target population ^a	Companies selected for the sample		
			All companies	Noncertainties	Certainties
Other transportation equipment	other 336	914	204	95	109
Furniture and related products	337	4,531	985	590	395
Miscellaneous manufacturing	339	6,668	1,344	691	653
Medical equipment and supplies	3391	2,396	639	260	379
Other miscellaneous	3399	4,272	705	431	274
Unclassified	–	62	52	1	51
Nonmanufacturing industries	21–23, 42–81	1,018,120	28,212	14,758	13,454
Mining, extraction, and support activities ^b	21	5,047	667	382	285
Utilities	22	794	197	46	151
Wholesale trade	42	70,086	5,905	4,138	1,767
Electronic shopping and electronic auctions	454111–12	3,516	383	270	113
Transportation and warehousing	48–49	33,760	509	185	324
Information	51	15,490	3,316	1,538	1,778
Publishing	511	5,132	1,262	561	701
Newspaper, periodical, book, and directory publishers	5111	2,795	530	323	207
Software publishers	5112	2,337	732	238	494
Telecommunications	517	2,368	481	268	213
Data processing, hosting, and related services	518	3,040	1,003	357	646
Other information	other 51	4,950	570	352	218
Finance and insurance	52	26,776	920	214	706
Real estate and rental and leasing	53	25,228	446	134	312
Lessors of nonfinancial intangible assets (except copyrighted works)	533	468	93	3	90
Other real estate and rental and leasing	other 53	24,760	353	131	222
Professional, scientific, and technical services	54	102,371	10,247	4,452	5,795
Architectural, engineering, and related services	5413	17,392	2,899	1,817	1,082
Computer systems design and related services	5415	16,549	3,262	1,978	1,284
Scientific research and development services	5417	2,446	2,446	0	2,446
Biotechnology research and development	541711	632	632	0	632
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,637	1,637	0	1,637
Social sciences and humanities research and development	541720	177	177	0	177
Other professional, scientific, and technical services ^c	other 54	65,984	1,640	657	983
Health care services	621–23	111,131	1,406	524	882
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	623,672	4,088	2,866	1,222
Unclassified	–	249	128	9	119
Company size (number of domestic employees)					
All companies	–	1,115,834	45,690	22,945	22,745
< 10 ^d	–	6,688	333	127	206
10–19	–	549,218	10,378	8,209	2,169
20–49	–	359,015	10,819	7,323	3,496
50–99	–	109,437	6,795	3,516	3,279
100–249	–	58,090	7,292	2,523	4,769
250–499	–	16,955	3,684	713	2,971
500–999	–	8,205	2,522	286	2,236

TECHNICAL TABLE A-2

Companies in the target population and selected for the sample, by industry and company size: 2018

(Number of companies)

Industry and company size	NAICS code	Companies in target population ^a	Companies selected for the sample		
			All companies	Noncertainties	Certainties
1,000–4,999	–	6,390	2,660	185	2,475
5,000–9,999	–	874	512	22	490
10,000–24,999	–	592	418	23	395
25,000 or more	–	370	277	18	259

NAICS = 2012 North American Industry Classification System.

^a Estimates of the number of companies in the target population are based on the original sampling frame that was created to select the 2018 Business Research and Development Survey (BRDS) sample. These estimates do not include 111 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 2018 sample with certainty but are not reflected in the number of certainties selected for the sample.

^b 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.

^c 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).

^d This category includes companies that are represented on the sampling frame as having missing data, but these companies are in scope to BRDS because they have at least \$500,000 in annual payroll.

Note(s):

Certainties are companies whose probability of selection is one 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 one. 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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TECHNICAL TABLE A-3

Sample size, by frame partition: 2008–18

(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

Note(s):

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 U.S. Census Bureau, Business Research and Development Survey.

TECHNICAL TABLE A-4

Companies sampled, by sampling stratum: 2018

(Number of companies)

Stratum	Total
Total	45,690
Known positive R&D	20,115
Certainties	15,448
Noncertainties	4,667
Known zero R&D	2,265
Certainties	1,558
Noncertainties	707
Unknown R&D	23,310
Certainties	5,739
Noncertainties	17,571

Note(s):

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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TECHNICAL TABLE A-5

Companies included in the survey that were not in the original sampling frame: 2008–18

(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

Note(s):
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 form. These company counts are not in **table A-2**.

Source(s):
National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey.

TECHNICAL TABLE A-6

Number and type of survey forms mailed: 2008–18

(Number)

Year	Total ^a	BRDI-1	BRDI-1A/B or BRDI-1(S)	BRDI-1 forms mailed due to reported data from BRDI-1(S) forms	Total BRDI-1 forms mailed
2008	39,593	4,875	34,718	na	na
2009	42,826	2,501	40,325	na	na
2010	42,314	2,572	19,871 (19,871)	na	na
2011	42,389	2,708	39,681	na	na
2012	42,869	6,946	35,923	1,972	8,918
2013	44,769	6,655	38,114	1,924	8,579
2014	43,697	6,823	36,874	1,530	8,353
2015	44,204	6,752	37,452	1,348	8,100
2016	44,733	7,183	37,550	1,578	8,761
2017	44,763	na	na	na	na
2018	45,300	na	na	na	na

na = not applicable.

^a For each year, the "Total forms mailed" is smaller than the sum of the "Total" sample size in **table A-3** plus the number of "Known positive R&D" companies added to the sample in **table A-5** because some companies selected for the sample went out of business or were merged with other companies between sample selection and survey mailout—that is, the sample was updated before actual mailout of the survey questionnaires.

Note(s):

Beginning in 2017, only one survey form (BRD-1) was mailed. For years prior to 2017, companies were sent the detailed survey form (BRDI-1) if their R&D spending was at least \$1.8 million in 2007 for the 2008 survey; at least \$7.0 million in 2009 for the 2010 and 2011 surveys; at least \$7.0 million in 2010 for the 2012 survey; or at least \$1.0 million in 2011 or 2012 for the 2013 survey (except companies that did not respond in these 2 prior years), at least \$1.0 million in 2012 or 2013 for the 2014 survey (except companies that did not respond in these prior 2 years), at least \$1.0 million in 2013 or 2014 for the 2015 survey (except companies that did not respond in these prior 2 years), or at least \$1.0 million in 2014 or 2015 for the 2016 survey (except companies that did not respond in these prior 2 years). All other companies received an abbreviated form (BRDI-1A for 2008–11; BRDI-1(S) for 2012–16). For 2010, some companies received BRDI-1B, an abbreviated form that tested questions on innovation. In 2012, the BRDI-1(S) was replaced by the BRDI-1A.

Source(s):

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

TECHNICAL TABLE A-7

Survey forms mailed, by sampling stratum: 2018

(Number)

Stratum	Total
Total	45,300
Known positive R&D	19,908
Certainties	15,282
Noncertainties	4,626
Known zero R&D	2,225
Certainties	1,520
Noncertainties	705
Unknown R&D	23,056
Certainties	5,563
Noncertainties	17,493
Cases not in the frame	111

Note(s):

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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TECHNICAL TABLE A-8

Survey forms mailed to multiple units in companies that requested subcompany reporting, by sampling stratum: 2018

(Number of companies)

Stratum	Sent one form	Sent multiple forms ^a
Total	45,206	94
Known positive R&D	19,814	94
Certainties	15,194	88
Noncertainties	4,620	6
Known zero R&D	2,225	0
Certainties	1,520	0
Noncertainties	705	0
Unknown R&D	23,056	0
Certainties	5,563	0
Noncertainties	17,493	0
Cases not in the frame	111	0

^a Under special arrangement with the U.S. Census Bureau, and to facilitate reporting, BRDS 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 U.S. Census Bureau after the initial mailout.

Note(s):

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 U.S. Census Bureau, Business Research and Development Survey, 2018.

TECHNICAL TABLE A-9

Response measures: 2008–18

(Percent)

Measure	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Check-in rate ^a	79.5	74.9	75.1	73.7	78.6	74.3	73.3	80.1	80.5	75.6	74.0
Response rate (unweighted) ^b	74.2	73.1	71.4	71.1	77.1	73.6	72.5	79.6	80.2	74.5	72.8
Coverage rate for known positive sampling strata (using weighted R&D) ^c	91.4	91.5	87.7	86.0	91.4	90.4	91.0	93.0	92.6	92.4	90.5
Coverage rate for unknown sampling strata (using weighted payroll) ^c	79.9	75.0	76.2	76.7	84.2	77.7	78.1	84.3	73.4	73.6	71.6
Coverage rate for known zero sampling strata (using unweighted counts) ^c	77.2	78.7	74.5	76.0	82.7	80.7	80.4	83.4	88.0	80.0	80.3

^a The number of survey responses from in-scope companies divided by the total number of in-scope companies in the sample.

^b 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.

^c 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.

Source(s):

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

TECHNICAL TABLE A-10

Unit response rates, by industry and company size: 2018

(Number and percent)

Industry and company size	NAICS code	Active reporting units ^a	Reporting units that met the response criteria ^b		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	42,314	30,808	72.8	7,195	17.0
Manufacturing industries	31–33	17,091	12,693	74.3	4,181	24.5
Food	311	1,010	734	72.7	188	18.6
Beverage and tobacco products	312	372	261	70.2	28	7.5
Textile, apparel, and leather products	313–16	552	383	69.4	59	10.7
Wood products	321	392	296	75.5	21	5.4
Paper	322	354	242	68.4	39	11.0
Printing and related support activities	323	981	716	73.0	32	3.3
Petroleum and coal products	324	152	112	73.7	33	21.7
Chemicals	325	2,071	1,630	78.7	995	48.0
Basic chemicals	3251	301	242	80.4	122	40.5
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	168	122	72.6	46	27.4
Pesticide, fertilizer, and other agricultural chemicals	3253	122	81	66.4	29	23.8
Pharmaceuticals and medicines	3254	913	775	84.9	660	72.3
Soap, cleaning compound, and toilet preparation	3256	220	149	67.7	55	25.0
Paint, coating, adhesive, and other chemicals	3255, 3259	348	262	75.3	84	24.1
Plastics and rubber products	326	956	706	73.8	204	21.3
Nonmetallic mineral products	327	400	276	69.0	40	10.0
Primary metals	331	403	286	71.0	70	17.4
Fabricated metal products	332	1,924	1,469	76.4	261	13.6
Machinery	333	1,819	1,373	75.5	507	27.9
Agricultural implement	33311	165	114	69.1	42	25.5
Semiconductor machinery	333242	61	49	80.3	27	44.3
Engine, turbine, and power transmission equipment	3336	126	95	75.4	34	27.0
Other machinery	other 333	1,470	1,118	76.1	407	27.7
Computer and electronic products	334	1,739	1,269	73.0	702	40.4
Communications equipment	3342	249	186	74.7	118	47.4
Semiconductor and other electronic components	3344	500	373	74.6	200	40.0
Navigational, measuring, electromedical, and control instruments	3345	765	559	73.1	302	39.5
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	188	122	64.9	69	36.7
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	107	81	75.7	39	36.4
Other measuring and controlling devices	other 3345	470	356	75.7	194	41.3
Other computer and electronic products	other 334	225	151	67.1	82	36.4
Electrical equipment, appliances, and components	335	636	468	73.6	196	30.8
Transportation equipment	336	1,066	806	75.6	374	35.1
Motor vehicles, bodies, trailers, and parts	3361–63	587	459	78.2	217	37.0
Aerospace products and parts	3364	254	192	75.6	106	41.7
Aircraft, aircraft engine, and aircraft parts	336411–13	217	163	75.1	86	39.6

TECHNICAL TABLE A-10

Unit response rates, by industry and company size: 2018

(Number and percent)

Industry and company size	NAICS code	Active reporting units ^a	Reporting units that met the response criteria ^b		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	37	29	78.4	20	54.1
Military armored vehicle, tank, and tank component	336992	12	10	83.3	5	41.7
Other transportation equipment	other 336	215	147	68.4	47	21.9
Furniture and related products	337	919	665	72.4	46	5.0
Miscellaneous manufacturing	339	1,363	1,018	74.7	400	29.3
Medical equipment and supplies	3391	651	487	74.8	257	39.5
Other miscellaneous	3399	712	531	74.6	143	20.1
Nonmanufacturing industries	21–23, 42–81	25,228	18,119	71.8	3,017	12.0
Mining, extraction, and support activities	21	615	432	70.2	40	6.5
Utilities	22	184	143	77.7	23	12.5
Wholesale trade	42	5,086	3,594	70.7	71	1.4
Electronic shopping and electronic auctions	454111–12	332	218	65.7	17	5.1
Transportation and warehousing	48–49	490	329	67.1	31	6.3
Information	51	3,255	2,295	70.5	983	30.2
Publishing	511	1,128	787	69.8	306	27.1
Newspaper, periodical, book, and directory publishers	5111	481	325	67.6	9	1.9
Software publishers	5112	647	462	71.4	297	45.9
Telecommunications	517	446	302	67.7	66	14.8
Data processing, hosting, and related services	518	1,145	839	73.3	524	45.8
Other information	other 51	537	368	68.5	87	16.2
Finance and insurance	52	868	675	77.8	84	9.7
Real estate and rental and leasing	53	405	266	65.7	13	3.2
Lessors of nonfinancial intangible assets (except copyrighted works)	533	77	43	55.8	D	D
Other real estate and rental and leasing	other 53	328	223	68.0	D	D
Professional, scientific, and technical services	54	8,926	6,495	72.8	1,476	16.5
Architectural, engineering, and related services	5413	2,713	2,202	81.2	273	10.1
Computer systems design and related services	5415	2,841	1,967	69.2	428	15.1
Scientific research and development services	5417	1,887	1,208	64.0	566	30.0
Biotechnology research and development	541711	418	234	56.0	115	27.5
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,329	866	65.2	439	33.0
Social sciences and humanities research and development	541720	140	108	77.1	12	8.6
Other professional, scientific, and technical services	other 54	1,485	1,118	75.3	209	14.1
Health care services	621–23	1,285	966	75.2	64	5.0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3,789	2,713	71.6	219	5.8
All companies (number of domestic employees)	–	42,314	30,808	72.8	7,195	17.0
Small companies	–					
10–19 ^c	–	8,174	5,949	72.8	505	6.2
20–49	–	10,842	8,116	74.9	1,134	10.5

TECHNICAL TABLE A-10

Unit response rates, by industry and company size: 2018

(Number and percent)

Industry and company size	NAICS code	Active reporting units ^a	Reporting units that met the response criteria ^b		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
Medium companies						
50–99	–	6,600	4,848	73.5	1,084	16.4
100–249	–	7,077	5,093	72.0	1,481	20.9
Large companies						
250–499	–	3,649	2,555	70.0	1,005	27.5
500–999	–	2,239	1,537	68.6	657	29.3
1,000–4,999	–	2,558	1,779	69.5	876	34.2
5,000–9,999	–	508	398	78.3	193	38.0
10,000–24,999	–	407	327	80.3	161	39.6
25,000 or more	–	D	D	D	99	39.3
Undistributed ^d	–	D	D	D	0	0.0

D = data withheld to avoid disclosing operations of individual companies.

NAICS = 2012 North American Industry Classification System.

^a 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

^b 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 they reported a value for worldwide sales or domestic sales, or if they reported a positive value for paid worldwide employees or paid domestic employees.

^c Business Research and Development Survey does not include companies with fewer than 10 domestic employees.

^d Companies were not assigned an employment category during 2018.

Source(s):

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

TECHNICAL TABLE A-11

Companies that required an analyst action, by sampling stratum: 2018

(Number)

Stratum	Total	Companies deleted ^a	Companies requiring action due to merger or acquisition ^b	Companies requiring action due to analyst review ^c
Total	3,190	2,983	192	15
Known positive R&D	857	721	129	7
Certainties	660	535	118	7
Noncertainties	197	186	11	0
Known zero R&D	119	112	5	2
Certainties	72	66	5	1
Noncertainties	47	46	0	1
Unknown R&D	2,184	2,126	52	6
Certainties	503	480	20	3
Noncertainties	1,681	1,646	32	3
Cases not in the frame	30	24	6	0

^a Companies are deleted when they are found to be out of business or out of scope for the survey during the reporting period.

^b 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.

^c These companies are added based on a review of historic R&D and reported to the Business Research and Development Survey and public information available on the companies' R&D expenses.

Note(s):

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 U.S. Census Bureau, Business Research and Development Survey, 2018.

Notes

¹ The population size was revised from 1,115,950 following final processing of the complete data set available for the 2018 cycle.

² The sample size was revised from 45,806 following final processing of the complete data set available for the 2018 cycle.

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